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Interim Remedial Measure Design Investigation for the 50 Kent Avenue Parcel

Williamsburg Works Former MGP Site
Site ID No. 224055
Brooklyn, Kings County, New York

Prepared for:

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INTERIM REMEDIAL MEASURE PRE-DESIGN INVESTIGATION DATA REPORT
FOR THE
50 KENT AVENUE PARCEL
FORMER WILLIAMSBURG WORKS MGP SITE
SITE ID NO. 224055
BROOKLYN, KINGS COUNTY, NEW YORK

PREPARED FOR:

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GLOSSARY

ASTM	American Society for Testing and Materials
CAMP	Community Air Monitoring Plan
CSM	Cutter soil Mixing
dBA	A-weighted decibels
DNAPL	Denser than water Nonaqueous Phase Liquid
DRO	Diesel Range Organics
DSM	Deep Soil Mixing
DWG	Drawing
GGBFS	Ground Granulated Blast Furnace Slag
GPR	Ground Penetrating Radar
GRO	Gasoline Range Organics
ID	Inside Diameter
IDW	Investigation Derived Waste
IRM	Interim Remedial Measure
ISS	In Situ Stabilization
Ln	Exceedance Sound Level
L_{eq}	Equivalent Sound Level
LNAPL	Lighter than water Nonaqueous Phase Liquid
MGP	Manufactured Gas Plan
NAPL	Nonaqueous Phase Liquid
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYCDOS	New York City Department of Sanitation
NYSDEC	New York State Department of Environmental Conservation
PDI	Predesign Investigation
PID	Photoionization Detector
POTW	Publically Owned Treatment Works
PPV	Peak Particle Velocity
RI	Remedial Investigation
TCB	Temporary Containment Building
TDS	Total Dissolved Solids
UCS	Unconfined Compressive Strength
USCS	Unified Soil Classification System
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

On behalf of National Grid, URS Corporation (URS) has prepared this Interim Remedial Measure (IRM) Pre-Design Investigation (PDI) Report for the 50 Kent Avenue parcel ("the Site") of the Williamsburg Works former Manufactured Gas Plant (MGP) site. The Williamsburg Works former MGP site consists of four parcels located in the Williamsburg neighborhood of Brooklyn, New York along North12th and North 11th Streets, Kent Avenue, and the East River. The purpose of the IRM is to address MGP-related source material at the 50 Kent Avenue parcel.

The Williamsburg Works former MGP site is covered under an administrative order on consent and administrative settlement #A2-0552-0606, which was entered into by KeySpan Corporation, the predecessor to National Grid, and New York State Department of Environmental Conservation (NYSDEC). National Grid is currently conducting a Remedial Investigation (RI) at the Williamsburg Works former MGP site. Interim results of the RI were transmitted to NYSDEC on August 25, 2010 in the Draft Remedial Investigation Interim Data Summary. The Summary identified that further investigation was necessary to define the nature and extent of environmental impacts at the Williamsburg Works former MGP site.

In a letter to National Grid dated September 23, 2010, NYSDEC stated that based on the Interim Data Summary sufficient data exist to initiate the design of an excavation/stabilization-based IRM for the 50 Kent Avenue parcel. National Grid met with NYSDEC on October 26, 2010 to discuss NYSDEC's request for an IRM Work Plan. During the meeting, NYSDEC agreed with National Grid that additional pre-IRM design data are needed. The scope of the IRM PDI is described in the "Final Interim Remedial Measure Design Work Plan" (GEI, 2011). This report presents a summary of the results of the PDI and a conceptual design of the IRM.

The PDI field work primarily consisted of the following activities:

- Delineation Soil Borings
- Geotechnical Borings
- Monitoring Well Installation
- Test Pits
- Groundwater Level and NAPL Gauging
- Hydraulic Conductivity Testing

- Utility and Subsurface Infrastructure Investigation
- Bench-Scale Treatability Testing
- Baseline Groundwater Modeling
- Noise and Vibration Study
- Adjacent Building Foundation Assessment

URS installed eleven borings for delineation and/or geotechnical analyses, installed three monitoring wells, and dug 14 test pits throughout the Site. Observations during these activities revealed the presence of MGP waste characterization from odors to tar saturated soils. No simply-described pattern of contamination was observed, but the contaminant extent was consistent with the existing site conceptual model that describes coal tar contamination migrating vertically downward from the former holders until reaching lower permeability lenses whereupon the NAPL would migrate horizontally downgradient.

Slug testing indicated that the soils are characterized as having moderate to low permeability. This information was used in the groundwater modeling effort to suggest that closely spaced wells or sumps would be required to lower the water table if necessary for soil excavation.

The geotechnical evaluation concluded that the soils are poorly sorted and are considered moderately to very dense based on blow counts. Cobble lenses were encountered. The basal clay layer was observed to be very stiff.

The geotechnical properties of the soil are conducive to the installation of shoring to aid in excavation, with the fines content assisting to improve strength and reduce permeability. The clay layer would provide a firm base for shoring installation and tie-in. However, the presence of cobbles and fill debris would make some technologies such as sheet pile difficult to install.

The test pits were installed along the perimeter of the east end of the Site and revealed frequent obstacles such as walls, pipes, and former holder foundations that would require removal prior to subsurface activities in these areas.

The conceptual approach for the IRM would be to excavate the former holder foundations, and the soils below them, excavate shallow soils elsewhere on the Site, and install NAPL collection wells along N. 12th Street, north of the Site and along the 55-foot zone between the western edge of shallow excavation and the CitiStorage building. Because of the depth of the holder foundations and their extent below the groundwater table, shoring and dewatering will be required. The excavations will be backfilled with a combination of site soils with concentrations of total polycyclic aromatic hydrocarbons less than 500 milligrams per kilogram (deeper backfill) and clean imported soil (shallow backfill).

1.0 INTRODUCTION

URS Corporation – New York (URS) has prepared this report to present the results of an Interim Remedial Measure (IRM) Pre-design Investigation (PDI) performed for National Grid. URS performed this PDI to collect data necessary to design an IRM for a portion of the former Williamsburg Works manufactured gas plant (MGP). Based on the data collected during this study and in previous investigations, URS presents the conceptual approach to implementing the IRM, including recommendations for collection of additional data required to complete the design.

1.1 Site Description

The former Williamsburg Works MGP operated from approximately 1863 through the late 1930s or early 1940s. The former MGP was located on four parcels in the Williamsburg neighborhood of Brooklyn, New York along North 12th and North 11th Streets, Kent Avenue, and the East River.

This PDI Report addresses only the 50 Kent Avenue component of the former MGP. This component, referred in this report as "the Site" is at Block 2287, Lot 1 and was the location for purifying operations, condensers and three gas holders. The 50 Kent Avenue parcel is bordered by North 12th Street to the northeast, Kent Avenue to the southeast, North 11th Street to the southwest, and Block 2287, Lot 16 to the northwest. Figure 1-1 shows the location of the 50 Kent Avenue site.

Following the closure of the MGP, the MGP structures were dismantled. However, the holder tanks and other structures remained underground.

Most recently, the Site was used by the New York City Department of Sanitation (NYCDOS) and included a NYCDOS garage on the northwestern half of the site. The garage was demolished in 2009 and the site is currently a vacant lot owned by the New York City Parks Department. Figure 1-2 shows the site location with the outlines of the historic MGP structures.

1.1.1 Geology and Hydrogeology

Fill material, including brick, concrete, wood, and coal are present to approximately 25 feet, and in some locations as deep as 42 feet. Glacial deposits (outwash sands and glacial till) underlie the fill material, with stratigraphy predominately consisting of widely graded sand interspersed with gravel or silty sand lenses at varying depths. A confining clay layer appears to be present throughout the Site at depths ranging from 41 to 72 feet bgs.

Groundwater is present at approximately 2 to 5 feet bgs. Groundwater within the gas holder tanks is elevated relative to the surrounding water table. Groundwater immediately outside holder structures was also elevated relative to the surrounding water table. Because of the proximity to the East River, groundwater levels are tidally influenced. Groundwater flow is towards the northwest (towards the East River).

1.2 Previous Investigations

The history of the investigation of the Site is summarized in detail in the Final Interim Remedial Measure Design Work Plan (GEI 2011). In brief, attention was initially drawn to the Site through the operations of NYCDOS. Prompted by observations of fuel-related free product in wells, remedial actions, including limited excavation and in situ treatment with oxygen release compound, bionutrient addition, and vacuum enhanced fluid recovery, were performed in the late 1990s and early 2000s. Figure 1-3 shows the location of previous sample locations on and near the Site.

A comprehensive investigation for portions of the former MGP, including the Site, was performed in 2006 by Metcalf and Eddy for the City of New York in anticipation of transforming site properties into a part of the planned Bushwick Inlet Park. This investigation studied the former NYCDOS property, the accessible corridors along 11th and 12th streets between the Site and the East River, and sediments in the East River adjacent to the former MGP property. Results of the investigation were summarized in a Site Investigation Report (Metcalf and Eddy, 2006).

The 2006 investigation advanced 28 soil borings and 9 sediment borings, installed 9 monitoring wells, and sampled the 9 new and 2 existing wells. Historic fill was observed to be present at depths of 9 to 42 feet below ground surface (bgs), consisting mainly of sand with gravel, brick, ash, and cinders. Field observations for 18 of the 28 soil borings indicated that petroleum and coal tar contamination was found to exist throughout the subsurface from the surface to the top of the clay layer. Petroleum contamination was found to be more prevalent in the historic fill material, while MGP contamination was encountered at depths below the water table to approximately 50 feet bgs. Free coal tar product was observed in two new monitoring wells. Sediment samples collected from the East River contained petroleum and coal tar contamination, with petroleum contamination closer to the surface transitioning to coal tar contamination as the borings were advanced further.

In August 2007 National Grid's predecessor, KeySpan, entered into a modification of Order on Consent and Administrative Settlement #A2-0552-0606 (the Order) with the New York State Department of Environmental Conservation (NYSDEC). The modification included the former Williamsburg Works MGP in the Order. During 2009-2010, National Grid's consultant GEI performed a Remedial Investigation (RI) of the former Williamsburg Works MGP, including the 50 Kent Avenue property. RI activities included advancement of 56 soil borings and 7 sediment borings, excavation of 6 test pits, groundwater sampling from 16 monitoring wells and surface soil sampling at 9 locations (see Figure 1-3 for sample location on and near the Site). The results of this investigation were reported by National Grid in an interim data transmittal letter to NYSDEC dated August 2010 (GEI, 2010).

Soil borings exhibited petroleum impacts to as deep as 43 feet bgs, but were primarily in the zone up to 20 feet bgs. Coal tar impacts, including sheen, staining, blebs, globs, coating, tar lenses, and tar saturation were observed as deep as 65 feet below grade. However, no impacts were observed below the clay layer present at approximately 55 to 65 feet bgs, and only one sample taken from just above the clay layer exceeded NYSDEC Part 375 commercial use soil cleanup objectives (SCOs).

1.2.1 Conceptual Site Model

An draft interim RI data report developed a conceptual site model describing the source of coal tar coming from the former gas holders and tar handling structures located on the eastern portion of the Site (Figure 2-1). Free product (coal tar NAPL) was observed in samples collected from the former holder structures, including at depth intervals as great as 16 feet in BPB-16. NAPL from this source appears to migrate vertically until encountering lower permeable silt and clay lenses, whereupon it migrates to the northwest (towards the East River). NAPL saturation was detected as deep as 48 feet bgs at location WW-SB-23 located immediately west of former gas holder No. 1. However, other soil borings among the gas holders, such as WW-MW-5 and WW-SB-42 showed only odors or sheens at depth.

This PDI updates the conceptual site model through installation of additional borings within the gas holder area and in the footprint of the former NYCDOS building.

1.3 PDI Objectives

The preliminary results of the RI, as summarized in the interim data report suggested a significant continuing coal tar source within the gas holder foundations, and in select locations below the holders but above the clay layer. Because sufficient data had been collected to initiate design, the NYSDEC directed that National Grid pursue implementation of an IRM. Conceptually, the IRM would consist of excavation of the source within the gas holder, coupled with in situ treatment of deeper source material or alternatively product recovery for source control.

The PDI was designed to collect the data necessary to design the IRM through collection of further characterization data near the former gas holders and from the footprint of the former NYCDOS building. In addition to collecting contamination extent information, an objective of the PDI soil borings was to collect geotechnical data needed for designing shoring systems required for excavation. Additional objectives of the PDI were to perform treatability tests for possible solidification treatment, subsurface utility location to aid in shoring design, background sound and vibration and monitoring and collection of information on adjacent building foundation construction to evaluate the viability of shoring techniques.

2.0 PRE-DESIGN INVESTIGATION PROGRAM

2.1 <u>Overview</u>

Activities described in this section were completed in accordance with the procedures described in the NYSDEC-approved Final Interim Remedial Measures Design Work Plan prepared by GEI Consultants (GEI 2011).

2.2 <u>IRM Pre-design Investigation Activities</u>

URS performed this PDI to collect data in support of an IRM design for a portion of the Williamsburg Works former MGP. Field activities performed during the investigation from February 23, 2012 to November 27, 2012 are discussed below.

2.2.1 <u>Environmental and Geotechnical Investigation</u>

The Environmental and Geotechnical Investigation consisted of

- Delineation Soil Borings
- Geotechnical Borings
- Monitoring Well Installation and Water Level Measurements
- Test Pits
- Community Air Monitoring, and
- Investigative Derived Waste Disposal

The delineation, geotechnical, and monitoring well borings were advanced by Fenley & Nicol Environmental, Inc. (Fenley & Nicol) using a Cantera CT-450 drill rig to the top of the clay layer, encountered at approximately 60 ft bgs, to delineate MGP-related source material and collect additional geotechnical information. Soil boring locations are presented in Figure 2-1. Boring logs are presented in Appendix A.

With the exception of boring WW-SB-102, the delineation and geotechnical borings were drilled using 4.25-inch inside diameter (ID) hollow stem augers. The initial 5 feet of each boring was advanced using soft dig procedures (i.e., post hole, hand auger, or air knife/vac truck) to minimize the risk of damaging unidentified subsurface utilities. Soil samples were continuously collected at each boring location using a 1.5-inch inside diameter, 24-inch long, split-barrel sampler. The samples were inspected and field screened with a PID to determine the presence of contamination. Over each 6-inch interval of split-spoon advancement, blow counts were recorded, as indicated on the boring logs. Due to the widespread presence of dense soil or obstructions, a 300 lb hammer was mainly used for the delineation borings to expedite the work and for the collection of environmental samples (the exception is that a 140 lb. hammer was used for WW-SB-110). Once blow counts start consistently exceeding 100, then hammer weight/drop becomes less meaningful and a heavier hammer was used to get qualitative data on soil density.

The soil was described in accordance with the Unified Soil Classification System (USCS). Soil descriptions, along with other pertinent drilling information, were recorded on a geologic boring log. Soil samples were evaluated for the presence of MGP-related contamination using a Mini Rae 2000 photoionization detector (PID) and visual observation. Any indications of MGP-related contamination (e.g., odors, staining, elevated PID readings, blebs/globs, and/or tar saturation) were recorded on the boring logs. Upon completion, boreholes were abandoned with a Portland cement/bentonite slurry mixture placed from the bottom-up using the tremie pipe method. All drill cuttings and other IDW were placed in drums for proper offsite disposal.

2.2.1.1 Delineation Soil Borings

From February 28 to March 29, 2012, seven delineation borings, WW-SB-104 through WW-SB-110, were completed to:

- Further delineate the extent of MGP-related source material between ground surface and the clay layer encountered at approximately 60 feet bgs;
- Evaluate the feasibility of deep MGP-related source stabilization; and
- Further define the limits of any potential shallow excavation.

The seven delineation borings were advanced to depths ranging from 55 to 64 feet bgs. The borings are located at the approximate locations identified in the IRM Design Work Plan (GEI 2011). However, several boring locations were moved to avoid subsurface obstructions that were impeding drilling progress.

2.2.1.2 Geotechnical Borings

From March 21 to April 19, 2012, four geotechnical soil borings, WW-SB-100 through WW-SB-103, were completed at locations along the potential excavation support system alignment surrounding the gas holders located in the eastern portion of the site (Figure 2-1). Geotechnical soil borings were completed using hollow stem auger methods as described above with the exception of boring WW-SB-102. Boring WW-SB-102 was initially completed to the target depth of 81 feet bgs using hollow stem augers. However, the bottom of the clay unit had not yet been encountered, and Fenley&Nicol did not have enough augers to continue with this drilling method. Therefore, the borehole was abandoned, and drilling continued from 81 to 101 feet bgs through the 6-inch permanent steel casing installed at the WW-MW-102D location (see well installation discussion below). Drilling from 81 to 101 feet bgs was completed using mud rotary drilling. Continuous soil sampling for the geotechnical borings was performed using a 140-lb hammer for all samples except the depth interval from 81 to 101 feet bgs in boring WW-SB-102. This interval was sampled using a 300-lb hammer because Fenley & Nicol did not have the necessary rod connection to be able to use the 140-lb hammer while drilling with mud rotary. In addition, one soil sample from the clay layer of each geotechnical boring was collected using Shelby tube (approximate dimensions 2.9-inch x 30-inch).

Select soil samples from the geotechnical borings were submitted to TerraSense, LLC for geotechnical testing of the following parameters:

- Unified Soil Classification System (USCS) description,
- Density,
- Moisture content,
- Atterberg limits,
- Particle size distribution,
- Unconfined compressive strength,
- Permeability, and
- Organic content, percentage by weight.

Standard ASTM methods were used for the above analyses. To provide thorough soil descriptions of the highly variable stratigraphy, at least five depths in each of the four geotechnical borings were targeted for laboratory testing. This includes each of the four Shelby tubes extracted from the clay layer (one from each boring). In order to provide enough sample size for testing, like field samples from split spoons were generally composited over a minimum 5 to 6-foot contiguous vertical zone. Each unique soil type identified by split spoon sampling was represented by laboratory testing.

The battery of laboratory tests performed was selected as support for potential IRM design components such as shoring type, pile driving, soil mixing, excavation stability, etc. For example, particle size is necessary to correlate typical hydraulic conductivity with that determined by slug tests (for dewatering assessment); and is useful to assess likely leakage through sheet pile joints (fines can help seal off open joints). The fraction of fines (fines are sizes less than #200 sieve size) will provide a general idea of sidewall stability of excavated sand (e.g., minimal fines generally equates to requiring flatter slopes). Particle size distribution and Atterberg limits are useful during detailed design of soil mix and reagents. Hydraulic conductivity of clay is necessary for input to the groundwater model. Geotechnical testing results are discussed in Section 3.3. Geotechnical lab results are presented in Appendix B.

2.2.1.3 Monitoring Well Installation and Water Level Measurements

Two intermediate and one deep monitoring well were installed by Fenley&Nicol at geotechnical soil boring locations WW-SB-100 and WW-SB-102 (Figure 2-1). The intermediate wells, WW-MW-100I and WW-MW-102I, were both installed to evaluate groundwater elevations and the possible presence of MGP-related contamination from the water bearing zone immediately above the clay layer. These wells were installed to depths of 58.5 and 61 feet bgs, respectively. Each intermediate monitoring well boring was advanced using 4.25-inch ID hollow stem augers. Each well was constructed with a 2-foot sump below the screened interval to collect possible DNAPL. A sufficient thickness of clay (minimum 5 feet) was identified at each of these locations; therefore, the sumps were set approximately two feet into the clay such that the bottom of the screen is flush with the top of clay.

Deep well, WW-MW-102D, was installed adjacent to well WW-MW-102I along Kent Avenue, below the clay layer, with a screen interval of 92 to 102 ft bgs. The driller advanced 10.25-inch ID hollow stem augers to a depth of 62-feet below grade (3 ft into the clay layer). To seal off the upper portion of the borehole above the clay layer, a 6-inch diameter permanent steel casing was placed from ground surface to a depth of 62 feet and grouted into the borehole. Because hollow stem augers could not be used within the 6-inch casing, mud rotary drilling methods were used to complete the boring to the final depth.

Each monitoring well was constructed with 2-inch Schedule 40 polyvinyl chloride (PVC) casing with a 10-foot long, slotted PVC screen (0.010 inch slot). The annulus around the screens was backfilled with clean silica sand to a height of 1 to 2 feet above the top of the screen. A bentonite pellet seal of 2 to 3 feet thickness was placed above the sand pack. The remainder of the annulus was filled with a cement/bentonite grout to just below the ground surface. The top of each well was finished using flush-mounted covers and keyed-alike locks. A concrete surface pad was sloped to direct water away from the well cover. All wells were installed in accordance with the NYSDEC-approved Field Sampling Plan. Monitoring well locations are presented in Figure 2-1. Monitoring well construction logs are presented in Appendix C.

Well construction details for the three new PDI monitoring wells, and the 17 RI monitoring wells previously installed by GEI, are summarized on Table 2-1.

2.2.1.4 Test Pits

From March 15 to 20, 2012, URS oversaw the excavation of fourteen test pits (WW-TP-100 through WW-TP-113) at selected locations along the proposed shoring perimeter and adjacent to the gas holder tanks (Figure 2-1). Test pits were completed to assist in evaluating the nature and extent of obstructions and utilities present in the urban fill stratum, and their potential impact on the installation of potential excavation shoring systems or stabilization procedures.

Fenley&Nicol used a Case 590K rubber-tire backhoe to excavate each test pit, which had an approximate area of 10 feet by 3 feet. Concrete or asphalt pavement was sawcut and removed at each test pit location. All material excavated from the test pit was placed on polyethylene sheeting. The concrete/asphalt pavement material was staged for future off-site disposal.

Each test pit was photographed and logged by the URS field representative during excavation. Once the final depth was attained, and URS recorded all necessary information, the test pit was backfilled with the excavated spoils. On April 26 and 27, 2012, test pit areas were paved with approximately six inches of bluestone and approximately 4 inches of asphalt. Test pit excavation locations are presented in Figure 2-1. Test pit logs/photo logs are presented in Appendix D.

2.2.1.5 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds and dust particulates was conducted during all intrusive activities (i.e., drilling and excavation) in accordance with Community Air Monitoring Plan (CAMP) procedures presented in the Work Plan. At each soil boring and test pit site, one upwind and one downwind data-logging monitoring station was deployed to monitor the potential for fugitive dust or vapors to migrate off site. Each monitoring station was equipped with one RAE Systems MiniRae 2000 photoionization detector (PID) and one TSI DustTrak aerosol monitor housed in a tripod-mounted environmental enclosure. In accordance with CAMP procedures, the monitoring station alarm levels were set to trigger when the 15-minute average of VOC or dust concentrations exceeded the predetermined threshold (i.e., 5 parts per million (ppm) VOCs and 100 micrograms per cubic meter (ug/m^3) dust). Action levels were not triggered during any of the investigative activities.

In addition, during drilling and excavation activities, periodic dust and VOC measurements were collected from within the work zone using a third set of the MiniRae and DustTrak monitoring instruments. No work stoppages were required due to elevated VOC or dust concentrations within the work zone. CAMP field notes are presented in Appendix E.

2.2.1.6 Investigation-Derived Waste

Investigation-derived wastes (IDW) including soil cuttings, decontamination water, development water, and personal protective equipment (PPE) were contained in 55-gallon drums and staged at a temporary onsite drum storage pad established for this investigation effort. Excess test pit soil and pavement debris (i.e., asphalt and concrete) generated from the test pit areas was temporarily stockpiled on site.

All waste disposal activities were coordinated through National Grid's IDW contractor, WRS Environmental Services, Inc. (WRS). URS collected representative samples of the IDW for waste characterization purposes. Samples of soil cuttings and purge/decontamination water were composited and submitted to Test America Laboratories, Inc. located in Amherst, New York. IDW samples were analyzed for the following parameters based on the analytical methods (Standard Methods for the Examination of Water and Wastewater [sulfur and total dissolved solids] and United States Environmental Protection Agency SW-846 [remainder]) required by WRS:

Soil

- 8260B Volatile Organic Compounds
- 8270C Semivolatile Organic Compounds
- 8015B Gasoline Range Organics (GRO)
- 8015B Diesel Range Organics (DRO)
- D129 Sulfur, Total Percent
- 9095A Paint Filter
- 8082 Polychlorinated Biphenyls (PCBs)
- 6010B Metals
- 7471A Mercury
- Percent Moisture

Purge/Decontamination Water

- 8082 PCBs
- 6010B Metals
- SM 2540C Solids, Total Dissolved Solids (TDS)
- 1010 Ignitability
- 9020 Total Organic Halides

URS submitted IDW characterization analytical results to WRS. IDW characterization test results are presented in Appendix F. WRS was responsible for profiling, manifesting, loading, and transporting all IDW generated during this PDI. WRS coordinated pickup of all IDW from the site on April 27 and 30, 2012. All soil (drummed and bulk) was transported directly to the disposal facility on the same day. The 27 drums of purge/decontamination water and pavement debris were transported from the site to the National Grid facility located in Hicksville, New York for temporary staging. The pavement debris was transported to the final disposal facility on April 30, 2012. The 27 drums of water were then transported to their final disposal facility on May 2, 2012.

All disposal documentation including non-hazardous waste manifests and disposal facility receipts are included in Appendix G. A summary of the IDW quantities and final disposal destinations follows:

Summary of IDW Disposal

Soil Cuttings – 75 drums	Bayshore Recycling Corp. 75 Crows Mill Road, Keasbey, New Jersey
Excess Test Pit Soil – 10.46 tons stockpile	Bayshore Recycling Corp. 75 Crows Mill Road, Keasbey, New Jersey
Purge/Decontamination Water – 27 drums	Clean Earth of North Jersey 115 Jacobus Avenue, South Kearny, New Jersey
Demo Pavement (asphalt and concrete from Test Pit areas) – 15.51 tons	Montecalvo Disposal Services, Inc. 75 Crows Mill Road, Keasbey, New Jersey

2.2.2 Utility and Subsurface Infrastructure Investigation

An investigation was conducted to confirm the location of subsurface utilities identified by the public utility markout service and to markout other detectable subsurface utilities and underground features around the IRM perimeter. On February 23, 2012 NAEVA Geophysics, Inc. (NAEVA) commenced a geophysical investigation along the IRM site perimeter where the potential excavation support system may be placed. However, due to the presence of NYC Parks Department materials stored at various locations within the geophysical investigation area, NAEVA only completed a portion of the work at that time. After discussions with National Grid, the decision was made to request that the Parks Department move the stored materials so that the geophysical survey could proceed unimpeded along the planned alignment. However, the Parks Department was unable to have the materials moved before the end of April. Therefore, on April 30, 2012, NAEVA completed the geophysical survey by working around the stored materials.

NAEVA employed a Fisher TW-6 Pipe and Cable Locator, a Mala RAMAC/Ground Penetrating Radar (GPR) system with a 250-Megahertz antenna, a Subsite 950 utility locator, and a 3M Dynatel 2250 Cable Locator. The area was visually inspected for evidence of subsurface utilities (such as utility valves and conduits, fire hydrants, etc.). Whenever a metallic/electrically conductive utility was noted, a radio frequency signal was conducted or induced onto the line using one of the utility locating instruments' transmitters. This signal was then used to delineate the utility using the locating instruments' receiver. Many utilities carry electric currents, and produce electromagnetic fields that can be detected at the surface. In addition, buried metallic conduits, acting as antennas, often pick up and re-radiate background commercial radio signals. The area was searched for evidence of these signals using the Subsite operating in passive modes.

The TW-6 Pipe and Cable Locator was carried over the area in a series of closely spaced bi-directional traverses in an attempt to locate underground storage tanks (USTs), subsurface utilities, and other subsurface metallic features. Anomalies detected with the TW-6 were further investigated with the GPR and utility locators to identify their sources. Additionally, the Dynatel Cable Locator was used for locating the surface trace of telephone lines, electric lines, and other narrow-gauge wiring. Detected features were marked on the ground using spray paint and identified on the site map included with the NAEVA Results of Geophysics Investigation Report presented in Appendix H. Results are discussed in Section 3.2.

2.2.3 Bench-Scale Treatability Study Sampling

A bench-scale treatability study was performed to evaluate various potential mixtures to stabilize soil containing NAPL. Soil samples were collected from each delineation soil boring location and archived in 5-gallon buckets for possible use for the bench-scale treatability study. A minimum of 1 five-gallon bucket sample was collected from each location representing contamination found at the site (i.e., NAPL saturated material, NAPL staining, blebs, fuel-odor, other).

From these buckets, URS provided Remedius, Inc. with three composite samples. The samples were composited from soil collected from soil borings WW-SB-104, WW-SB-105, and a combination of WW-SB-106 and WW-SB-107. These locations and depth intervals were selected based on several factors including:

- The availability of soil material – different intervals from different borings had varying degrees of recovery. Not all soil recovered during drilling was archived for treatability testing for practical purposes of segregated soil storage.
- The presence of DNAPL. The WW-SB-106 interval of 47' to 57' bgs exhibited 100% NAPL saturation, and was combined with soil from WW-SB-107 that was collected from 43' to 57' bgs (also with 100% NAPL saturation) as well as more soil from WW-SB-107 from the entire length of the boring.

Remedius performed NAPL Stabilization Bench Tests on collected soil material following sieving to remove particles greater than ½ inch nominal size. Three mixes were prepared using a 3-to-1 blend of ground granulated blast furnace slag (GGBFS) and Portland cement. One mix was created using a low dose of reagents, the second a medium dose, and the third a high dose. For each prepared mix, 5 cylindrical specimens were formed, 3 of which were analyzed for strength and 2 for permeability. Specimens were cured and analyzed at 7, 14, and 28 days (strength) and 14 and 28 days (permeability). The GGBFS and Portland cement mixes were adequate; therefore, a second series of mixes using bentonite or organoclay as an additive were not necessary. Results are presented in Appendix I and summarized in Section 3-4.

2.2.4 <u>Hydraulic Conductivity Testing</u>

From April 18 to 25, 2012, URS attempted to perform slug testing on 13 existing and 3 newly installed monitoring wells. Upon analysis of slug test field data, it was determined that insufficient data was collected, and as a result, these test results are not usable. Therefore, on August 28 and 29, 2012, URS conducted additional slug testing on five existing and 3 newly installed wells located on or near the 50 Kent Avenue parcel. Slug tests were performed in accordance with the GEI Field Sampling Plan (GEI, 2011). The slug test data were analyzed using the Bouwer and Rice (1976, 1989) method. Results are presented in Appendix J and summarized in Section 3-1.

2.2.5 <u>Baseline Groundwater Modeling</u>

Visual MODFLOW was used to simulate existing groundwater flow conditions in the vicinity of the site. The model boundaries included: (1) the East River as a constant head or a river boundary to the west; (2) a constant head or general head boundary upgradient to the east; and, (3) no flow boundaries to the north and south. A quasi–steady state groundwater flow model was developed to simulate flow conditions and calibrated to existing groundwater levels. Then a transient groundwater flow model was developed to estimate dewatering rate and volume, and to evaluate the effect of an excavation support system on the groundwater table. The groundwater flow modeling report is presented in Appendix K and summarized in Section 3.5.

2.2.6 Noise and Vibration Study

Construction activities associated with the proposed clean-up activities, such as sheet pile installation, excavation, soil compaction, or the movement of heavy equipment, produce ground vibrations and noise that would be well beyond the ambient vibrations and noise within the project limits. Representative peak particle velocities and typical noise levels for common construction equipment are shown on Tables 2-2 and 2-3, respectively.

URS retained Vibra-Tech Engineers, Inc. (Vibra-Tech) to perform ambient vibration and noise monitoring using seismographs and sound level monitoring systems at six locations within the vicinity of the Site. The locations were selected to provide a representative coverage of nearby sensitive receptors. The field work was conducted between April 23, and April 29, 2012.A second, planned ambient noise study, identical to the first, was performed between November 21 and November 27, 2012.

Results of vibration and noise monitoring/prediction are discussed in Section 3. The Vibra-Tech reports describing the vibration level study and two ambient sound studies are attached in Appendix L.

2.2.6.1 Vibration Study

Six seismographs were deployed to perform vibration monitoring for a minimum of seven days at each location. Each unit consisted of a portable digital seismograph (Vibra-Tech Multiseis Plus) equipped with a triaxial geophone that measured and recorded ground vibrations in three dimensions (longitudinal, transverse, and vertical). The seismograph locations are listed in Table 2-4 and shown in Figure 2-2. The sensors at locations 1, 4, 5, and 6 were buried approximately 1.5 feet in the soil. The sensors at locations 2 and 3 were coupled to the sidewalk with hot glue melt and sandbags. The geophone was positioned with the orientation of the longitudinal axis toward the proposed construction site. The seismographs were powered by a solar panel and a back-up battery.

2.2.6.2 Noise Study

Six Larson Davis System 820 sound level monitoring systems were used to conduct unattended monitoring for up to seven days at the locations listed in Table 2-4 and shown in Figure 2-2. In addition, two Larson Davis 824 Systems were used to conduct spot check attended monitoring for one hour at the same locations. The sound level system was mounted on a tripod approximately five feet above the ground and the microphone was equipped with a wind screen. During the April 2012 study, the microphone element was stolen from location #5 on April 25. Sound level meters at locations 3 and 4 failed to save data from April 25 to April 29 due to corrupted memory.

In addition to the six stations deployed, two Larson Davis 824 Systems were used to conduct 1 hour spot checks at each of the six monitoring locations. The sound level system was mounted on a tripod approximately five feet above the ground and the microphone was equipped with a wind screen. During these spot check tests, specific information regarding singular events which occurred near the monitoring location or were evident during each sound level test period were noted. Weather conditions during the testing are also recorded.

An identical week-long ambient noise monitoring study was performed from November 21 to November 27, 2012. In light of the microphone being stolen during the April study, for added security, all six sound level monitors for the November study were placed within the fenced area of the 50 Kent Avenue parcel. The monitor numbering (#1 through #6) corresponded to the same numbering scheme as the April study. But, location #'s 2, 3, 4, and 5 were slightly different (Figure 2-2).

2.2.6.3 Sound Prediction Analysis

Vibra-Tech also completed a sound prediction and control program for the Site. The sound prediction analysis focused on all major noise sources associated with the environmental remediation site, including pile driving, drilling, and excavation.

2.2.7 Adjacent Building Foundation Assessment

URS performed an evaluation of available building foundation information for buildings located near the Site that may be impacted by remediation activities. Foundation information for the following blocks and lots was evaluated:

- Block 2287, Lot 16 (immediately northwest of the Site)
- Block 2295 (across from Kent Avenue and south of 11th St)

- Block 2277 Lot 1 – Building 1 (northwest of the Site, across N. 12th Street)
- Block 2277 Lot 1 – Building 2 (northeast of the Site, across N. 12th Street)
- Block 2287 Lot 1 (the Site)
- Block 2288 Lot 1 (across Kent Avenue from the Site)
- Block 2294 Lot 1 (across N. 11th Street from the Site)

Locations of buildings adjacent to the Site, and that may be potentially impacted by remediation activity, are shown on Figure 2-3.

On April 19, 2012, URS personnel performed an exterior visual inspection of the buildings and their foundations and made a visit to the Brooklyn Borough Office Building Department located at 210 Joralemon Street, 8th Fl. Brooklyn, NY 11201 to examine building foundation records of the buildings which are in the scope of work. These plans were reviewed for information pertinent to the design of the onsite excavation support system. The building foundation plans are presented in Appendix M and the assessment prepared by URS is presented in Section 3.7.

2.2.8 Groundwater Level and NAPL Gauging

URS completed water level and NAPL gauging of existing and newly installed groundwater monitoring wells to determine the presence and thickness of NAPL in each well. This data was collected to evaluate the need for NAPL recovery pilot testing.

URS performed water level and NAPL gauging on April 23, 2012. Measurements were recorded in 16 wells located on the IRM site and in the surrounding area. Wells WW-MW-01 has been paved over or destroyed and could not be located. Wells WW-MW-14 and -15 are located within a fenced area and could not be accessed at the time of gauging. Water levels are discussed in Section 3.

Results of NAPL gauging using the electronic oil-water interface probe indicated the presence of significant amounts of DNAPL in many of the monitoring wells. Based on field observations and review of existing information from monitoring well installation records, the NAPL gauging results are considered questionable and are, therefore, not presented in this report.

URS performed additional NAPL gauging on August 28, 2012. NAPL gauging was performed by first checking for LNAPL using an oil/water interface probe. If no LNAPL was detected, then gauging was performed by lowering a white absorbent liner (NAPL FLUTe) into the well and then retrieving it to inspect for indications of NAPL. The NAPL FLUTe absorbs any NAPL and the approximate NAPL thickness present in the well can be directly measured from the NAPL FLUTe.

2.2.9 Surveying

Following installation of the groundwater monitoring wells, soil borings and test pits, the locations and elevations were surveyed by a NYS-licensed surveyor from YEC, Inc. on April 24, 2012 using the existing site datum on the NYS Plane Coordinate System and mean sea level. YEC, Inc. survey information is presented in Appendix N.

3.0 INVESTIGATION RESULTS

3.1 Environmental and Geotechnical Investigation

This section summarizes the findings from each of the investigation activities described in Section 2 and their impact on potential IRM activities. PDI test pit locations and delineation and geotechnical boring/monitoring well locations are presented in Figure 2-1.

3.1.1 Soil Borings

Figure 3-1 presents the geologic cross-sections developed from information in the newly-installed soil borings and the GEI boring logs. Cross-sections A-A' through C-C' are presented on Figures 3-2 through 3-4.

The Williamsburg site is covered by a layer of fill material consisting primarily of sand, silt, gravel, some cobbles, and varying amounts of construction and demolition debris (i.e., bricks, concrete, etc.). Among the borings installed for this PDI, the fill layer was typically found to range in depth from 5 feet bgs (WW-SB-103) to 15 feet bgs (WW-SB-100). However, fill material was observed to 29 feet bgs at WW-SB-102. Fill is absent at boring WW-MW-05. Also, the former gas holders contain fill to a depth of approximately 30 feet bgs, as depicted on Figure 3-2.

Overburden material consists mainly of fine to coarse-grained sand and silt with some interbedded clay and gravel/cobbles. A widespread continuous clay layer was encountered at depths ranging from 45 feet bgs at WW-SB-105 to 71 feet bgs at WW-SB-103.

Weathered schist bedrock was encountered at a depth of 99 feet bgs in the deepest boring at the site (WW-SB-102, drilled to 101 feet bgs) during the IRM Investigation.

Soil samples were evaluated for the presence of MGP-related contamination using a PID and visual and olfactory observations. Boring sample information is summarized in Table 3-1. MGP-related contamination was found in all borings drilled during the PDI. Petroleum and fuel impacts were also observed.

Coal tar-like odors were observed in each of the soil borings. NAPL saturation ranging from 30-100% was visually observed in 7 of the 11 boring locations (WW-SB-100, -101, -104, -105, -106, -107, and -110); these are also depicted in brown on Figures 3-2 through 3-4.

Elevated PID readings were recorded at all 11 boring locations. The highest PID readings were recorded at boring locations WW-SB-101, -104, and -107). At soil boring WW-SB-101 (located 15 feet east of the former Relief Holder), the maximum PID reading of 2,238 ppm was recorded at a depth of 22 feet bgs. Complete NAPL saturation was observed from 21 feet to 25 feet bgs and 33 feet to 49 feet bgs. At soil boring WW-SB-104 (located 30 feet southeast of the former Relief Holder), the maximum PID reading of 4,119 ppm was recorded at a depth of 36 feet bgs. Complete NAPL saturation was observed from 19 feet to 23 feet bgs, while 50% NAPL saturation was observed from 33 feet to 35 feet bgs. At soil boring WW-SB-107 (located in the center of the former central Purifying House), the maximum PID reading of 2,485 ppm was recorded at a depth of 53 feet bgs. Complete NAPL saturation was observed from 49 to 58.5 feet bgs. Petroleum-like odors were also observed from 7 feet to 11 feet bgs.

Low amounts of contamination were encountered at soil borings WW-SB-102 and WW-SB-108. Faint to moderate coal tar-like odors were observed to a depth of 69 feet bgs at soil boring WW-SB-102, located in the southeast end of the property along Kent Avenue. A light coating or sheen was only evident down to a depth of 33 feet bgs with a maximum PID reading of 57 ppm at 29 feet bgs. Faint to moderate coal tar-like odors were also observed throughout soil boring WW-SB-108, located between the former southern Purifying House and the former Meter/Lime House. A maximum PID reading of 27 ppm was recorded at this boring at 23 feet bgs.

Petroleum-like odors were also observed in soil borings WW-SB-106 and WW-SB-110 from 8.5 feet to 19 feet bgs and 5.5 feet to 11 feet bgs, respectively.

3.1.2 Groundwater Monitoring Wells

A round of groundwater levels was obtained on April 23, 2012 from 16 of the 19 new and existing monitoring wells on site. Monitoring well WW-MW-01 could not be located to obtain a water level and wells WW-MW-14 and WM-15 were inaccessible. Groundwater levels are presented on Table 3-2 and shown on Figure 3-5. Groundwater was found at relatively shallow depths across the site at average depths of between 3.5 to 4.5 feet bgs. Groundwater elevations in the shallow monitoring wells across the study area ranged from 1.58 feet above mean sea level (amsl) at WW-MW-13 downgradient of the property to 10.05 feet amsl at WW-MW-07. The average onsite groundwater elevation in the shallow monitoring wells is 8 feet amsl. In the western portion of the property, groundwater flow is northwest towards the East River. There is a groundwater mound in the vicinity of the former holder locations. This mounding presumably is due to accumulation within the holder foundations. This local mound impacts the regional (northwestern) direction and with a radial flow of groundwater from the holder foundation area to the north, east and south.

The groundwater elevation in the intermediate zone ranged from 2.23 feet amsl (WW-MW-101I) to 3.84 feet amsl (WW-MW-102I). The groundwater elevation in the deep zone (WW-MW-102D) was at 3.74 feet amsl.

3.1.3 Hydraulic Conductivity Testing

Slug test results provide estimated values for hydraulic conductivity of multiple stratigraphic zones beneath the Site. Five wells, WW-MW-04, -05, -07, -08, & -17, are screened within the upper 22 feet of fill and overburden soils. Two wells, WW-MW-100I and -102I, are screened from approximately 47 to 57 feet bgs and 49 to 59 feet bgs, respectively. One well, WW-MW-102, is screened below the clay layer from 90 to 100 feet bgs.

Estimated hydraulic conductivities for the August 2012 slug tests are summarized on Table 3-3. Mean hydraulic conductivity for the shallow soils (0 to 22 feet bgs) was 4.34×10^{-4} centimeters per second (cm/s). Mean hydraulic conductivities for the intermediate (47 to 59 feet bgs) and deep zones (90 to 100 feet bgs) were 7.11×10^{-5} cm/s and 5.87×10^{-4} cm/s, respectively.

3.1.4 Test Pits

Test pit excavations were mainly comprised of fill material consisting primarily of sand, silt, gravel, and varying amounts of construction and demolition debris (i.e., bricks, concrete, paving stones, etc.). The fill layer generally extends beyond the vertical limit of the test pit excavations. The deepest test pit (WW-TP-111) was excavated to a depth of 10 feet bgs.

Various utilities and concrete/brick structures were encountered in 12 of the 14 test pits. No underground structures were identified in test pits WW-TP-111 and WW-TP-113. These structures and utilities are discussed in Section 3.2.

Coal tar and/or petroleum-like odors were encountered at 11 of the 14 test pits. Odors were not encountered at test pits WW-TP-105, -107, and -110. VOCs were detected in soil samples from 7 of the 14 test pits (WW-TP-101, -102, -104, -106, - 109, -111, and -113). The highest PID readings were recorded at test pits WW-TP-101 and WW-TP-102 at 218 ppm and 322 ppm, respectively, generally between 4 feet and 8 feet bgs. A small amount of NAPL free product was observed in test pit WW-TP-101 at 1 foot bgs. A heavy NAPL coating was also noted in test pit WW-TP-104. Petroleum blebs were observed on the water at test pit WW-TP-112.

Pooling water hindered visual inspection in test pits WW-TP-100, -103, -105, -107, -108, -110, and -112 beyond approximately 6 feet to 6.5 feet bgs.

3.1.5 Summary of MGP and Petroleum/Fuel Contamination

A summary of observed impacts is presented on Figure 3-6. MGP impacts (tar saturation, coatings, sheens, odors) were identified in borings across the IRM site. The highest degree of contamination, tar saturated soils, is found to the greatest extent surrounding the relief holder and extending to an approximate depth of 55 feet bgs. Within these tar saturated soils are areas of tar staining and coatings (moderate and light). Additional impacts (sheens and odors) are found below the depth of 55 feet to a depth of approximately 60 feet bgs, in the western portion of the site (WW-SB-106, WW-SB-107, WW-SB-108, and WW-SB-110). Impacts extend to approximately 69 feet bgs in the eastern portion of the site (coal tar odors in WW-SB-102), and to approximately 81 feet bgs near the central portion of the site (coal tar odor and light coating observed in WW-SB-100), and between the two former holders in the southeast portion of the Site (coal tar odor in WW-SB-103). However, observations of impacts in the clay layer in borings WW-SB-100 and WW-SB-103 may be a result of sampling equipment passing through more heavily contaminated zones at shallower depths rather than actual impacted soil.

MGP impacts (other than odors) along the periphery of the property, as observed within the test pits, were limited except in WW-TP-104 located adjacent to WW-SB-102. In this location it appears that MGP impacts extend to the property line. Due to the lack of MGP impacts observed in WW-TP-105, WW-TP-106, WW-TP-107, WW-TP-109, and WW-TP-110, it appears that the northeastern, eastern, and southeastern perimeters of the property are not impacted by MGP operations. Note that the edge of gas holder No. 2 was encountered in test pit WW-TP-108.

A summary of observed petroleum/fuel odors is presented on Figure 3-7. Petroleum/fuel odors were observed in the majority of soil borings and test pits in the western portion of the site both above and below the water table. They were generally not observed in soil borings and test pits in the eastern portion of the property (WW-SB-101, WW-SB-103, WW-SB-104, WW-TP-102, WW-TP-105, WW-TP-107, WW-TP-108, WW-TP-110, WW-TP-111) except in the northeast (WW-TP-106) and southeast (WW-TP-109) corners, and at depth in WW-SB-100 (32 feet bgs) and WW-SB-102 (29 feet bgs). In the western portion of the site, petroleum/ fuel odors were observed between depths of 1 to 19 feet bgs, generally in the range of 5 to 10 feet bgs.

3.2 Utilities and Subsurface Infrastructure

Figure 3-8 shows the results of the utility investigation. Utilities located through mark-outs and estimated through geophysical techniques are depicted. The purpose of the utility investigation was to determine whether utilities would interfere with construction of shoring systems for excavation. The results indicate that there are no utility obstructions parallel to the site border with 11th St. and parallel to the border with Kent St. Near these borders, the metal detector detected anomalies in some places. Furthermore, the edge of the former gas holder No. 2 was detected as a "utility", presumably due to the metal components (observed in TP-108)of the former holder foundation. Portions of the edge of the relief holder were also detected along North 12thStreet. The edge of the former holder No. 1 was not similarly detected.

There are utilities along 12th St. that may interfere with the installation of shoring. Utilities along this border include overhead wires, a water line, and telephone lines. The water line may have been used to serve the former NYCDOS building, so it may be able to be decommissioned to allow for shoring installation. This will have to be confirmed. The telephone lines would have to be moved by the telephone company to allow for shoring installation. The overhead lines would have to be shielded during shoring installation if they are currently active and in use.

Existing storm sewers traversing the Site southward from 12th St. would have to be removed or relocated if remedial actions were to be performed in these areas.

3.3 Soil Geotechnical Properties

The site soil properties are illustrated by the 4 geotechnical borings on the east half of the site (WW-SB-100, -101, -102, and -103), the geotechnical laboratory testing results associated with these borings, and the seven environmental borings on the west half of the site (WW-SB-104 through -110). Figures 3-2 through 3-4 illustrate the site stratigraphy. Table 3-4 summarizes the geotechnical laboratory testing results.

In general, the stratigraphy consists of, from top down, the following:

- Fill of a granular nature up to 30 feet thick;
- (Upper) Sandy silty native soil at least 30 feet thick;
- Clay soil starting at about 60 feet bgs and extending to about 90 feet bgs (WW-SB-103 shows the clay to consist of alternating layers about 1-foot thick of clay and silt/sand);
- (Lower) Sandy silty native soil about 10 feet thick;
- Bedrock at about 100 feet bgs.

Fill - The fill layer appears to be primarily silty sandy soil that also contains clay and brick materials. Based on blow count information, this layer appears generally medium dense to dense with some loose material, as well. The geotechnical laboratory test data shows that the non-plastic sandy portion of the fill contains enough fines (i.e., silt and clay sizes) – 12 weight percent per WW-SB-102 – to prohibit relatively free flowing groundwater. Fines content of about 10 to 15 percent by weight is considered sufficient to prevent free flowing condition. Such data is useful in determination/confirmation of hydraulic conductivity. Some fines in this amount will also hinder free flow of water through sheet pile joints if sheet pile is used as shoring. Since fill is likely highly variable, its properties are also more highly variable than a naturally deposited soil, and such variability and unpredictability should be expected. Debris such as the brick found in this layer can hinder the installation of sheet pile if used as shoring, particularly if debris pieces are concentrated together, so pile driving operations must account for the reduction in size or removal of such debris before and/or during pile driving. Other methods of shoring can more readily account for debris as discussed later in Section 4.

(Upper) Silty Sand/Silt Soil – The native silty sand/silt layer appears to contain a minimum of about 10 to 12 weight percent fines,although negligible fines, as well as a clay lens (WW-SB-104) and cobble zones (WW-SB-105) should be expected. The laboratory test data show that particles in the clay size range are present at least 2 weight percent which would help promote sealing of joint leakage in sheet pile.

Significantly high blow counts represent this layer. Blow counts over 30 per foot in granular material denote dense soil. Except for the upper 5 feet in WW-SB-101 and WW-SB-103, where loose and medium dense soil are found, respectively, the blow counts indicate dense soil and/or gravel.

Cobbles can hinder the installation of sheet pile if sheet pile is used as shoring, particularly if cobbles are concentrated together, so pile driving operations must account for the reduction in size or removal of cobbles before and/or during pile driving (other methods of shoring can more readily account for cobbles as discussed later in Section 4). In the shallower native silty sand/silt layer, gravel is present that likely caused blow counts to exceed counts associated with dense soils. This is shown by, for example, blow counts exceeding 100 over a few inches. The gravel cannot advance into the split spoon sampler and does not get pushed aside by the sampler. Thus, blow counts in such zones are not necessarily representative or a true measure of the native soil density. A better gauge is to view the zones where there is nearly or fully 100 percent recovery of soils by the sampler. For example, in the 30-foot bgs to 60-foot bgs zone near full or full recovery soils demonstrate blow counts of about 30 to 100 per foot, which are very dense. Blow counts per foot that approach 100 can be challenging for shoring operations of sheet pile type as the sheets must be driven through such soil.

In contrast, boring WW-SB-100 from about 35 to 45 feet bgs is a good example of why we conclude gravel and not merely dense soil exists there. The blow counts exceed 100 in this zone with recovery typically less than 50 percent. Geotechnical laboratory test data show these soils to contain significant fines and clay that would prevent cohesionless soil from falling out of the sampler. Thus, it appears that gravel, shown on the boring log to exist at that interval, prevented full recovery.

Clay – The clay layer appears to exist as a minimum 12-foot thick low permeability barrier underneath the silty sand/silt native soil. The blow counts for the clay layer were indicative of a hard soil (i.e., blow counts greater than 32 per foot). Cohesive soil classified as "very stiff" fall in the blow count range of 16 to 32 per foot. The 3 unconfined compressive strength tests in the laboratory showed an average unconfined strength (UCS) of about 21 pounds per square inch (psi) which corresponds to 3 kilopounds per square foot (ksf), which is closer to a stiff material. There was no gravel of note to skew blow counts to the high side so the UCS testing appeared to underestimate the strength. This clay can provide a firm base for shoring installation and tie-in and shoring tie-in would require a moderate effort to accomplish such tie-in. The 3 hydraulic conductivity tests showed a narrow range of values from about 2×10^{-8} to 6×10^{-8} cm/sec, serving as a very low permeability seepage barrier.

(Lower) Sandy Silty Native Soil – The sandy silty native soil that exists underneath the clay appears very similar to the sandy silty native soil above the clay. Based on Remedial Investigation borings installed by GEI, the clay appears to be between 12 to 30 feet thick. Remedial construction such as shoring and excavation will not extend to the sandy silty native soil underneath the clay.

Bedrock – Boring WW-SB-102 shows weathered bedrock to exist about 100 feet bgs. Remedial construction such as shoring and excavation will not extend to the bedrock layer.

3.4 NAPL Stabilization

URS's subcontractor Remedius, LLC performed a bench-scale stabilization treatability study to evaluate the ability to solidify NAPL-contaminated soil to reduce its hydraulic conductivity and thus keep groundwater from flowing through the contaminated areas which serve as a source of contamination.

URS provided Remedius with the composite soil samples described in section 2.2.3. The soil, archived in five-gallon buckets following collection from the hollow-stem-auger flights, was manually composited prior to re-packing in five-gallon buckets for delivery to Remedius.

At Remedius, the contents of each bucket from a specific sample location were combined and homogenized to form a single composite sample for each specific sampling area (i.e., Soil 1, Soil 2, and Soil 3). A portion of each composite sample was used to characterize the physical properties of each sample. The soil characterization allowed an assessment of the variability of soil properties, which aided in evaluating whether more than one solidification mix design (i.e., reagent combinations) or mix strength (i.e., percent of reagents per dry weight of soil) was needed for the site. The soil characterization parameters are as follows:

- Moisture Content
- Particle-Size Distribution
- Density
- Atterberg Limits
- Hydraulic Conductivity

Prior to creating soil solidification reagent mixes, the soil samples were screened through a No. 4 sieve to remove oversize particles, and only soil passing through the screen was used to create solidified soil specimens. The ASTM testing methods require that particles larger than one tenth of the specimen diameter be removed so the large particles in the soil do not affect the geotechnical tests for UCS and permeability performed on small diameter solidified specimens. The moisture content of screened soil samples was determined for use as the base soil moisture content for each soil/reagent mix.

The moisture content of the composite soil samples ranged from 15.9% (Soil 2) to 22.6% (Soil 3). The wet densities of the soil samples were found to vary within a narrow range of 126.7 to 131.8 pounds per cubic foot (lb/feet^3). The particle size distribution analysis found all soil samples to consist primarily of sand and silt, with a minor gravel component, with Soil 2 (with the lowest moisture content) containing a greater percentage of large particles than the other two soil samples. Atterberg limit analyses showed a very narrow range of plastic behavior, with liquid limits ranging from 20% to 24% and the plastic limits ranging from 17% to 18%. The hydraulic conductivities of the soil samples, following compaction to 100% of each sample's dry density, were in the 10^{-6} to 10^{-7} cm/sec range; however, Remedius indicates these results overstate the impermeability of the native soil due to the compaction.

Remedius tested the solidification using a 3:1 mixture of ground granulated blast furnace slag (GGBFS) and Type I/II portland cement. The GGBFS was type 120 from LaFarge North America. No other reagents, such as bentonite were tested in this preliminary study. For each soil sample, Remedius prepared mixes of 6%, 9%, and 12% cementitious materials based on the dry weight of the soil. Water was added first to the extent needed to make the grout pumpable, and then to the amount needed when mixed with soil to make a soil/reagent mix with a slump in the range of 2 to 6 inches. In practice, water to reagent ratios (considering only added water) ranged from 0.81 to 1.99, with the low moisture Soil 2 requiring the most water, and the highest reagent dose samples requiring lower ratios (because of higher overall grout addition).

Prepared samples were molded into cylinders and allowed to cure under moist conditions for 7, 14, or 28 days prior to analysis for unconfined compressive strength (UCS) and hydraulic conductivity.

Typical performance goals for solidified source materials are a minimum UCS of 50 pounds per square inch (psi) (for structural stability) and a maximum hydraulic conductivity of 10^{-6} cm/sec to minimize flow of groundwater through a solidified monolith. All samples prepared in these treatability tests, regardless of curing duration, met these criteria, with UCS values ranging from 63 psi (a 7-day cured sample) to 868 psi. Hydraulic conductivities were in the range of 10^{-7} to 10^{-8} cm/sec. These results indicate that the soil submitted for testing, which was selected to be representative of the site and contained coal tar contamination, could be effectively treated by solidification.

3.5 Baseline Groundwater Modeling

URS performed modeling to estimate the rate of groundwater extraction that would be needed during the IRM's excavation. The modeling effort consisted of developing a model simulating the conditions at the site (i.e. the existing conditions), and then using this model to predict extraction rates and groundwater level depression during remediation (i.e. conditions during the IRM). A full summary of the modeling effort, including a description of the groundwater zone layers and assumptions regarding how the holder foundations influence groundwater flow, is presented in Appendix K. In this section, the results of the modeling of existing conditions are presented. Discussion of groundwater modeling during IRM activities is presented in section 4.4 - Dewatering.

The modeling results simulating existing conditions are shown in Figure 3-9. The differences between the modeled elevations and the actual existing elevations (the calculated residuals) ranged from -0.48 to +0.45 feet. This figure shows groundwater level contours without excavation or pumping. This figure shows the modeling correctly captures the groundwater mounding in the vicinity of the former holder foundations due the presence of holder foundation walls impeding the lateral flow of groundwater.

3.6 Noise and Vibration Assessment

3.6.1 Results of Vibration Assessment

The effect of vibrations for the assessment of building damage impacts is usually monitored based on the peak particle velocity (PPV) of vibratory ground motion and the predominant frequency. PPV is defined as the maximum value of the vibration during a selected time interval. It represents the maximum instantaneous speed at which a point on the floor moves from static position and is expressed in inches per second. As such, the installed seismographs recorded ambient ground vibrations in terms of PPV with a resolution of 0.005 in/s, and corresponding frequency in the 2 Hz to 300 Hz. ranges. These parameters were measured by a geophone in a continuous mode with a sampling rate of 1024 samples per second per channel, and maximum values were recorded with 1 minute intervals for each channel. Files were saved electronically and printed after the completion of monitoring at each location. The seismograph systems are laboratory calibrated on an annual basis. A calibration check was completed by a Vibra-Tech Technician prior to the study and the systems were programmed to check the calibration after each day of recording.

The absolute maximum PPV level at each location ranged from 0.015 in/sec to 0.1 in/sec. The typical background PPV level (defined as the median of the measured PPV levels at each location) ranged from 0.005 to 0.01 in/s, and the 99th percentile of the measured PPV levels at each location ranged from 0.01 to 0.035 in/s, excluding isolated infrequent high values due most probably to human interference.

The observed range of vibration frequencies mostly falls into those frequencies greater than 40 Hz, which are expected for regular street traffic. Lower frequency vibrations (i.e., 40 Hz and less) were also recorded; however, these vibrations represent less than 5% of all of the recorded vibrations at all locations except location #4. Approximately 56 % and 38 % of the vibrations measured in transverse and vertical directions (respectively) at location #4 had a frequency of less than 40 Hz. The highest two PPV levels were measured at locations #3 and #6. This might be attributed to the routine urban activities near these locations. A summary of the vibration measurements, and the associated geophone locations, is presented in Table 3-5. A complete graphical record of the vibration measurements is included in the Vibra-Tech Ambient Vibrations Study Report in Appendix L.

3.6.2 **Results of Noise Assessment**

The installed sound level systems recorded ambient noise in terms of A-weighted decibels (dBA). A dBA sound level measurement weighs the various frequency components of a sound as perceived by the human ear in order to yield a single number indicator of its relative loudness. The effect of noise is usually monitored based on the exceedance level (Ln) and the equivalent sound level (L_{eq}) values. Ln is defined as the percentage of time of the total measurement period that the level was exceeded. For example, if L_{10} is 50 dBA, for 10 percent of the test period, the sound level present was 50 dBA or above. L_{eq}, describes a receiver's cumulative noise exposure from all noise events for a period of time. The ambient noise in dBA was measured by the sound level monitoring system, and L_{eq} and Ln values were calculated based on the measured data. The sound level systems were laboratory calibrated by the manufacturer prior to the study. The systems were also calibrated after installation and removal.

April 23-29, 2012

The daily maximum measured sound levels at six locations ranged from 88.2 dBA to 124.1 dBA, the daily minimum measured sound levels at six locations ranged from 39.3 dBA to 42.6 dBA, and the equivalent measured sound levels at six locations ranged from 56.4 dBA to 71.8 dBA. The 1 hour spot checks were in general agreement with the measured values. The highest overall maximum dBA was measured at location #3. This might be attributed to routine urban activities near this location. Table 3-6 presents the overall maximum dBA, overall minimum dBA, overall equivalent dBA, and several Ln values. More detailed data from the sound level systems are included in the Vibra-Tech Ambient Sound Level Study Report dated May 10, 2012 (Appendix L).

November 21-27, 2012

The daily maximum measured sound levels at six locations ranged from 88.2 dBA to 103.5 dBA, the daily minimum measured sound levels at six locations ranged from 36.9 dBA to 43 dBA, and the equivalent measured sound levels at six locations ranged from 54.5 dBA to 67.5 dBA. The 1 hour spot checks were in general agreement with the measured values. The highest overall maximum dBA was measured at location #4. This might be attributed to routine urban activities near this location. Table 3-6 presents the overall maximum dBA, overall minimum dBA, overall equivalent dBA, and several Ln values. More detailed data from the sound level systems are included in the Vibra-Tech Ambient Sound Level Study Report dated November 30, 2012 (Appendix L).

Overall, measured sound levels were higher during the April study. This may be attributable, in part, to the fact that the November study period encompassed Thanksgiving. Therefore, commercial activity in the area at this time may have been reduced when compared to normal business weeks.

3.6.3 Results of Sound Prediction and Control Evaluation

Vibra-Tech also performed a sound prediction and control program for the site. The sound prediction analysis focused on all major noise sources associated with the site, including pile driving, drilling, and excavation. Based on the noise predictions for the assumed equipment that will be used for the project, the vibratory pile driver is the loudest noise source (92 dBA). The next highest noise sources are the auger drill rig, roller, and dozer (all at 82 dBA). The backhoe and the front end loader had the lowest predicted noise levels. Maximum noise levels of 85 to 92 from the pile driver exceed the New York City Noise Code of 85 dBA at or beyond a distance of 50 feet from the source. For all other assumed equipment running individually, the predicted levels are below 85 dBA. Based on an analysis of combined noise levels from all noise sources running at the same time, predicted sound levels in excess of the 85 dBA New York City Noise Code were calculated at four of the six monitoring locations. If the pile driver was eliminated from this analysis, then only two locations would exceed 85 dBA. According to the New York City Department of Environmental Protection (NYCDEP) Environmental Protection Citywide Construction Noise Mitigation regulations, several noise mitigation efforts should be made to reduce noise at the receptor locations. Additional noise mitigation efforts must be made when operating the vibratory pile driver, dump trucks, and the auger drill rig. Sound should be monitored during the use of the construction equipment to verify sound level predictions for comparison to the levels noted in the Federal Highway Administration Roadway Construction Noise Model User's Guide, and to ensure compliance with local noise ordinances.

3.7 Adjacent Building Assessment

URS reviewed documents at the Brooklyn Borough Office building department at 210 Joralemon Street, 8th Floor, Brooklyn, NY 11201 to examine building foundation records of the buildings which are in the scope of work. The record review was supplemented with subsequent observation by field personnel. Building locations are provided by Block and Lot on Figure 2-3. The following information was obtained:

- Block 2287, Lot 16 (west of the site): No record was found. Observation in the field indicated the building is about 4.5 feet from the property line marked with the fence. The building is a two story warehouse type structure with no basement.
- Block 2295 (across from Kent Avenue and south of 11th St): No record was found.
- Block 2277 Lot 1: There are two buildings in this block:
    - Building No. 1 at address 1 N. 12th St, Brooklyn, NY is a four-story located 140 feet to the northwest of the site. Record drawings show the building is on piles (unknown pile type). URS personnel inquired about the basement of the building and were informed by the building Superintendent that the building had no basement. Two drawings were copied from the records, DWG No. 1 (section) and DWG. No. 2 (plan) (date of the drawing were not found).
    - Building No. 2 is approximately 75 feet west of Kent Avenue and 65 feet from the south curb line of 12th Street. No record was found for this building. Based on visual observations, the building appeared to be a one story garage/storage facility.
- Building 2287 Lot 1 (the Site): Record was found for a warehouse type building having one story with steel column on pedestal. No foundation type was found on record drawing. It is likely that the foundation is shallow footing. Two drawings were copied, DWG. No. SP-1 - Sprinkler system plan and DWG No. SP-2 – Elevations (dated August 8, 1948). This building was demolished in 2009.
- Block 2288 Lot 1: Pictures of record drawings were taken. No foundation record was found. Building is a one story warehouse type supported on steel column.
- Block 2294 Lot 1: The building is located approximately 46 feet from the north sidewalk curb of N. 11th Street. Record drawing showed a two story warehouse on shallow foundation (strip footing and individual footing for column). Two

drawings were copied, DWG No. 3 and DWG No. 4 (dated May 2, and April 12, 1912) showing plan and section. However, it appears the building in the 1912 record drawing has been long demolished and has been replaced by the current document storage building. A record drawing of the current building foundation was not found.

This evaluation only identified record drawings of existing buildings from one adjacent parcel (Block 2271 across N. 12thSt. from the Site. However, considering that NYSDEC allows for excavation activities to remain a minimum of 55 feet away from adjacent buildings, there are no special procedures such as underpinning that must be implemented to preserve these features. Typical monitoring such as vibration monitoring and a preconstruction survey of buildings must be implemented, however.

3.8 NAPL Recoverability

NAPL recoverability was evaluated through review of the boring logs and measurement of NAPL levels in monitoring wells. Several soil borings exhibited 100% NAPL saturation, including WW-SB-100 (37 to 50 feet bgs), WW-SB-101 (33 to 49 feet bgs), WW-SB-106 (47 to 53 feet bgs), WW-SB-107 (49 to 58 feet bgs). However, no wells were observed to contain NAPL except for well WW-MW-13 (approximately 8 inches thick) which is not located adjacent to the Site. Based on these observations, it is not possible to predict to what extent NAPL could be recovered in wells.

4.0 CONCEPTUAL DESIGN

4.1 Elements of the IRM

The intent of the Interim Remedial Measure (IRM) is to implement a remedy at the Site where such remedy would be considered final and be considered interim only from the standpoint that it would be part of a larger remedy that would be implemented later. A "final" IRM would allow for the Site to be used by the property owner (the New York City (NYC) Parks Department) with few or no restrictions before the entire former Manufactured Gas Plant (MGP), which comprises parcels beyond the Site, is remediated. The IRM is therefore a remedy that shall not require any re-work/removal in the future and where there is minimal risk that implementing the IRM might be redundant as far as an eventual remedy of the entire former MGP is concerned, thereby creating a cost-efficient IRM. Pursuant to agreements with NYSDEC, National Grid has committed to implementing an IRM that:

- Excavates and removes holders and surrounding soil and source material.
- Excavates and removes other shallow source material on the Site.
- Considers treating isolated deep materials through solidification, if feasible.
- Considers use of product recovery wells, if feasible.
- Preserves city infrastructure and maintains access to infrastructure for CitiStorage and Bayside Fuel Oil;
- Creates no building/appurtenances, utility or other structure damage from vibrations. This will include preservation of document racks inside surrounding buildings;
- Restoration of the remediated Site to a state that can be developed by NYC Parks Department in accordance with existing plans for Bushwick Inlet Park, which show that the ultimate disposition of the Site will be as part of a large lawn area with no buildings present.

The IRM Pre-Design Investigation (PDI) was performed to refine and define the elements that will comprise the IRM. Based on the soil boring observations from the PDI, the option of in-situ stabilization (ISS) has been ruled out as a component of the IRM. Although the mixture of sand and silt in the native soils allowed for preparation of solidified samples in the treatability study that provided high strength and low permeability for all mixes tested, the soil borings observations argued against ISS for two reasons.

First, the deeper source material was generally found in zones well below (typically greater than 30 to 40 feet below ground surface [bgs]) the surface, with cleaner soils above. For example, boring WW-SB-106 showed 100% saturation at a depth interval of 47 to 52 feet bgs, but had no NAPL saturation above, although odors and slight sheen were observed in certain shallower intervals. ISS treatment of this soil would require solidification of dozens of feet of cleaner overburden soil, increasing costs and potentially spreading source material over a greater depth interval at each ISS column. Additionally, the depths at which these zones of contamination are found are at the far end of the limits of the depths reachable by commonly used ISS technology.

Second, the boring logs revealed occurrences of cobbles and/or gravel. For example boring WW-SB-107 showed cobbles at depth interval of 37 to 39 feet bgs. Also, the frequently limited recovery of soil in the split spoons – soils that included cohesive material that would exhibit high recovery should gravel not be present – indicated the frequent presence of undesirable gravel. The presence of gravel/cobbles may prevent or significantly impede augering. High blow counts in many areas also point to the presence of dense soils which are hard to mix.

The presence of non-aqueous phase liquid (NAPL) only at greater depths is consistent with the conceptual site model describing coal tar contamination migrating vertically downward from the former holders until reaching lower permeability lenses whereupon the NAPL would migrate horizontally downgradient. An IRM program targeting the significant amounts of NAPL present at the former holder locations would contribute to preventing further contribution to such horizontal migration.

The feasibility of product recovery wells as a component of the IRM was not clarified by the IRM PDI. Only one well,WW-MW-13, which is not located on or adjacent to the IRM area, was found to contain NAPL. It is not possible to select locations for potential recovery wells based on the investigation data. Pursuant to discussions held with the New York State Department of Environmental Conservation (NYSDEC) on November 28, 2012, recovery wells could be installed along the downgradient edge of the Site (the side bordered by N. 12th Street) to see the extent to which NAPL could be collected, and decisions could be made for collection frequencies and possible additional “infill” well installations depending on performance observations.

Based on these considerations, the IRM will comprise excavation of the gas holder/foundations, contaminated soil immediately below the gas holder foundations, and excavation of shallow soils elsewhere on the Site. Product recovery would be pursued through installation of recovery wells along the edge of the Site along N. 12^{th}Street.

The gas holder/foundations and associated contamination are expected to extend approximately 26-28 feet bgs. Dewatering would be required to excavate these structures and soils. As discussed below, this would be accomplished through construction of excavation support barrier walls hydraulically confining the areas of excavation. Because these excavation support barrier walls would be keyed into a deeper low permeability layer and left in place following completion of the IRM, they would additionally serve as containment mechanisms for deeper, unexcavated source material.

Shallow soils would be excavated throughout the rest of the Site. There is only limited data on the extent of contamination of the shallow soils throughout the Site. However, to prepare the Site for future use as parkland, shallow soil will be removed throughout the Site and be replaced with appropriate backfill, eliminating direct contact exposure pathways from surface soil. None of the borings installed demonstrated the presence of source material in soil above the water table, therefore excavation of soil to the groundwater table (depth varies, but averages approximately 4 feet bgs) throughout the Site, apart from the gas holder locations, is sufficient, as discussed in Section 4.7.

In summary, the major components of the IRM, include the following:

- Installation of passive product recovery wells;
- Installation of excavation support to act as both temporary structure and a final barrier wall;
- Dewatering during construction including treatment, as necessary, and discharge to a Publicly-Owned Treatment Works (POTW) or off-site disposal;
- Excavation and removal of gas holders and soil immediately below the holder foundations;
- Backfill with clean compacted fill;
- Restoration to include removal of excavation support portion above the average groundwater surface (for prevention of bathtub mounding effect within IRM area), grading and approved surface topping.

- Excavation, disposal, and backfill of shallow soils (above groundwater surface) throughout the rest of the Site.

4.2 Product Recovery Wells

Product recovery wells would be installed in a single line starting along the sidewalk area of N. 12th St. adjacent to the Site and then continuing southwest along the edge of the 55-foot zone between the western edge of shallow excavation and the CitiStorage building. The spacing between the wells will be determined during the design phase. Based on observations of product in site borings, the depth of the wells would be as deep as 55 to 60 feet. The wells would be installed with sumps to collect product. After several months of monthly product recovery, a determination would be made on which wells produce sufficient product to warrant continued recovery. A determination would also be made on whether additional wells should be installed between high-producing wells. Recovered product would be drummed and shipped off-site for disposal.

4.3 Holder Foundation Deep Excavation Support Barrier

Excavation support will be required along the property line (along the sidewalk) to support sidewalls for expected excavation depth of about 30 feet bgs, which is a couple of feet below the bottom of the gas holders that will be removed. In addition, there will be consideration during design for some form of excavation support inside the property line for cell by cell excavation. Due to space limitations and high groundwater surface level, open cut excavation without excavation support and dewatering is not feasible at the Site. A haul road/ramp into the excavation is also not feasible as a maximum 10 percent slope for loaded haul trucks access road/ramp would be required. The west portion of the Site provides very limited space for any such ramp as the east side will be the subject of the gas holder excavation effort. Such open cut and ramping must be dewatered – and protected by supports– and would also require the soil excavated for the access ramp to be permanently removed from the Site and treated as necessary. Thus, vertical excavation support will be the proposed method of external, deep excavation support.

The gas holder remediation area consists of three approximately 100-foot by 100-foot squares in plan. Remediating this area would require breaking these into 50-foot by 100-foot, or smaller sub-areas or "cells." The type of excavation support to be implemented, dewatering volumes/rates, and the likely need for temporary containment structures for vapor management are the key drivers of cell size. Where open cut excavation/berms are not employed, excavation support must be braced by way of, for example, diagonal corner bracing and/or straight-across bracing. The first level of bracing will be installed at the groundwater surface level, at about 5 to 10 feet deep. Secant pile and slurry walls may need only one level of bracing but interlocking steel sheet pile may need additional levels of bracing. Bracing must be pre-stressed at each side of the brace, as well. Excavation support of any sort will require bracing as discussed herein, so manageable cell sizes, possibly with substantial truss-type bracing – or with intermediate pile support at cell midpoints to reduce unsupported bracing length – dictates the need for a minimum of 3 or 4 cells. Where multiple cells are implemented and construction proceeds cell by cell, bracing and dewatering equipment would be moved from cell to cell as each cell remediation is completed.

Excavation support methods generally considered for excavation work include steel interlocking sheet pile – either cantilevered or braced, secant pile consisting of cement/bentonite and aggregate (i.e., concrete), cutter soil-mixed (CSM), slurry wall consisting of cement/bentonite and aggregate (i.e., concrete), deep soil mixed (DSM) wall, and soil berms. Soldier piles with lagging are not feasible as groundwater surface level is high and such supports contain many joints that will leak significantly. Excavation support will be carried into the underlying clay layer that is about 60 feet bgs in order to create a fairly water-tight barrier that will provide suitable containment and prevent groundwater from seeping into the excavation. Regarding the clay layer, boring WW-SB-103 indicated the presence of sandy lenses or sandy layers alternating with clay layers. Thus, it may be necessary to advance excavation support more than a few feet into the top of clay so that any potential pervious sandy zones will be cut off. The feasible excavation support methods will be more closely assessed during detailed design. The perimeter excavation support may act as a long term vertical barrier that will remain in place after the IRM construction is complete. The excavation support, whether perimeter or interior, will be cut off at or below the groundwater surface elevation so that groundwater elevation within the cells would equilibrate with the elevations outside the supports.

It is critical to note that there appears to be limited space available next to each holder along the property line to install excavation support. As an example of confined working space for excavation support, Test Pit WW-TP-103 shows what evidently was the holder sidewall to be about 8 to 10 feet from the fence line. Additionally, an existing waterline within this test pit cut this distance in half so space available for excavation support installation is potentially limited. Excavation support methods that employ wet cement/bentonite methods to seal or act as excavation support ingredients require spoils containment such as berms that can encroach beyond the excavation support footprint itself, towards the Site perimeter, so this must be carefully considered during detailed design when laying out the excavation support alignment. It should be noted that all excavation support methods will likely encounter undetermined obstructions such as cobbles, boulders, concrete debris, other buried and abandoned concrete facilities, and the foundations for the holders, for example if there is a ring foundation and the excavation support encroaches upon it. Thus, some degree of noise and vibration from such obstruction demolition and removal should be expected for any type of excavation support at the Site.

Similarly, unless existing concrete and debris such as those uncovered by previous test pits at the Site perimeter can be left in place, their removal will also require demolition work. Strong consideration during detailed design can be given to leaving some perimeter foundation obstructions in place while installing the excavation support barrier wall to the inside of these obstructions, space and remedy effectiveness permitting.

In order to install interior excavation support (excavation support other than the outermost perimeter) into the solid base of existing gas holders, pre-drilling of such existing materials would be necessary to puncture them so that excavation support can be punched through the resulting void.

At a minimum, a single type of excavation support that is effective as a barrier to groundwater will be required around each proposed deep holder excavation area. If all sides of the remediation area are vertically supported and typical manageably-sized TCBs are implemented, then excavation support subdividing the remediation area further into manageable cells (interior excavation support) may also be required. The use of more than one type of interior excavation support will be considered in the detailed design. As is discussed herein, cell size can vary. For example, cells smaller than 100 feet by 100 feet would likely be required to provide for vapor management in a temporary containment structure.

Each excavation support method that was considered is described briefly, below.

4.3.1 <u>Interlocking Steel Sheet Pile</u>

Interlocking steel sheet pile will only be considered for interior support that subdivides the Site into cells due to their leakage potential, deflection of sheets, and that they are removable and reusable. Interlocking steel sheet pile can be driven via impact hammer, via typical vibratory hammers, or via quiet and minimal vibration press pile method. The impact hammer method is eliminated from consideration due to sometimes-unacceptable vibration and noise. Press pile equipment is typically the most expensive and requires very specialized equipment. It is unlikely that press pile will be selected during design due to expected time duration of the project, significant quantity of piles to be pressed, and availability/cost of the equipment when weighed against scheduling of the driving operations and equipment availability. Thus, use of a vibratory hammer should be anticipated and is a feasible method given the distance of existing buildings from the proposed work.

Typical interlocking sheet pile in a cantilever configuration can withstand about 15 feet of unsaturated soil but the Site has about 25 feet on average of fully saturated soil above the bottom of the planned excavation, so braced or specialized sheets are necessary. Braced or other specialized sheets would also be implemented in the case of 30-foot excavation. Because of sheet flexibility and deflection, one or more levels of bracing will be required. The pile driver would set up within the Site so no equipment encroachment beyond the excavation support line would be needed. Since undetermined concrete debris, cobbles and boulders are known to exist at the Site, such obstructions must be removed via excavator during pile driving. Contending with obstructions will inhibit fast and efficient interlocking sheet pile installation so such conditions must be anticipated and explicitly accounted for in construction bidding and scheduling. Interlocking sheet pile joints are known to leak so this condition will be accounted for in the final excavation drainage design. Bracing for interlocking sheet pile are expected to be on the order of about 20 feet apart from each other, tied into horizontal steel supports or "walers," so bracing would not hinder excavator movement to any appreciable degree. If intermediate vertical steel members are elected to be used so that bracing lengths/sections can be reduced, such vertical members would need to be drilled into the existing gas holder bottoms for proper anchorage. Tiebacks can be considered if necessary in lieu of vertical supports in locations where they would not encroach upon adjacent buried infrastructure and foundations.

4.3.2 Cutter Soil Mixing

Cutter Soil Mixing (CSM) is a deep soil mixing operation that consists of dual mixing/cutting heads that can be equipped with teeth and that has been reported to cut through cobbles up to about 8 inches in diameter or bedrock with up to 5,000 psi unconfined compressive strength. Resulting wall thickness can be up to 3 feet with each pass of the equipment. The CSM method is reported to have well exceeded the required 60 to 70-foot depths needed for this project. Vertical steel supports can be installed into the still-wet soil mixed mass if necessary to strengthen the wall and tiebacks can be attached, as well, provided the soil-cement is chipped away to expose the vertical steel supports.

A 30-foot deep gravity wall without supports would require this wall to be at least 20 feet wide – which would be of prohibitive cost to construct. Regardless, due to horizontal space limitations between existing gas holders and street rights-of-way, a massive, wide gravity wall created by CSM, in lieu of vertical steel supports, would not be possible. Therefore, installation of vertical supports into the CSM soil-cement would be expected. Tie-backs are discouraged as they can encroach upon adjacent, buried infrastructure and foundations.

Existing soils would be left in place during construction of the CSM wall but soil-cement spoils would need to be disposed. Groundwater surface elevation is high, so spoils volume would be significant. Since the existing soils are incorporated into the CSM wall, its strength and permeability are not as predictable as, say, a slurry wall, secant wall, or interlocking sheet pile wall. The cutting of debris and cobbles would generate noise and vibration, as well, if a separate obstruction removal operation is not employed.

4.3.3 Slurry Wall

A slurry wall would be a soil-cement or concrete structure that displaces existing in-place soils. Typical slurry walls are, like a CSM wall, about 3 feet thick. The preferred wall would consist of cement/bentonite and aggregate (i.e., concrete) primarily and be of predictable strength and permeability. Like a CSM wall, however, internal reinforcement (steel bar cages or vertical steel beams) must be placed within the slurry wall since it will be used for excavation support.

Slurry walls canalsobe constructed by incorporating the excavated on-site soil, in a 2-step procedure, as a wall ingredient in order to preclude off-site disposal of such soil but the resulting slurry wall would be of less predictable – and less desirable - strength and permeability. The two steps involve keeping the trench open with water/bentonite slurry then replacing such slurry with slurry/cement/aggregate (i.e., concrete) backfill. Full replacement method of slurry wall construction is the preferred method as this method removes completely the existing trench soil and replaces it in one step with concrete. Slurry wall construction has the advantage of accommodating the removal of obstructions in the path of the slurry wall.

It must be recognized that zones of large voids such as large concrete debris and nested cobble layers can be problematic in that some water/bentonite slurry used to keep the trench open can escape through large voids. Such slurry loss is more likely to occur within debris zones and not in cobble zones present at the Site, as the cobble voids evidently are filled with soil fines_(i.e., they are not nested). This can occur particularly above the groundwater surface where existing water pressure to contain the slurry does not exist. Slurry loss must be replenished by slurry pumping, otherwise there can be lowering of the slurry level in the slurry trench, creating trench collapse near the top of the trench. Slurry walls are most effective to construct where the slurry creates a filter cake on trench sidewalls that prevents slurry loss into the surrounding formation. Consideration of slurry loss through nested cobble and large debris voids must be accounted for during detailed design and construction document preparation. Nested cobble zones have not been identified and are not expected for the Site geology, so any real concern for nested large objects is for the fill zone. Constructing the wall in typically manageable trench segments, say 3 feet by 10 feet at a time, will limit risk of widespread slurry loss. Segments of cement/bentonite/aggregate would be constructed in leapfrog fashion and then doubled back to interlock each segment.

4.3.4 Secant Pile

A secant pile wall is similar to a full replacement slurry wall in that vertical, augered, interlocking cylinders of cement/bentonite/aggregate (i.e., concrete) are drilled into place in leapfrog fashion and then doubled-backed to tie together each augered cylinder. This creates contiguous concrete cylinders that are a continuous excavation support and barrier wall. Vertical steel supports would be installed in every other cylinder for reinforcement. Obstructions will need to be removed from the secant wall alignment or otherwise mitigated (e.g., drilling/blasting)during the wall construction as a supplemental operation if secant wall auger equipment is not capable to do so. The use of temporary casing in lieu of water/bentonite slurry can preclude any slurry loss and promote borehole stability, as well. Also, each cylinder is installed individually so there is more control of integrity of the excavated area. Secant pile walls are water tight, would require no more than one level of bracing, are suitable to serve as underpinning where foundation types are unknown, and their lateral deflections can be controlled by pre-stressing the bracing as necessary.

4.3.5 DSM Wall

A DSM wall would be very similar to a CSM wall constructed using excavated soil as one of the DSM wall components. Such wall would require supplemental vertical supports. The known cobbles and debris at the Site would make DSM wall construction difficult, if not impractical, as such obstructions would impede advancement downward of the DSM augers. DSM is a much less robust form of soil mixing than provided by CSM. Therefore, DSM construction would require having an excavator on hand to remove obstructions during DSM operations or reducing in size – to about 4 inches – isolated obstructions by pre-drilling or removal during DSM operations. DSM walls have spoils that must be removed and disposed of offsite, as well.

Like CSM, DSM would commence from existing grade prior to any other intrusive work with the possible exception of excavating a few feet from existing grade to create a working surface that can also contain generated spoils. The potential for cobbles – known to exist at the Site – and other debris will require having an excavator on standby to remove such material as DSM proceeds. DSM augers can knock aside the occasional fist-sized cobble but generally cannot contend with interlocking zones of such material. Borings show the existing fill layer to end at a maximum depth of about 30 feet bgs so debris fill in that zone should be expected. Typical DSM auger diameters are 2 to 12 feet. Smaller diameter augers should be anticipated at problem areas, auger diameter as small as 2 feet. Spoils from DSM would be removed and disposed of offsite.

DSM would be made difficult by the dense soil conditions that contain stone, cobbles and debris at the Site. The soil conditions at the Site appear to lend themselves to very slow DSM operations due to the need for smaller augers and obstruction removal. Supplemental operations before or during DSM operations such as pre-drilling to loosen the soil, reducing in size of obstructions and/or removal of obstructions should be anticipated throughout DSM phase. These supplemental operations will increase construction costs accordingly. If detailed design and associated cost estimating show that these types of DSM and supplemental operations are not cost-and-schedule feasible then alternatives to DSM can be considered at that phase in the design.

Soil mixing alternatives to DSM such as soil mixing via an excavator is not feasible given inefficiencies due to the depths involved, at least 60 feet to top of clay.

4.3.6 Interior Soil Berms

To minimize noise and vibration, internal shoring within the deep excavation area (as may be required to create sub-cells of suitable size to accommodate temporary containment buildings for vapor control,native or clean imported soil could be used to build berms for internal excavation support. The drawback of the use of soil berms is the slopes necessary to maintain the berm integrity would reduce the workable footprint of each cell. Cells would require significant overlap to excavate contaminated soil from throughout the footprint defined by the holders. Repositioning of the cells would require multiple handling of soil. The advantage of soil berm support would offer the promise of less noise and vibration compared to the other forms of support evaluated.

4.3.7 Excavation Support Summary and Recommendations

The preferred types of perimeter excavation support barrier wall are full replacement secant pile or slurry wall. These are of predictable strength and hydraulic conductivity. The secant pile method can implement casing to prevent slurry loss prior to placement of concrete backfill and encountered obstructions would require operation with separate equipment to remove them. The slurry wall method can seamlessly handle obstructions encountered during excavation with the equipment performing the slurry wall excavation, but potential loss of slurry into large nested debris voids must be accounted for.

For the interior support barriers needed to define each excavation cell, secant pile and slurry walls would also be preferred. In addition, the possible use of soil berms will be considered during the design to weight the potential increased costs of such an interior support system against the noise and vibration considerations of the IRM implementation.

URS recommends that additional soil explorations should be performed in order to more precisely characterize the likelihood of obstructions and to better delineate the highly variable soil conditions at the Site. Additional borings to close the information gap to about 50 feet apart should be considered. This would necessitate an additional 12 to 14 borings advanced at least to the clay layer, varying 60 to 80 feet deep. Design given only the amount of subsurface information currently available would require (pending comparative cost estimates and evaluation of construction staging) more conservative assumptions and higher construction costs related to such conservatism. The additional borings would be useful in developing construct contract documents and will also better delineate obstructions that are a major driver of construction cost unit pricing. Assumption of many obstructions, for example, based on minimal geotechnical information will drive up construction bid pricing.

4.3.8 Excavation - Additional Considerations

There are no special procedures such as underpinning that must be implemented to preserve structures near the excavation. This is because existing buildings are at least 55 feet from the proposed heavy construction zone. Typical monitoring such as vibration monitoring and preconstruction survey of buildings must be implemented, however. Also, utilities must be pre-located and marked, and close coordination with each affected utility for their utility protection requirements included in the work.

4.4 Dewatering

Dewatering of the planned excavation area is necessary because the groundwater table is more than 25 feet above the anticipated elevation at the bottom of the excavation. A firm dry surface will also be required during demolition of the holder foundations at 26-28 ft bgs. Since groundwater is very shallow, dewatering operations will be kept in place throughout the excavation operations and subsequent backfill operations.

The approach to dewatering was developed through modeling the conceptual IRM design. The modeling approach and results are presented in Appendix K. This appendix describes the model design, including the stratigraphic layers. The IRM requires installing shoring to the underlying contiguous clay layer to serve two purposes: 1) to allow deep excavation of the gasholders and 2) to hydrologically isolate the excavations to minimize infiltration. Therefore, the predictive modeling evaluated the extraction of groundwater from within the shored excavation areas.

The model initially evaluated surrounding the entire gas holder area and dewatering this area using a single extraction well (Scenario 1). The results of this simulation are shown in Figures 4-1 and 4-2. The results of this simulation indicate that a single well would not be able to sufficiently draw the water table down to the 30 feet bgs required to allow for excavation. Although the hydrostatic head of the deeper groundwater zone (layer 2) can be lowered to 30 feet bgs or lower (Figure 4-1), the presence of the holders foundation floors and walls would prevent the upper groundwater zone (layer 1) from dropping greater than about 4 feet bgs (5 feet above mean sea level [amsl]) or less (Figure 4-2).

Therefore, the predictive model was revised to incorporate a different approach where sumps are used to dewater excavations at each gas holder (Scenario 2). This approach was modeled based on the following assumptions:

- Shoring was installed to the clay layer such that each gas holder was surrounded in its own excavation cell before dewatering. This corresponds to three separate 100-foot by 100-foot excavation cells (one for each gas holder) as shown on Figure 4-3. The shoring was assumed to have an hydraulic conductivity of 2.8×10^{-6} feet/day (10^{-9} cm/sec). This hydraulic conductivity, one commonly used in modeling for sealed sheet pile, was selected in order to provide the modeling focus inside the remedial area soil block/zone, and to yield the maximum drawdown of the groundwater there. This is considered an appropriate assumption for this conceptual level design.

- Groundwater would be extracted from sumps excavated at the bottom of the excavation cells. These sumps would be continuously reestablished as excavation proceeds from the surface to the bottom of the planned excavation. For modeling purposes, nine sumps (trenches) are assumed to be located within each cell.
- Soil excavation is assumed to remove from 2 to 3 feet of soil from each cell per day. The model assumes that the excavation of each gas holder will require nine days followed by the excavation of soil beneath the gas holder for an additional two days.

The simulated groundwater elevations inside and outside of the shoring wall by end of nine days before excavation of the concrete bottom of gas holder are presented in Figure 4-3. Inside of the shoring the groundwater level drops to -16 feet amsl. Outside of the shoring the change of water level is less than 0.5 feet.

The simulated dewatering rate of nine sumps ranges from 4 gallons per minute (gpm) to 16 gpm. For each day, the sump dewatering rate is relatively high at the beginning of each day's lowering of the sump elevation by 2 to 3 feet, and then gradually decreases to a relatively stable rate of 4 gpm.

The simulated total volume of dewatering in nine days is 11,300 ft^3 (84,500 gallons). Thus, the average dewatering rate over nine days is approximately 6.5 gpm.

Extracted groundwater will have to be treated and discharged to a storm sewer.

4.5 Excavation and Removal of Gas Holders

Excavation cell size would have to be about 50 feet by 100 feet or less to accommodate vapor management with a temporary containment building of a size suitable for repositioning by means of crane picks and sliding on rails at ground surface. Excavation equipment based at ground surface would be able to reach the target depths of contamination. Excavators and demolition equipment would commence work until final excavation depth is achieved.

The groundwater mounding around the gas holder area suggests that the gas holders are intact and is causing the observed adjacent groundwater to rise up around these structures. Borings WW-SB-03 through -08 were drilled into the gas holder and indicate the gas holders are filled with soil type fill. Excavation around and within gas holders must proceed with extreme caution in case of large unstable voids, gas pockets, liquid zones, etc. These considerations will be accounted for in the placement of the sumps as lowering of groundwater in and around the holders could be uneven with the presence of holder walls acting as vertical barriers to flow.

4.6 Backfill

Backfilling operations will commence immediately after the excavation is completed, cell by cell. Backfilling will proceed as soon as possible so that dewatering operations and, if bracing is implemented with the excavation support method, bracing for that cell or cells can be removed and moved over to a subsequent cell for eventual work. In order to ensure firm compact subgrade for future construction, backfilling will commence while the cell is dewatered and dry. Dry operations will permit controlled filling and compaction operations, typically in 12-inch lifts or less. A dry operation will also permit a wide variety of fill to be used as backfill. Otherwise, backfilling in submerged conditions would only permit expensive high quality stone to be used as backfill.

The dewatering equipment – and any interlocking sheet pile, if interlocking sheet pile is the selected as an interior (subdividing) cell excavation support mechanism, or soil used in berms, if soil berms are selected as an excavation support system – will be reused for subsequent cells. Interlocking sheet pile has the unique advantage of being reusable but, as discussed earlier, obstructions and vibrations are a significant concern with interlocking sheet pile at the Site. Regardless, from a safety standpoint, as well, a cell where excavation is completed should be backfilled as promptly as possible. A 30-foot deep excavation that is shored and dewatered must be backfilled to eliminate any potential problem, for example, such as failure of the dewatering system that creates additional forces on the excavation support, or from loads at the original ground surface. Sufficient safety factor will be built into design of the excavation support system, however, to account for reasonable amount of adjacent water level and adjacent surcharge loads at the existing ground surface.

4.7 Shallow Soil Excavation and Disposal

Shallow soil excavation would typically be about minimum 6 inches for areas subject only to occasional light foot traffic, about 2 feet for more heavily trafficked by persons, and about 4 feet for areas where minor structures such as trees, fences, utilities and small shelters would be constructed. As the Site is planned to be used by NYC Parks Department, a minimum 4-foot soil removal and backfill is recommended to protect persons against dermal exposure. This corresponds to the approximate depth to groundwater. By excavating only to the groundwater surface, no dewatering would be required. However, if tar saturated material is observed during excavation, the contractor would be directed to wet-excavate such areas to the extent possible.

4.8 Summary of IRM Components

The IRM will require detailed design and possible further evaluation and thus is only discussed conceptually in this report. The primary components of the IRM will consist of the following:

- Installation of product recovery wells.
- Installation of excavation support barrier.
- Soil excavation and tank removal of the three approximately 100-foot by 100-foot holder areas down to and just below tank foundations (~30 feet bgs).
- Implementation of vapor management for excavation work is expected to be required so its specifications will be determined during detailed design. Likewise, the use of a temporary containment structure to manage vapors is expected to be required so detailed design will assess related criteria such as cell size, potential locations of vertical supports and cut side slopes, as well as required location of earth-moving equipment (e.g., remain perched up at original grade or within the excavation).
- Perimeter construction phase excavation support will remain in place as a long term barrier to groundwater. Full replacement slurry wall or secant pile wall are preferred due to short term and long term performance reliability. Slurry wall methodology can remove obstructions as they are encountered at vibration/noise level lower than other typical excavation support systems. Loss of slurry and limited trench sidewall instability may be an issue for slurry wall where, if at all, nested cobbles/debris form large voids, so means to address this in construction documents and unit pricing must be incorporated. Secant pile is also desirable as a full replacement method but has the disadvantage of requiring separate obstruction removal equipment.
- Shallow soil will be excavated and disposed/reused as appropriate. The Site will be backfilled with appropriate backfilland vegetated for subsequent use by the Parks Department~~.~~

5.0 REFERENCES

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TABLES

Table 2-1
Monitoring Well Construction Summary
Williamsburg Works Former MGP Site
Brooklyn, NY

Well ID	Northing	Easting	Ground Surface Elevation	Riser Elevation (feet NAVD88)	Borehole Diameter (inch)	Well Diameter (inch)	Total Well Depth (feet)	Screen Interval (feet)	Screen Slot Size (inch)	Sand Filter Pack Interval (feet)	Sand Type	Bentonite Seal Interval (feet)	Sump Interval (feet)	Installation Method
WW-MW-01	688406.1	642399.31	21.55	21.05	6	2	25	13 - 23	0.010	11 - 25	#0	1 - 11	23 - 25	Hollow Stem Auger
WW-MW-02	688484.29	642128.99	19.19	18.59	6	2	17.7	7.4 - 17.4	0.010	5 - 17.7	#0	1 - 5	17.4 - 17.7	Hollow Stem Auger
WW-MW-03	688683.91	642207.81	13.99	13.69	6	2	16	4 - 14	0.010	2.5 - 16	#0	0.5 - 2.5	14 - 16	Hollow Stem Auger
WW-MW-04	688733.54	642033.04	13.34	12.71	6	2	22	10 - 20	0.010	8 - 22	#0	0.75 - 8	20 - 22	Hollow Stem Auger
WW-MW-05	688775.73	641946.36	12.48	12.05	6	2	16	4 - 14	0.010	2 - 16	#0	1 - 2	14 - 16	Hollow Stem Auger
WW-MW-06	688730.17	641823.66	12.23	11.81	6	2	12.3	0.3 - 10.3	0.010	0.4 - 12.3	#0	-	10.3 - 12.3	Hollow Stem Auger
WW-MW-07	688889.72	641970.87	10.69	11.84	6	2	13	1 - 11	0.010	1.1 - 13	#0	-	11 - 13	Hollow Stem Auger
WW-MW-08	688854.11	641670.88	9.93	9.89	6	2	12.3	0.3 - 10.3	0.010	0.4 - 12.3	#0	-	10.3 - 12.3	Hollow Stem Auger
WW-MW-10	689118.5	641685.93	8.07	7.67	6	2	16	4 - 14	0.010	3 - 16	#0	1 - 3	14 - 16	Geoprobe
WW-MW-11	688957.02	641529.95	9.2	8.72	3.25	2	16	4 - 14	0.010	3 - 16	#0	1 - 3	14 - 16	Geoprobe
WW-MW-12	689010.95	641395.17	7.89	7.42	3.25	2	17	5 - 15	0.010	4 - 17	#0	2 - 4	15 - 17	Geoprobe
WW-MW-13	689223.85	641556.91	7.07	6.89	3.25	2	16	4 - 14	0.010	3 - 16	#0	1 - 3	14 - 16	Geoprobe
WW-MW-14	689120.85	641312.56	6.75	6.38	3.25	2	16	4 - 14	0.010	3 - 16	#0	1 - 3	14 - 16	Geoprobe
WW-MW-15	689376.89	641364.64	6.35	5.94	3.25	2	16	4 - 14	0.010	3 - 16	#0	1 - 3	14 - 16	Geoprobe
WW-MW-16	688979.55	642265.93	9.99	9.73	6	2	17	4 - 14	0.010	3 - 17	#0	1 - 3	16 - 17	Hollow Stem Auger
WW-MW-17	688916.75	641757.91	11.62	11.25	6	2	16	4 - 14	0.010	2 - 16	#0	1 - 2	14 - 16	Hollow Stem Auger
WW-MW-100I	688815.7878	641893.7957	11.04	10.51	8	2	58.5	46.5 - 56.5	0.010	44.5 - 57.5	#2	42.5 - 44.5	56.5 - 58.5	Hollow Stem Auger
WW-MW-102I	688714.6543	642010.6524	11.64	11.07	8	2	61	49 - 59	0.010	47 - 61	#2	44 - 47	59 - 61	Hollow Stem Auger
WW-MW-102D	688710.055	642019.1811	11.73	10.98	6	2	102	92 - 102	0.010	91 - 102	#2	89 - 91	-	HSA/Mud Rotary

Notes:
Data for all wells except WW-MW-100I, WW-MW-102I, & WW-MW-102D provided by GEI Consultants.

Table 2-2
Typical Vibration Levels for Common Construction Equipment
Williamsburg Works Former MGP Site
Brooklyn, New York

Equipment		PPV at 25 ft (in/sec)	Approximate RMS* Velocity Level at 25 ft
Pile Driver (impact)	Upper Range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper Range	0.734	105
	Typical	0.170	93
Clam Shovel Drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Loaded Dump Trucks (6 yd^3)		0.076	86
Jackhammer		0.035	79
Small Bulldozer / Shover		0.003	58
***RMS velocity in decibels (VdB) re: 1 micro-inch/ second**			

Source: Transit Noise and Impact Assessment, United States Department of Transportation
Publication FTA-VA-90-1003-06, May 2006

Table 2-3
Typical Noise Levels for Common Construction Equipment
Williamsburg Works Former MGP Site
Brooklyn, New York

Equipment	Typical Noise Level (dBA) 50 ft from Source
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-Driver (Impact)	101
Pile-Driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88
Table based on an EPA Report,[4] measured data from railroad construction equipment taken during the Northeast Corridor Improvement Project, and other measured data.	

Source: Transit Noise and Impact Assessment, United States Department of Transportation Publication FTA-VA-90-1003-06, May 2006

Table 2-4
Vibration and Noise Monitoring Locations
Williamsburg Works Former MGP Site
Brooklyn, New York

April 23-29, 2012

Location	Seismograph/ Sound Level Meter Serial Number	Description	GPS
1	BD8002/1816	20 N. 12th Street Block 2287 - South Corner	N 40° 43' 24.02" W 73° 57' 38.02"
2	BF11110/1817	Block 2294 Lot 1 - North Side of Building	N 40° 43' 22.24" W 73° 57' 36.30"
3	BD6674/1861	51 Kent Avenue - North Corner	N 40° 43' 20.67" W 73° 57' 33.76"
4	BD8340/1821	35 Kent Avenue Block 2288 Lot 1 - North Corner	N 40° 43' 22.62" W 73° 57' 31.43"
5	BF14209/1862	Block 2277 Lot 1 - South of Building	N 40° 43' 24.27" W 73° 57' 33.02"
6	BF10975/1855	20 N. 12th Street Block 2287 - Northeast Corner	N 40° 43' 25.49" W 73° 57' 36.07"

Source: Vibratech Ambient Vibration and Sound Level Studies, Williamsburg Works, dated May 10, 2012

November 21-27, 2012

Location	Sound Level Meter Serial Number	Description	GPS
1	1893	Northwest corner of site, along 11th Street	N 40° 43’ 24.02” W 73° 57’ 37.76”
2	1577	West side of site, along 11th Street	N 40° 43’ 22.79” W 73° 57’ 35.69”
3	1827	South Corner of site - Intersection of Kent Ave. and 11th Street	N 40° 43’ 21.55” W 73° 57’ 33.73”
4	1857	Southeast Corner of site - Intersection of Kent Ave. and 12th Street	N 40° 43’ 23.07” W 73° 57’ 32.13”
5	1532	East side of site, along 12th Street	N 40° 43’ 24.22” W 73° 57’ 33.96”
6	1692	North corner of site, along 12th Street	N 40° 43’ 25.51” W 73° 57’ 36.13”

Source: Vibratech Ambient Sound Level Study, Williamsburg Works, dated November 30, 2012

Table 3-1
Boring Sample Information
IRM Investigation Report
50 Kent Avenue Parcel
Williamsburg Works Former MGP Site

Boring	Location	Total Depth (ft)	Depth to Water (ft)	Max PID	Comments
WW-SB-100	Central area of property	81.0	9	438 ppm at 37 ft	Fill to 15 ft. Sand and silt from 15 to 55.5 ft. Clay from 55.5 to 65 ft followed by mostly sand and silt from 65 to 81 ft. Coal Tar-like odor throughout. NAPL saturation from 5 to 19 ft and 37 to 51 ft.
WW-SB-101	Southeast end of property along N. 12th Street	61.0	21	2,238 ppm at 22 ft	Mostly sand and silt with some clay and gravel from 7 to 57 ft. Clay from 57 to 61 ft. Coal Tar-like odor throughout. 100% NAPL saturation from 21 to 25 and 33 to 49 ft.
WW-SB-102	Southeast end of property along Kent Avenue	101.0	5	57 ppm at 29 ft	Fill to 29 ft. Mostly sand and silt with some gravel from 29 to 59 ft. Clay from 59 to 90 ft followed by mostly sand and silt from 90 to 99 ft. Weathered bedrock from 99 to 101 ft. Coal Tar-like odor from 5 to 69 ft.
WW-SB-103	Southeast end of property along N. 11th Street	81.0	11	840 ppm at 40 ft	Mostly sand and silt with some clay from 5 to 71 ft. Mostly clay from 71 to 81 ft. Coal Tar-like odor from 5 to 25 ft and 33 to 81 ft.
WW-SB-104	Central area of southeast end of property	63.0	7	4,119 ppm at 36 ft	Mostly sand and silt with some clay from 9 to 61.5 ft. Clay from 61.5 to 63 ft. Coal Tar-like odor from 9 to 59 ft. NAPL saturation from 19 to 23 ft and 33 to 35 ft.
WW-SB-105	Central area of property	55.0	7	555 ppm at 41 ft	Cobbles from 9 to 15 ft. Mostly sand and silt with some clay and cobbles from 15 to 45 ft and 50 to 53.5 ft. Clay from 45 to 50 ft and 53.5 to 55 ft. Coal Tar-like odor interspersed throughout. NAPL saturation at 16 and 53 ft.
WW-SB-106	Northwest end of property near N. 12th Street	59.0	11	498 ppm at 51 ft	Mostly sand and silt with some clay and cobbles from 10 to 56.5 ft. Faint petroleum-like odor from 8.5 to 19 ft. Coal Tar-like odor from 37 to 59 ft. NAPL saturation from 47 to 53 ft.
WW-SB-107	Central area of northwest end of property	61.0	7	2,485 ppm at 53 ft	Mostly sand and silt with some clay from 13 to 57.5 ft. Clay from 57.5 to 61 ft. Petroleum-like odor from 7 to 11 ft. Coal Tar-like odor from 13 to 27 ft and 41 to 61 ft. NAPL saturation from 49 to 58.5 ft.
WW-SB-108	Central area of northwest end of property	57.0	5	27 ppm at 23 ft	Mostly sand and silt with some clay from 11 to 25 ft and 29.5 to 55 ft. Cobbles from 25 to 29.5 ft. Clay from 55 to 57 ft. Coal Tar-like odor from 15 to 27 ft and 39 to 57 ft.
WW-SB-109	West corner of northwest end of property	55.0	5	219 ppm at 46 ft	Mostly sand and silt with some clay and cobbles from 6 to 55 ft. Coal Tar-like odor throughout. NAPL saturation from 6 to 7 ft.
WW-SB-110	Northwest end of property	64.0	6	640 ppm at 25 ft	Mostly sand and silt with some clay and gravel from 9 to 17 ft and 23 to 64 ft. Petroleum-like odor from 5.5 to 11 ft. Coal Tar-like odor from 11 to 29 ft and 37 to 62 ft. NAPL saturation at 17 ft and from 24 to 26.5 ft.

Table 3-2
Groundwater Elevations
Williamsburg Works Former MGP Site
April 23, 2012

Well ID	Measuring Point Elevation (ft amsl)	Groundwater Depth (feet)	Groundwater Elevation (ft amsl)
WW-MW-01(1)	21.05	NM	NA
WW-MW-02	18.59	12.25	6.34
WW-MW-03	13.69	7.88	5.81
WW-MW-04	12.71	3.76	8.95
WW-MW-05	12.05	4.52	7.53
WW-MW-06	11.81	3.59	8.22
WW-MW-07	11.84	1.79	10.05
WW-MW-08	9.89	3.72	6.17
WW-MW-10	7.67	4.58	3.09
WW-MW-11	8.72	5.82	2.90
WW-MW-12	7.42	4.77	2.65
WW-MW-13	6.89	5.31	1.58
WW-MW-14(2)	6.38	NM	NA
WW-MW-15(3)	5.94	NM	NA
WW-MW-16	9.73	4.48	5.25
WW-MW-17	11.25	4.16	7.09
WW-MW-100I	10.51	8.28	2.23
WW-MW-102I	11.07	7.23	3.84
WW-MW-102D	10.98	7.24	3.74

Notes:
amsl - above mean sea level
NAPL - non-aqueous phase liquid
(1) - Well could not be located.
(2) - Well was inaccessible due to parked car.
(3) - Well was inaccessible due to fence.

Table 3-3
Summary of Results
Williamsburg Works Former MGP Slug Tests

Well ID	8/28/2012 Hydraulic Conductivity [cm/sec]				Formation Mean K (cm/sec)
	FH	RH	N(**)	Mean (***)	
WW-MW-04	1.57E-04	3.11E-04	2	2.21E-04	4.34E-04
WW-MW-05	2.38E-04	1.63E-04	2	1.97E-04	
WW-MW-07	2.06E-03	1.95E-03	2	2.00E-03	
WW-MW-08	5.78E-04	2.47E-04	2	3.78E-04	
WW-MW-17	4.30E-04	5.01E-04	2	4.64E-04	
WW-MW-100I	4.61E-06	6.33E-05	2	1.71E-05	7.11E-05
WW-MW-102I	3.44E-04	2.54E-04	2	2.96E-04	
WW-MW-102D	5.26E-04	6.56E-04	2	5.87E-04	5.87E-04

(**) - number of vlid tests
(***) - geometric mean

FH - Falling Head test
RH - Rising Head test

Note:
-For all graphs, normalized head is defined as H(t)/Ho, where H(t) is the displacement measured at time t and Ho is the initial displacement at time t=0.

-Results that are bold and italicized are considered invalid (see Data Useability sheet).

-While the geometric mean for both the falling and rising head tests are given, it is understood that the rising head tests more accurately describe the overall hydraulic characteristics of the aquifer.
(See attached reference, *The Bouwer and Rice Slug Test - An Update*)

TABLE 3-4
GEOTECHNICAL LAB TEST RESULTS

SAMPLE IDENTIFICATION			INDEX TESTS							ENGINEERING TESTS							REMARKS
BORING NO.	SAMPLE NO.	DEPTH (ft)	USCS SYMB. (1)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	SIEVE MINUS NO. 200 (%)	HYDRO. % MINUS 2 μm (%)	ORGANIC CONTENT (burnoff) (%)	TEST TYPE	WATER CONTENT (%)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	HYDRAULIC CONDUCTIVITY (cm/sec)	PEAK COMP. STRESS (psi)	STRAIN @ PEAK STRESS (%)	
SB-100	S-3,4,5	9-15	SC-SM	22	17	5	40.0	9		w	17.1						
SB-100	S-10,11,12	23-29	SM	np	np	np	41.5	11		w	14.5						
SB-100	S-18,19,20	39-45	SC-SM	26	21	5	40.3	10		w	15.3						
SB-100		59-61								UW		126.6					
SB-100		59.35								w	30.1						
SB-100	A	59.6								K	24.0	128.4	103.6	2.1E-8			P9395
SB-100		59.9								w	23.6						
SB-100	B	60.15	CL	48	23	25	91.5	41		UC	21.8	131.0	107.6		32.6	8.4	UC122b
SB-100		60.45								w	20.2						
SB-100	S-31,32,33	67-73	SC-SM	24	18	6	47.2	6		w	23.8						
SB-100	S-35,36	75-79	SM	27	22	5	47.3	8		w	29.9						
SB-101	S-2,3,4	7-13	SM	np	np	np	27.7	5		w	15.5						
SB-101	S-8,9,10	19-25	SM	np	np	np	21.3	5		w	15.7						
SB-101	S-17,18,21	37-47	SC	30	19	11	37.4	11		w	16.0						
SB-101	S-20	43-45	SC	30	18	12	49.2	12		w	12.0						
SB-101		59-61								UW		128.7					
SB-101	A	59.4	CL	45	25	20	90.0	41		w	27.2						
SB-101		59.7								w	27.0						

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Project No.: T11176638
File: Indx1.xls

TABLE 3-4
GEOTECHNICAL LAB TEST RESULTS

SAMPLE IDENTIFICATION			INDEX TESTS							ENGINEERING TESTS							REMARKS
BORING NO.	SAMPLE NO.	DEPTH (ft)	USCS SYMB. (1)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	SIEVE MINUS NO. 200 (%)	HYDRO. % MINUS 2 μm (%)	ORGANIC CONTENT (burnoff) (%)	TEST TYPE	WATER CONTENT (%)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	HYDRAULIC CONDUCTIVITY (cm/sec)	PEAK COMP. STRESS (psi)	STRAIN @ PEAK STRESS (%)	
SB-102	S-5,6,7	13-19	SM	np	np	np	15.9	2		w	19.4						
SB-102	S-9,10,11	21-27	SP-SM	np	np	np	11.5	2		w	23.9						
SB-102	S-16,17,18	35-41	SP-SM	np	np	np	11.6	2		w	21.3						
SB-102		63-65								UW		111.3					
SB-102		63.4								w	20.4						
SB-102	B	63.65								K	31.5	122.6	93.2	5.8E-8			P9396
SB-102		63.95								w	31.5						
SB-102	C	64.2	CL	47	22	25	83.2	41		UC	26.7	126.2	99.6		10.3	15.0	UC123e
SB-102	S-33,34,35	71-77	CL	41	23	18	97.9	33		w	29.0						
SB-102	S-38,39,40	81-87	CL	32	20	12	55.7	32	4.4	w	23.5						
SB-103	S-5,6,7	13-19	SM	np	np	np	29.7	4		w	16.4						
SB-103	S-10,12,13	23-31	CL	33	17	16	64.4	11		w	17.0						
SB-103	S-20,21,22	43-49	SP-SM	np	np	np	10.3	2		w	17.9						
SB-103	S-26,27,28	55-61	SC	26	17	9	43.1	7		w	24.2						
SB-103	S-33,34,35	69-75	CL	26	15	11	59.7	15		w	24.7						
SB-103		75-77								UW		125.3					
SB-103	A	75.15								K	26.2	125.9	99.8	2.3E-8			P9394
SB-103		75.4								w	25.8						
SB-103	B	75.65	CL	37	22	15	94.3	20		UC	23.2	129.5	105.2		23.0	15.0	UC122a
Note:	(1) USCS symbol based on visual observation, Sieve results, and Atterberg limits reported.																

Table 3-5
Summary of Ambient Vibration Data
Williamsburg Works Former MGP Site
Brooklyn, New York

Geophone Location	**Measured Peak Particle Velocity (in/sec)**			**Percent Events of Measured Frequency**		
Address in Brooklyn, NY	**Typical (Median) PPV**	**99th Percentile PPV**	**Absolute Maximum PPV**	**20Hz<**	**20-40Hz**	**>40Hz**
Location 1 20 N. 12th Street Block 2287 - Southwest Corner	0.010(L)	0.010(L)	0.020(L)	0.00%(L)	0.00%(L)	100.00%(L)
	0.010(T)	0.010(T)	0.015(T)	0.04%(T)	0.05%(T)	99.91%(T)
	0.005(V)	0.010(V)	0.040(V)	0.06%(V)	0.29%(V)	99.65%(V)
Location 2 Block 2294 Lot1 North Side of Building	0.005(L)	0.010(L)	0.040(L)	0.02%(L)	0.29%(L)	99.69%(L)
	0.010(T)	0.015(T)	0.020(T)	0.29%(T)	0.55%(T)	99.17%(T)
	0.005(V)	0.010(V)	0.055(V)	0.00%(V)	0.09%(V)	99.91%(V)
Location 3 51 Kent Avenue North Corner	0.010(L)	0.010(L)	0.085(L)	0.01%(L)	0.02%(L)	99.97%(L)
	0.010(T)	0.015(T)	0.040(T)	0.04%(T)	0.22%(T)	99.74%(T)
	0.010(V)	0.010(V)	0.090(V)	0.03%(V)	0.09%(V)	99.88%(V)
Location 4 35 Kent Avenue Block 2288 Lot 1 - North Corner	0.005(L)	0.010(L)	0.015(L)	0.00%(L)	0.01%(L)	99.99%(L)
	0.015(T)	0.015(T)	0.030(T)	43.99%(T)	12.49%(T)	43.52%(T)
	0.010(V)	0.035(V)	0.080(V)	6.95%(V)	30.73%(V)	62.32%(V)
Location 5 Block 2277 Lot 1 7 ft South of Building	0.010(L)	0.010(L)	0.025(L)	0.01%(L)	0.03%(L)	99.96%(L)
	0.010(T)	0.010(T)	0.015(T)	0.00%(T)	0.01%(T)	99.99%(T)
	0.010(V)	0.010(V)	0.060(V)	0.01%(V)	0.03%(V)	99.96%(V)
Location 6 20 N. 12th Street Block 2287 - Northeast Corner	0.010(L)	0.010(L)	0.035(L)	0.00%(L)	0.00%(L)	100.00%(L)
	0.010(T)	0.010(T)	0.045(T)	0.00%(T)	0.00%(T)	100.00%(T)
	0.010(V)	0.010(V)	0.100(V)	0.00%(V)	0.00%(V)	100.00%(V)

Source: Vibratech Ambient Vibration Study, Williamsburg Works, dated May 10, 2012.

Table 3-6
Summary of Ambient Noise Data
Williamsburg Works Former MGP Site
Brooklyn, New York

April 23-29, 2012

Location	1	2	3	4	*5	6
Overall Maximum dBA	88.2	92.9	124.1	115.8	107	103.9
Overall Minimum dBA	39.6	40.2	41.7	42.6	40.5	39.3
Overall Leq	56.4	60.4	71.8	69.4	63.5	63.4
Ln 10	58.7	63.2	72.4	71.8	64.2	61.6
Ln 20	55.9	59.7	68.9	68.8	61.3	57.9
Ln 30	50.5	57	65.9	66.3	59.6	55.5
Ln 50	50.5	53.4	60.6	61.6	57.1	52.1
Ln 90	45.2	47.2	49.1	51.2	53.1	45.5
Ln 95	44.2	45.8	47.4	49.2	52.4	44.2

* Data up to time of microphone theft.

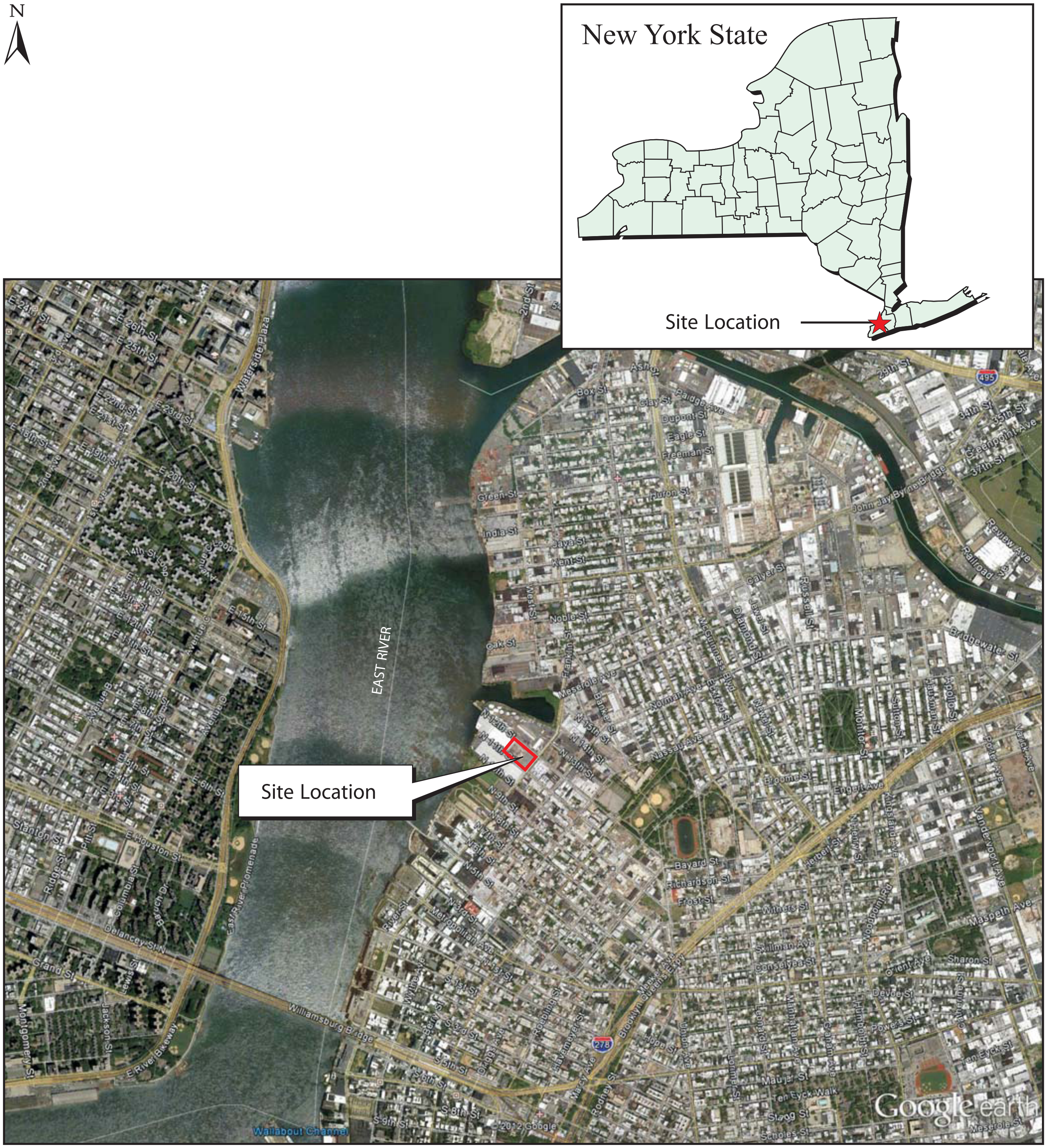
Source: Vibratech Ambient Sound Level Study, Williamsburg Works, dated May 10, 2012.

November 21-27, 2012

Location	1	2	3	4	5	6
Overall Maximum dBA	102.2	89.3	100.6	103.5	88.2	89.7
Overall Minimum dBA	37.6	39.2	40.9	43	40.1	36.9
Overall Leq	58.9	54.8	66	67.5	57.4	54.5
Ln 10	60.9	57.3	68.4	72.1	59.5	55.6
Ln 20	56.6	55.2	64.9	67.7	57.5	53.4
Ln 30	54.5	53.6	62.2	64.6	55.3	51.9
Ln 50	51	50.8	57.9	58.8	52.3	49.2
Ln 90	43.7	45.1	49.2	49.7	46.4	43
Ln 95	42.7	44.1	47.6	47.7	44.9	41.9

Source: Vibratech Ambient Sound Level Study, Williamsburg Works, dated November 30, 2012.

FIGURES



Source: Google Earth Pro - © 2012 Google

APPROXIMATE SCALE IN FEET

2000 0 2000

AG20745-11176638-071812-GCM

URS

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK
SITE LOCATION MAP

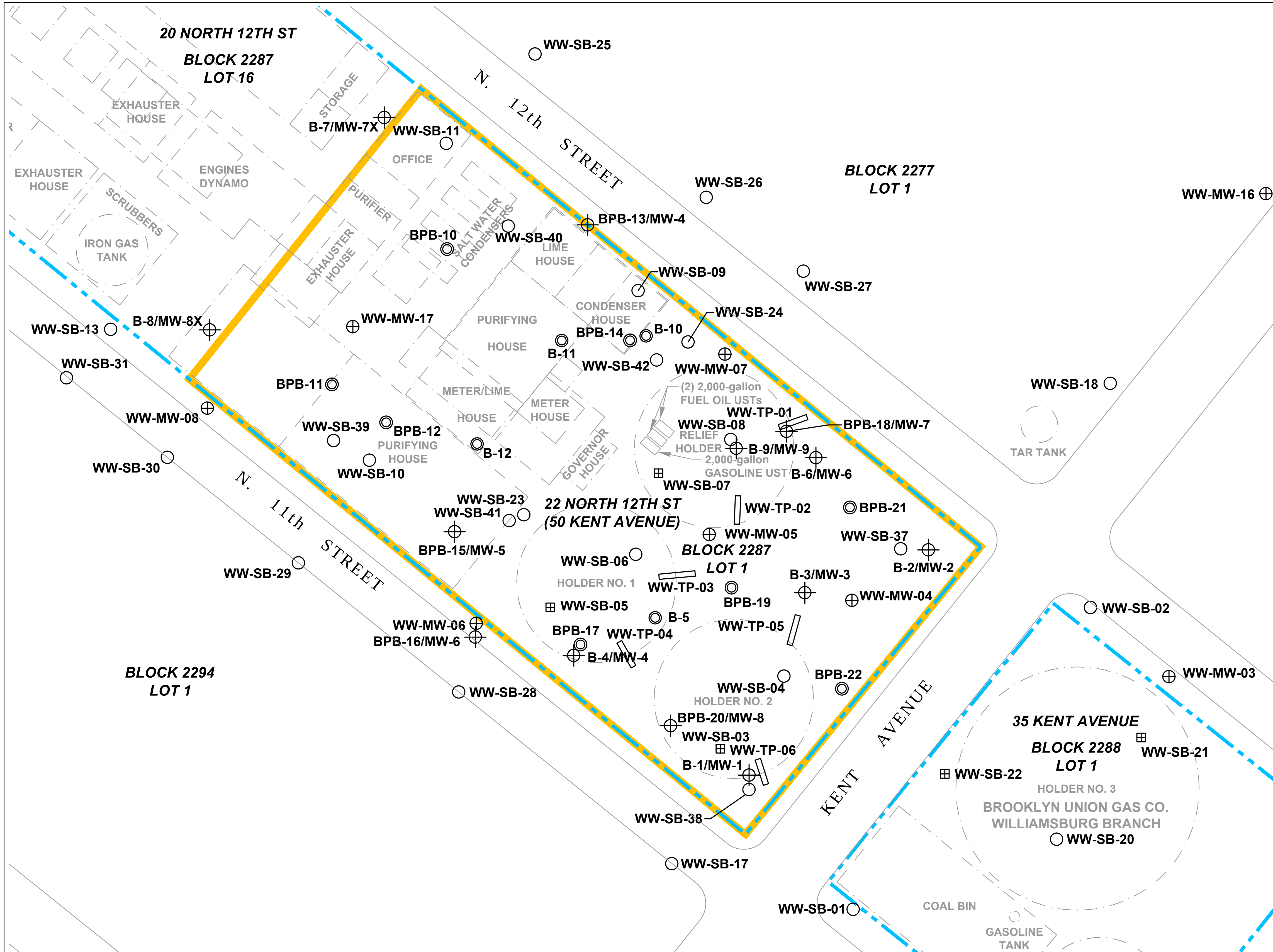
FIGURE 1-1

SOURCES:

1. DRAWING PROVIDED BY GEI CONSULTANTS, INC., DATED AUGUST 2011.

IRM PREDESIGN INVESTIGATION 50 KENT AVENUE PARCEL OF THE WILLIAMSBURG WORKS FORMER MGP SITE BOROUGH OF BROOKLYN, NEW YORK	URS	FORMER MGP STRUCTURES AND SITE FEATURES
nationalgrid	Project 11176638.00008	AUGUST 2012 Figure 1-2

I:\11176638\CAD\FIGURE 1-2.DWG



LEGEND

APPROXIMATE CURRENT 50 KENT AVENUE PROPERTY BOUNDARY

APPROXIMATE BOUNDARY OF FORMER MANUFACTURED GAS PLANT (MGP) SITE

HISTORIC STRUCTURE

EXISTING SAMPLES

REMEDIAL INVESTIGATION

WW-MW-05	MONITORING WELL LOCATION
WW-SB-01	SOIL BORING LOCATION
WW-SB-03	SOIL BORING WITH TEMPORARY GROUNDWATER SAMPLE LOCATION
WW-TP-01	TEST PIT LOCATION

OTHER PREVIOUS INVESTIGATION

MW-8X	MONITORING WELL LOCATION
BPB-10	SOIL BORING LOCATION

SOURCES:

1. DRAWING PROVIDED BY GEI CONSULTANTS, INC., DATED AUGUST 2011.

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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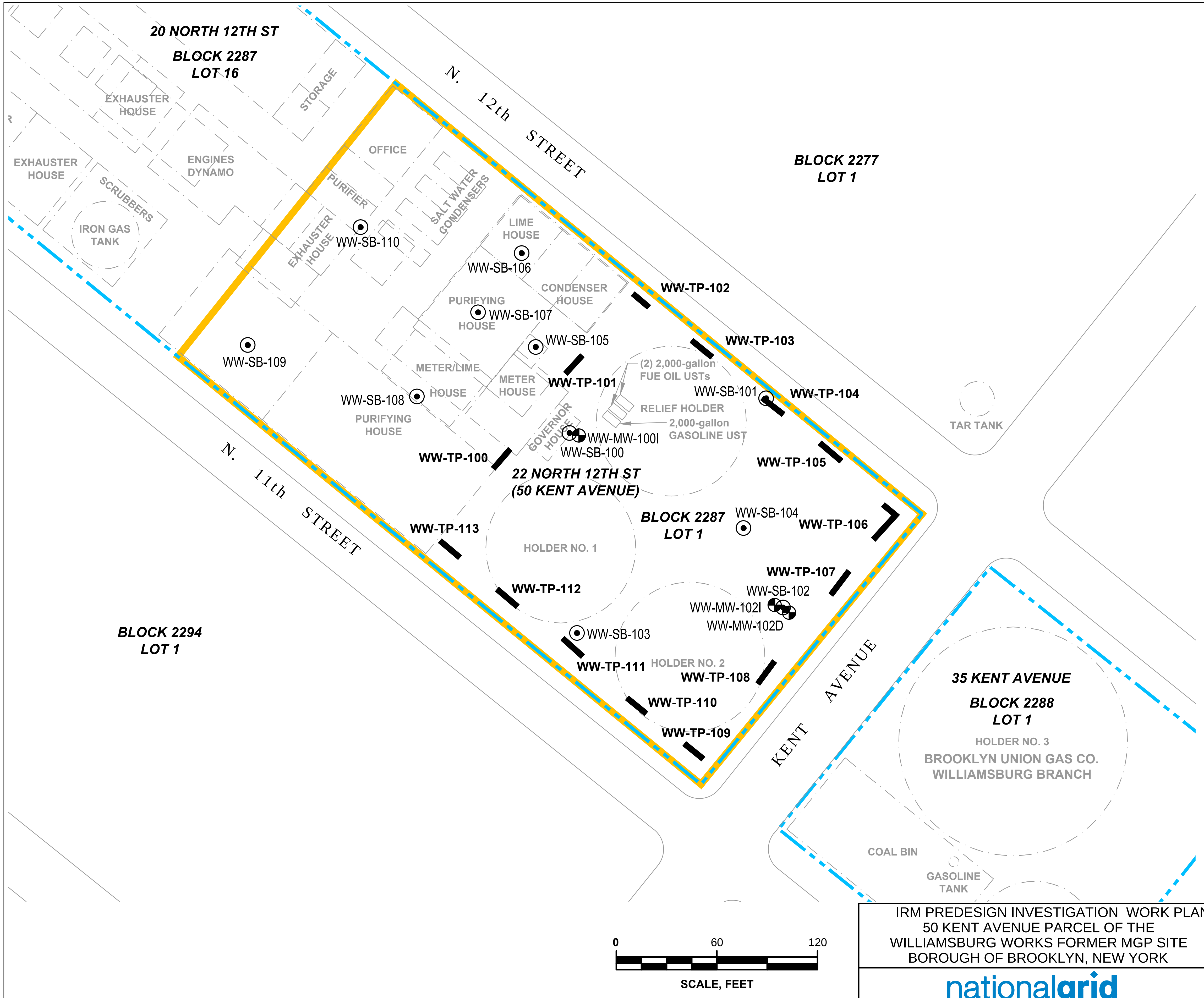
PREVIOUS SAMPLE LOCATIONS

Project 11176638.00008 | AUGUST 2012 | Figure 1-3

I:\11176638\CAD\FIGURE 1-3.DWG



LEGEND

APPROXIMATE CURRENT 50 KENT AVENUE PROPERTY BOUNDARY

APPROXIMATE BOUNDARY OF FORMER MANUFACTURED GAS PLANT (MGP) SITE

HISTORIC STRUCTURE

SAMPLE LOCATIONS

WW-MW-100I — INTERIM REMEDIAL MEASURE (IRM) DESIGN INVESTIGATION MONITORING WELL LOCATION

WW-SB-103 — IRM DESIGN INVESTIGATION SOIL BORING LOCATION

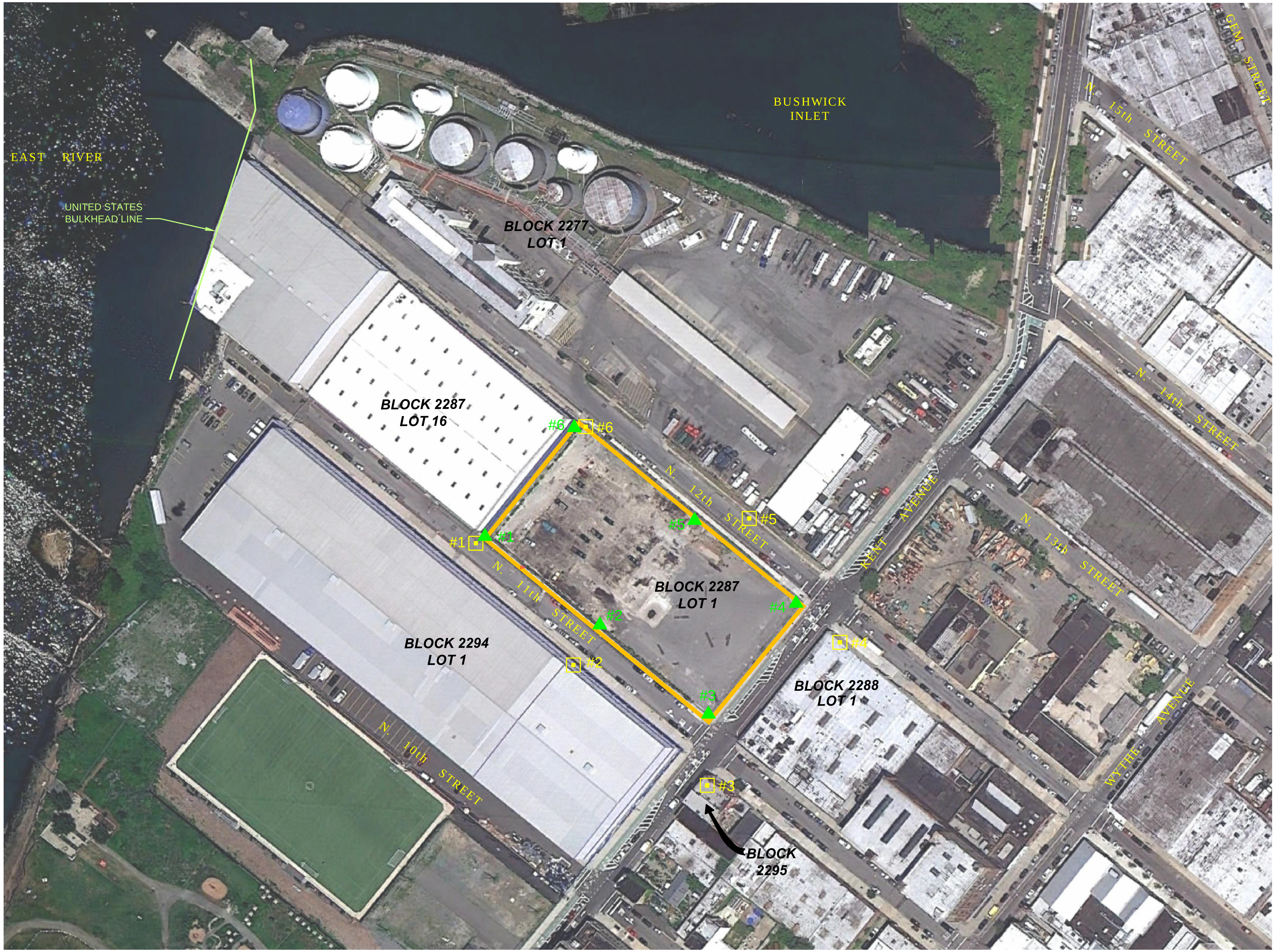
WW-TP-100 — IRM DESIGN INVESTIGATION TEST PIT LOCATION

SOURCES:.

1. DRAWING PROVIDED BY GEI CONSULTANTS, INC., DATED AUGUST 2011.
2. IRM DESIGN INVESTIGATION LOCATIONS SURVEYED BY YEC, INC., ON APRIL 24, 2012.

IRM PREDESIGN INVESTIGATION WORK PLAN 50 KENT AVENUE PARCEL OF THE WILLIAMSBURG WORKS FORMER MGP SITE BOROUGH OF BROOKLYN, NEW YORK	URS	IRM DESIGN INVESTIGATION LOCATIONS
nationalgrid	Project 11176638.00008	AUGUST 2012 Figure 2-1

I:\11176638\CAD\FIGURE 2-1.DWG



LEGEND

NOISE AND VIBRATION MONITORING LOCATIONS (APRIL 23-29, 2012)

#1 NOISE MONITORING LOCATIONS (NOVEMBER 21-27, 2012)

SOURCES:

1. DRAWING PROVIDED BY GEI CONSULTANTS, INC., DATED AUGUST 2011. PHOTOGRAPH OBTAINED FROM BLUE SKY INTERNATIONAL LTD. ALL RIGHTS RESERVED. COPYRIGHT 2007.
2. SOUND AND VIBRATION LOCATIONS SURVEYED BY VIBRA-TECH ENGINEERS, INC., APRIL AND NOVEMBER 2012.

SOURCES:

1. PHOTOGRAPH OBTAINED FROM BLUE SKY INTERNATIONAL LTD. ALL RIGHTS RESERVED. COPYRIGHT 2007.

0 150 300

SCALE, FEET

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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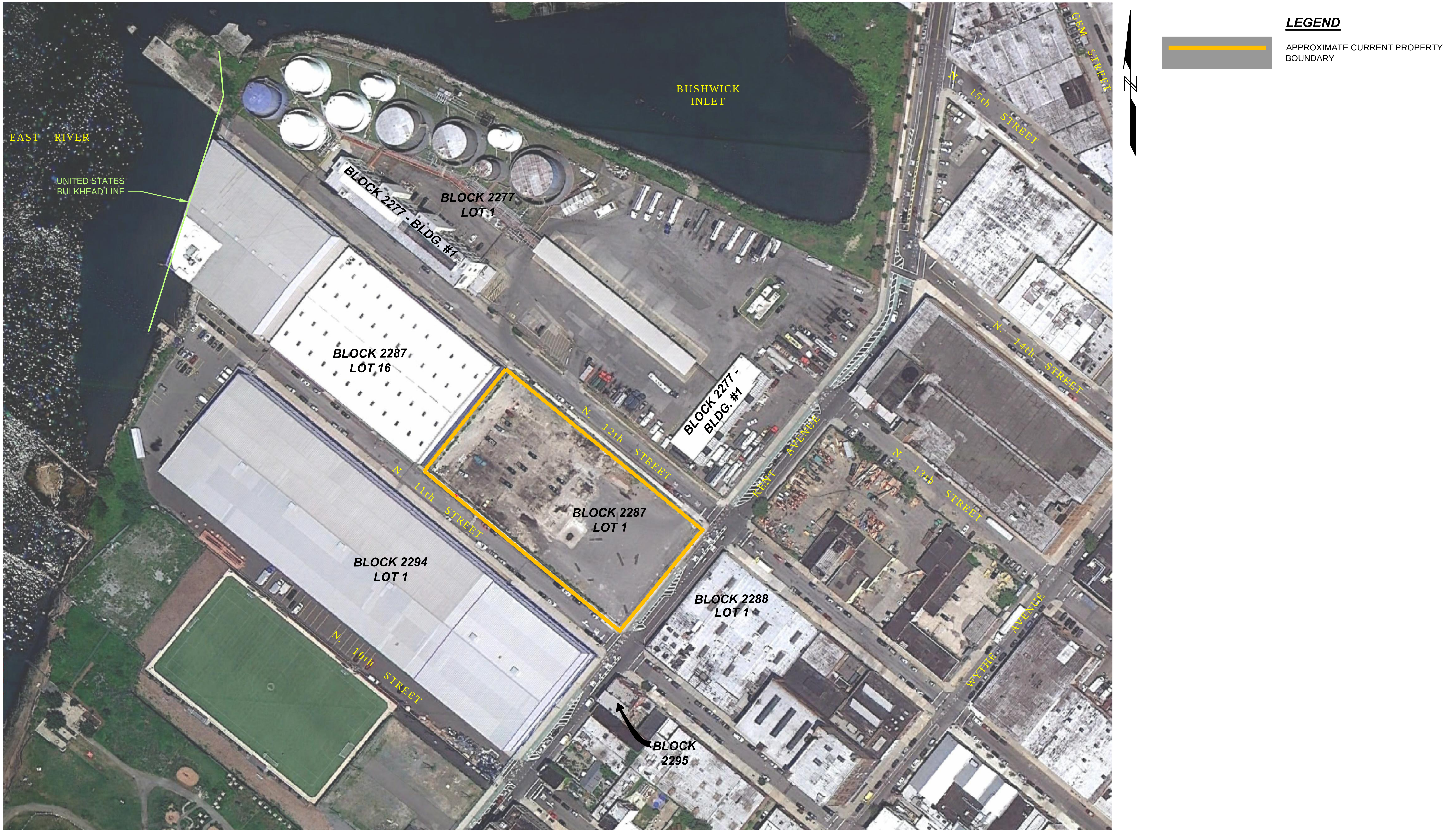
NOISE AND VIBRATION MONITORING LOCATIONS

Project 093060-1-1108	AUGUST 2012	Figure 2-2

I:\11176638\CAD\ FIGURE 2-2-REV1.dwg \Jan 11, 2013



SOURCES:

1. PHOTOGRAPH OBTAINED FROM BLUE SKY INTERNATIONAL LTD. ALL RIGHTS RESERVED. COPYRIGHT 2007.

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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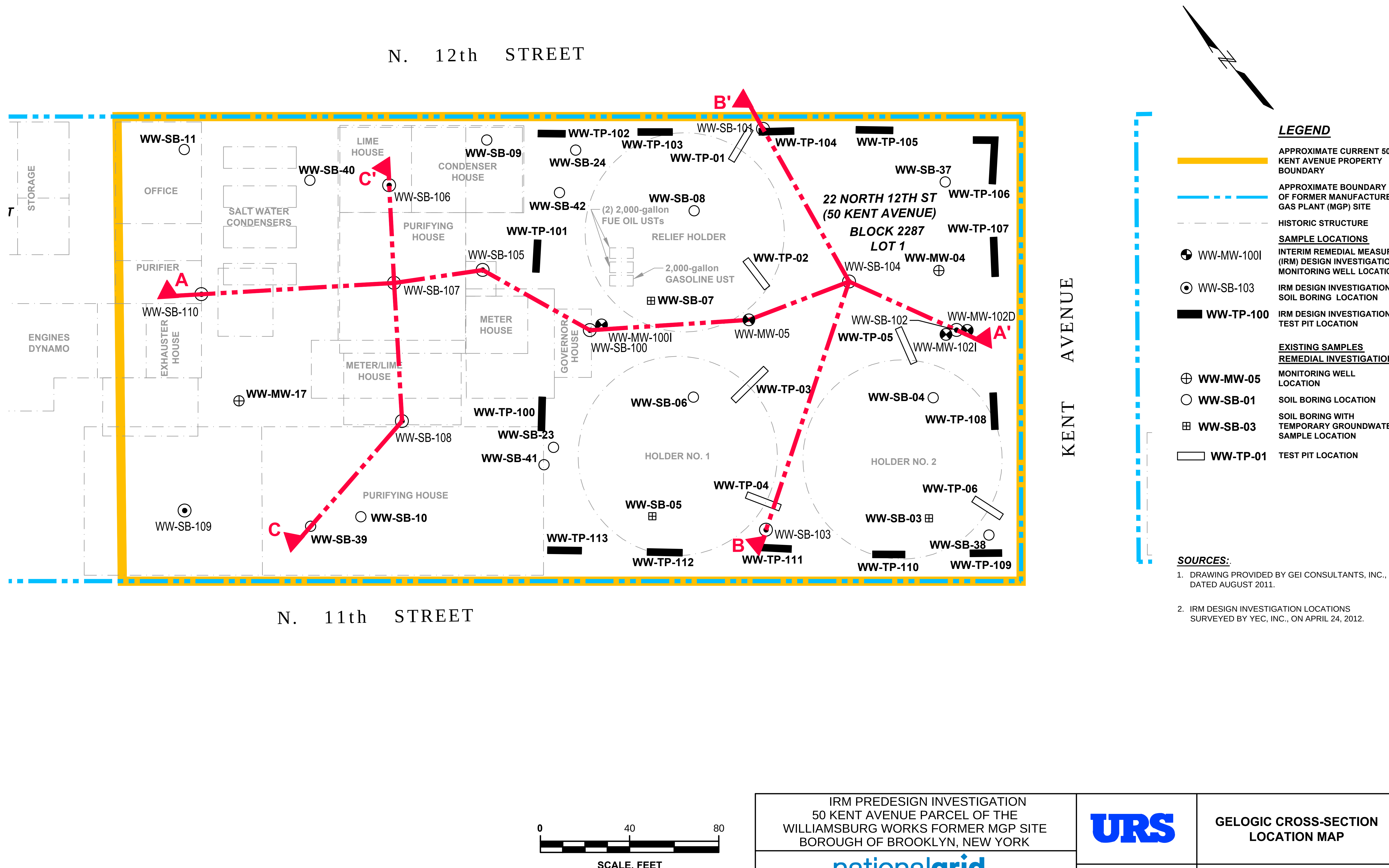
ADJACENT BUILDING LOCATIONS

Project 093060-1-1108 | AUGUST 2012 | Figure 2-3

I:\11176638\CAD\ FIGURE 2-3.dwg \Aug 10, 2012



IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

nationalgrid

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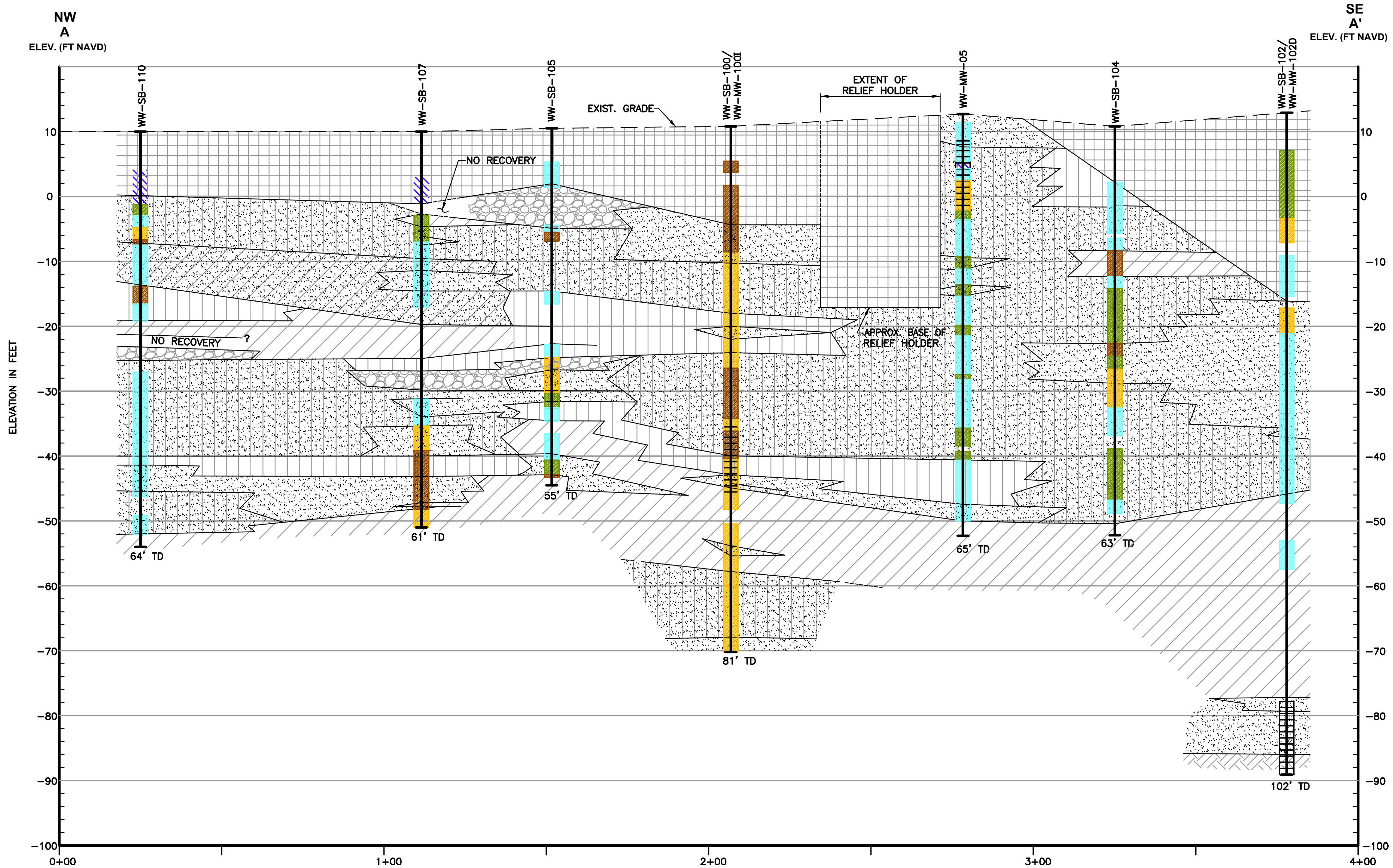
GELOGIC CROSS-SECTION LOCATION MAP

Project 11176638.00008 | AUGUST 2012 | Figure 3-1

I:\11176638\CAD\FIGURE 3-1.DWG



CROSS SECTION LEGEND

GEOLOGIC UNIT		PHYSICAL OBSERVATIONS	
FILL	CLAYEY SAND	TAR SATURATED	SOIL BORING IDENTIFICATION (WW-SB-104)
SAND	GRAVEL OR COBBLES	BLEBS, GLOBS, LENSES, COATINGS, AND TAR/NAPHTHA ODORS	SOIL BORING LOCATION
SILT	SCHIST BEDROCK	TAR SHEEN/STAINING AND TAR/NAPHTHA ODORS	BOUNDARY IS APPROXIMATED
SILTY SAND		TAR/NAPHTHA-LIKE ODORS	MONITORING WELL SCREENED INTERVAL
CLAY		PETROLEUM ODORS	

10' 0 10'
VERTICAL SCALE IN FEET

20' 0 20'
HORIZONTAL SCALE IN FEET

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

nationalgrid

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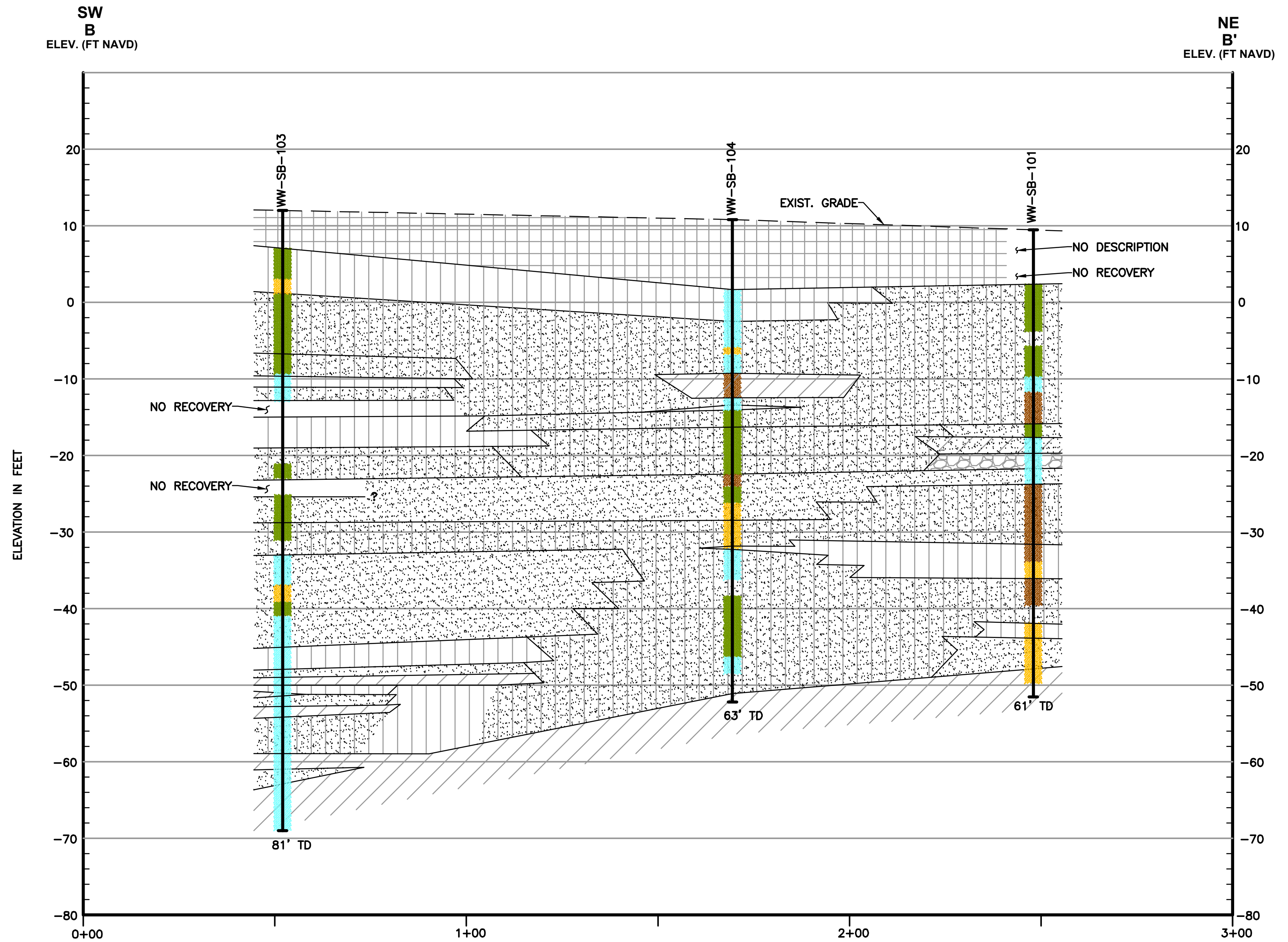
**IRM DESIGN INVESTIGATION
GEOLOGIC
CROSS-SECTION A-A'**

Project 11176638.00008 | AUGUST 2012 | Figure 3-2

I:\11176638\CAD\FIGURE 3-2.DWG



CROSS SECTION LEGEND

GEOLOGIC UNIT

- FILL
- SAND
- SILT
- SILTY SAND
- CLAY
- CLAYEY SAND
- GRAVEL OR COBBLES
- SCHIST BEDROCK

PHYSICAL OBSERVATIONS

- TAR SATURATED
- BLEBS, GLOBS, LENSES, COATINGS, AND TAR/NAPHTHA ODORS
- TAR SHEEN/STAINING AND TAR/NAPHTHA ODORS
- TAR/NAPHTHA-LIKE ODORS
- PETROLEUM ODORS

WW-SB-104 SOIL BORING IDENTIFICATION

SOIL BORING LOCATION

BOUNDARY IS APPROXIMATED

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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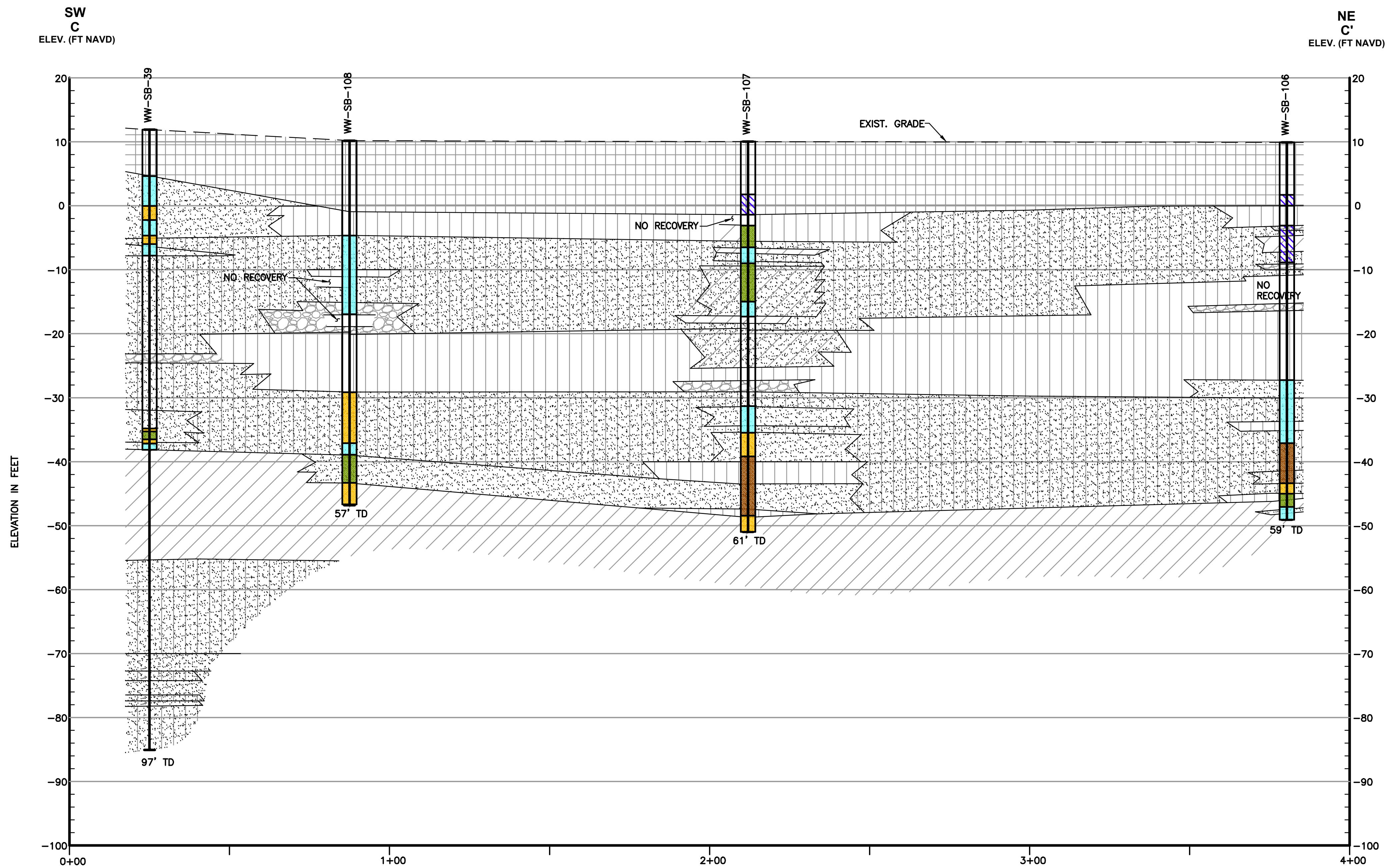
IRM DESIGN INVESTIGATION GEOLOGIC CROSS-SECTION B-B'

Project 11176638.00008 | AUGUST 2012 | Figure 3-3

I:\11176638\CAD\FIGURE 3-3.DWG



CROSS SECTION LEGEND

GEOLOGIC UNIT

- FILL
- SAND
- SILT
- SILTY SAND
- CLAY
- CLAYEY SAND
- GRAVEL OR COBBLES
- SCHIST BEDROCK

PHYSICAL OBSERVATIONS

- TAR SATURATED
- BLEBS, GLOBS, LENSES, COATINGS, AND TAR/NAPHTHA ODORS
- TAR SHEEN/STAINING AND TAR/NAPHTHA ODORS
- TAR/NAPHTHA-LIKE ODORS
- PETROLEUM ODORS

WW-SB-106 SOIL BORING IDENTIFICATION

SOIL BORING LOCATION

BOUNDARY IS APPROXIMATED

10' 0 10' VERTICAL SCALE IN FEET

20' 0 20' HORIZONTAL SCALE IN FEET

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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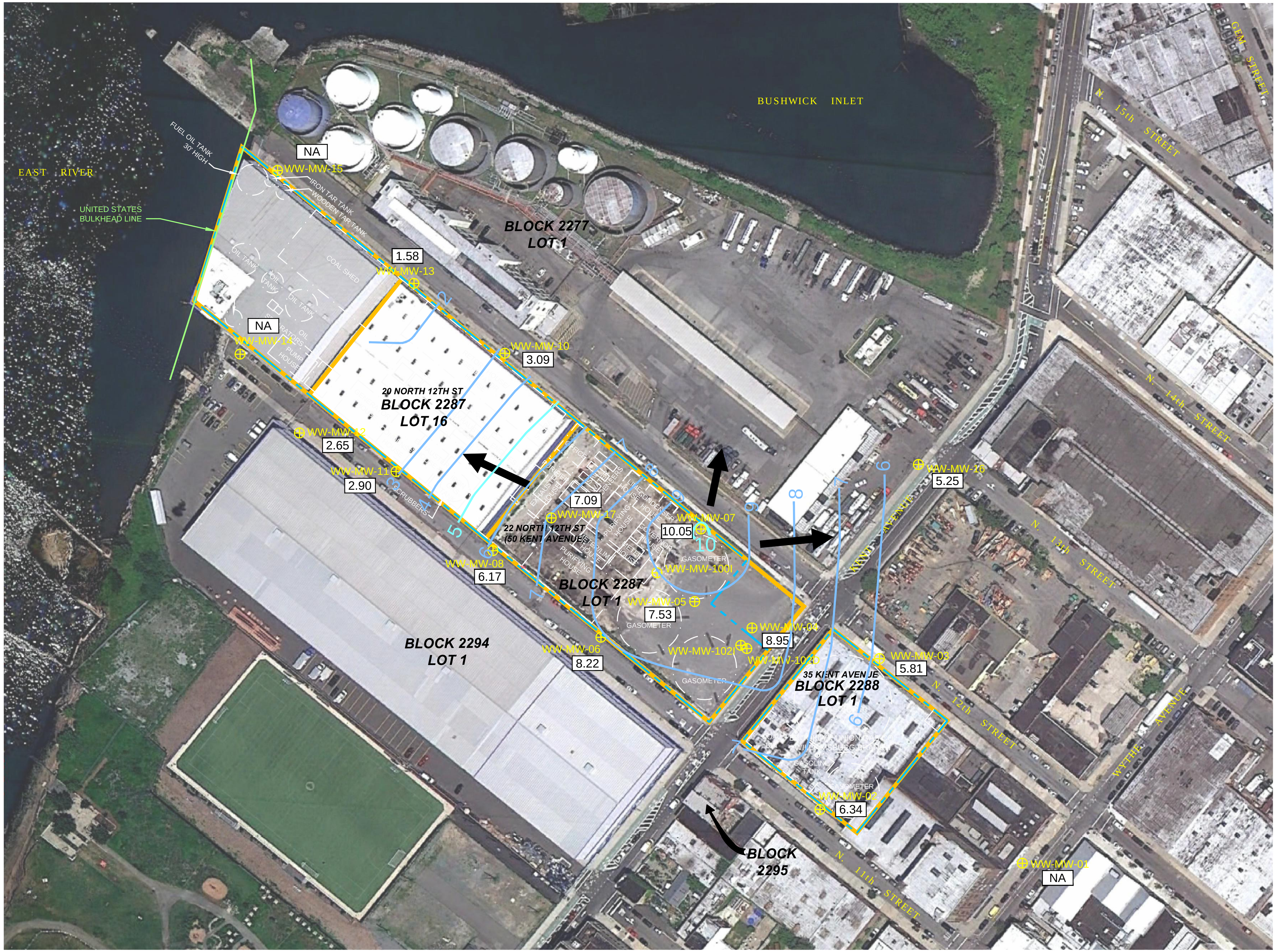
URS

**IRM DESIGN INVESTIGATION
GEOLOGIC
CROSS-SECTION C-C'**

Project 11176638.00008 | AUGUST 2012 | Figure 3-4

I:\11176638\CAD\FIGURE 3-4.DWG



LEGEND

APPROXIMATE CURRENT PROPERTY BOUNDARY

APPROXIMATE BOUNDARY OF FORMER MANUFACTURED GAS PLANT (MGP) SITE

HISTORIC STRUCTURE

WW-MW-05 REMEDIAL INVESTIGATION (RI) MONITORING WELL LOCATION

7.74 GROUNDWATER ELEVATION (FEET AMSL)

8 GROUNDWATER CONTOUR (FEET AMSL)

GROUNDWATER FLOW DIRECTION

NOTE:

THE WATER LEVEL AT WW-MW-07 IS ELEVATED DUE TO WATER DRAINING INTO THE AREA FROM THE ADJACENT HOLDER. THE WATER ELEVATION WITHIN THE HOLDER IS 8.27 FEET NAVD.

SOURCES:

1. PHOTOGRAPH OBTAINED FROM BLUE SKY INTERNATIONAL LTD. ALL RIGHTS RESERVED. COPYRIGHT 2007.
2. GROUNDWATER LEVELS MEASURED ON APRIL 23, 2012.

0 150 300

SCALE, FEET

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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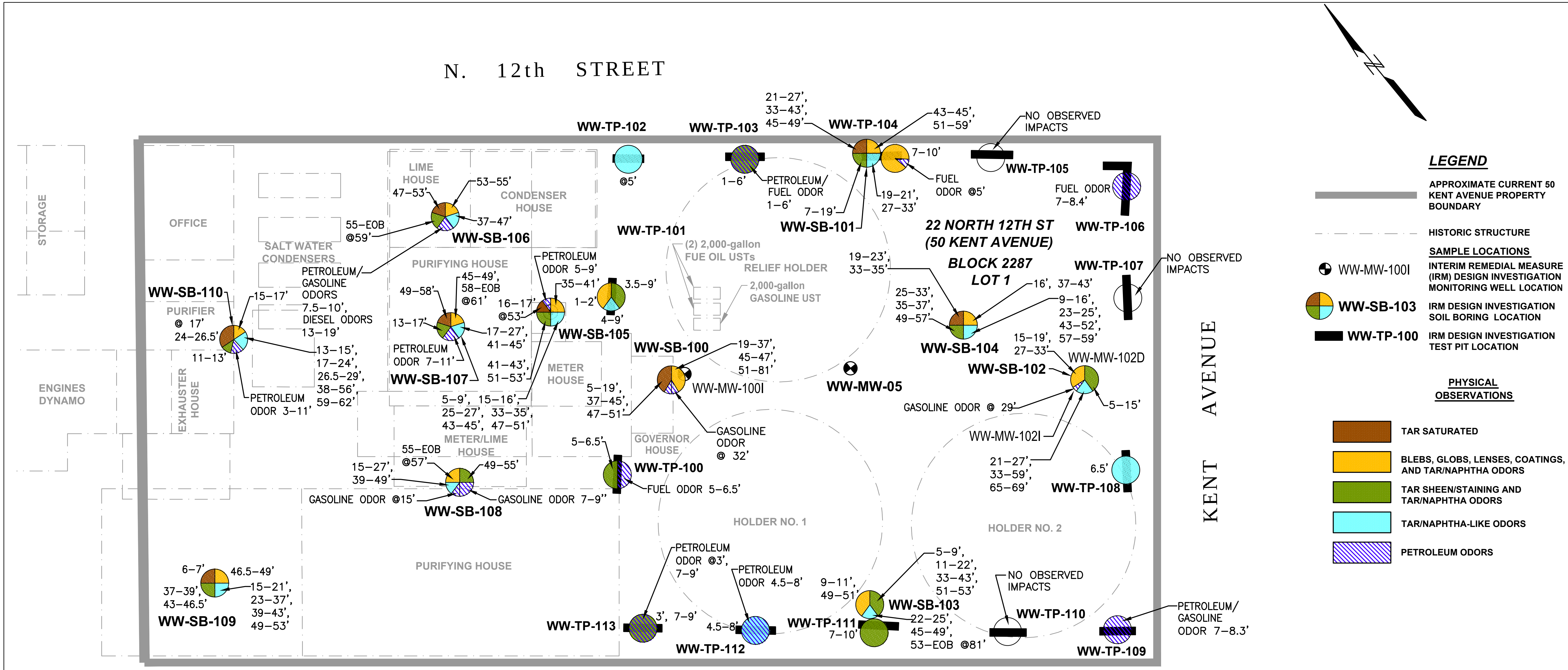
GROUNDWATER CONTOURS (FEET AMSL)

Project 093060-1-1108 | AUGUST 2012 | Figure 3-5

I:\11176638\CAD\ FIGURE 3-5.dwg \Aug 10, 2012

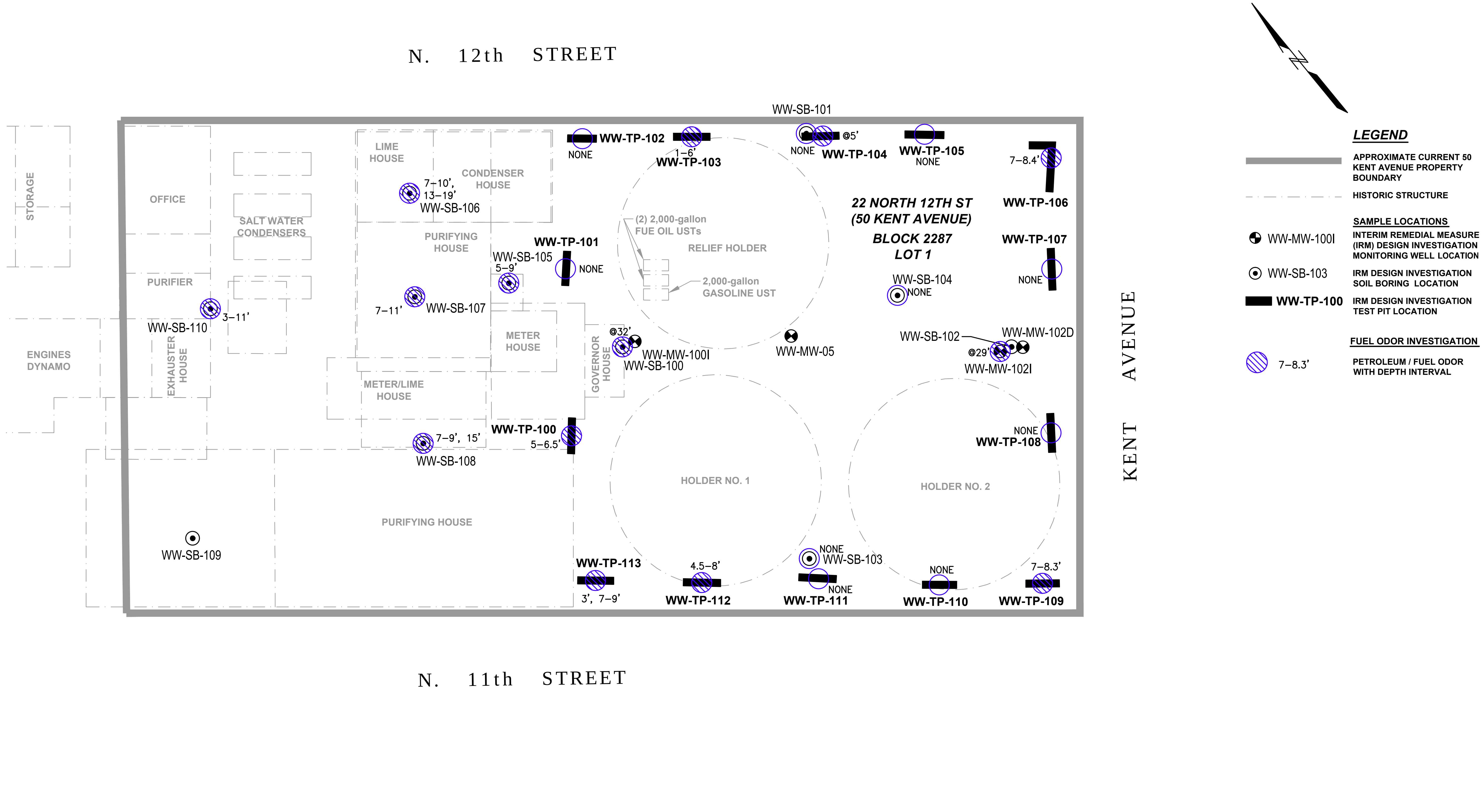


SOURCE:

1. IRM DESIGN INVESTIGATION LOCATIONS SURVEYED BY YEC, INC., ON APRIL 24, 2012.

IRM PREDESIGN INVESTIGATION 50 KENT AVENUE PARCEL OF THE WILLIAMSBURG WORKS FORMER MGP SITE BOROUGH OF BROOKLYN, NEW YORK	URS	**QUALITATIVE OBSERVATIONS IN SOIL BORINGS AND TEST PITS**
nationalgrid	Project 11176638.00008	AUGUST 2012 Figure 3-6

I:\11176638\CAD\FIGURE 3-6.DWG



SOURCE:

1. IRM DESIGN INVESTIGATION LOCATIONS SURVEYED BY YEC, INC., ON APRIL 24, 2012.

0 40 80

SCALE, FEET

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

URS

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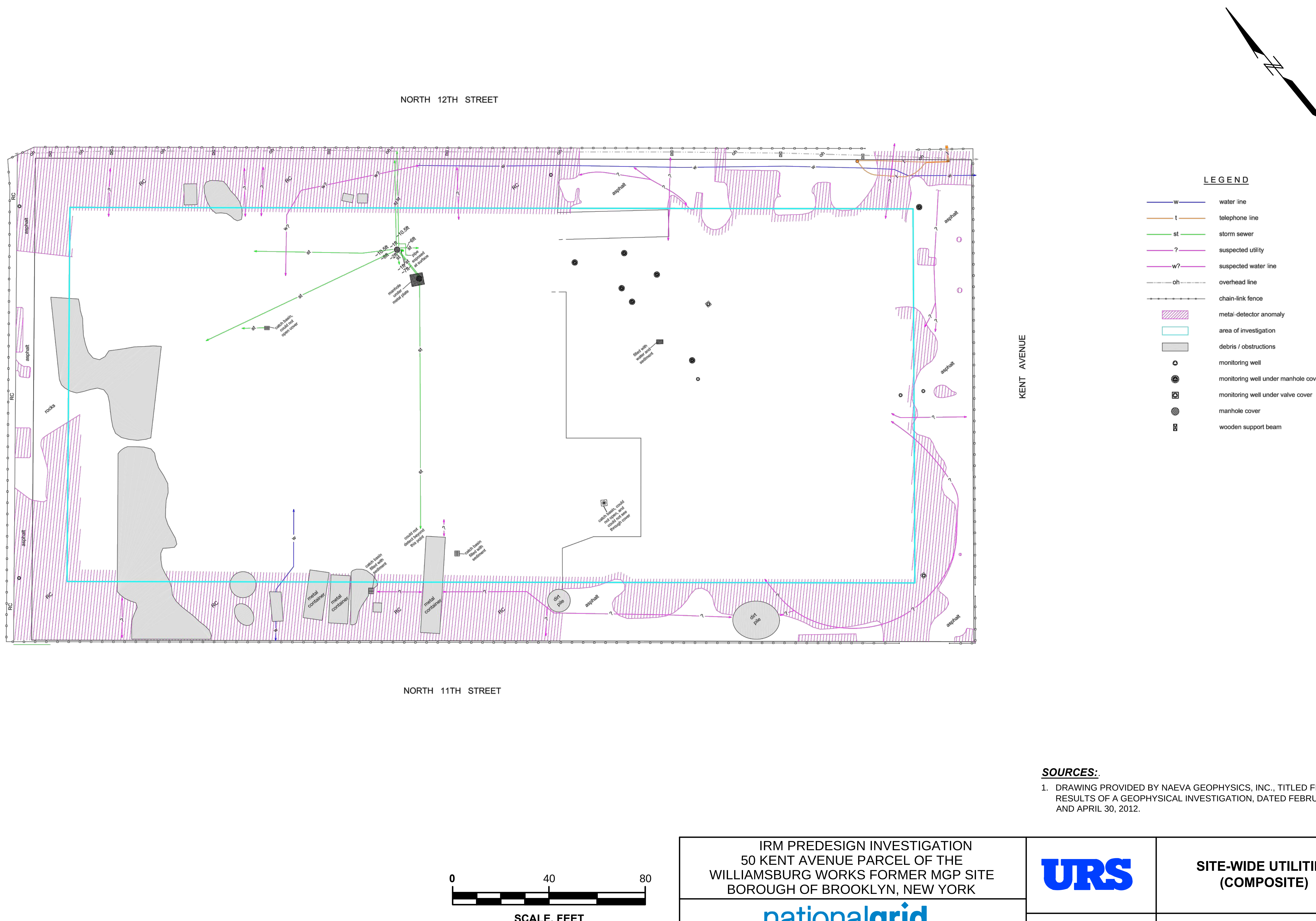
PETROLEUM / FUEL ODORS

Project 11176638.00008 | AUGUST 2012 | Figure 3-7

I:\11176638\CAD\FIGURE 3-7.DWG

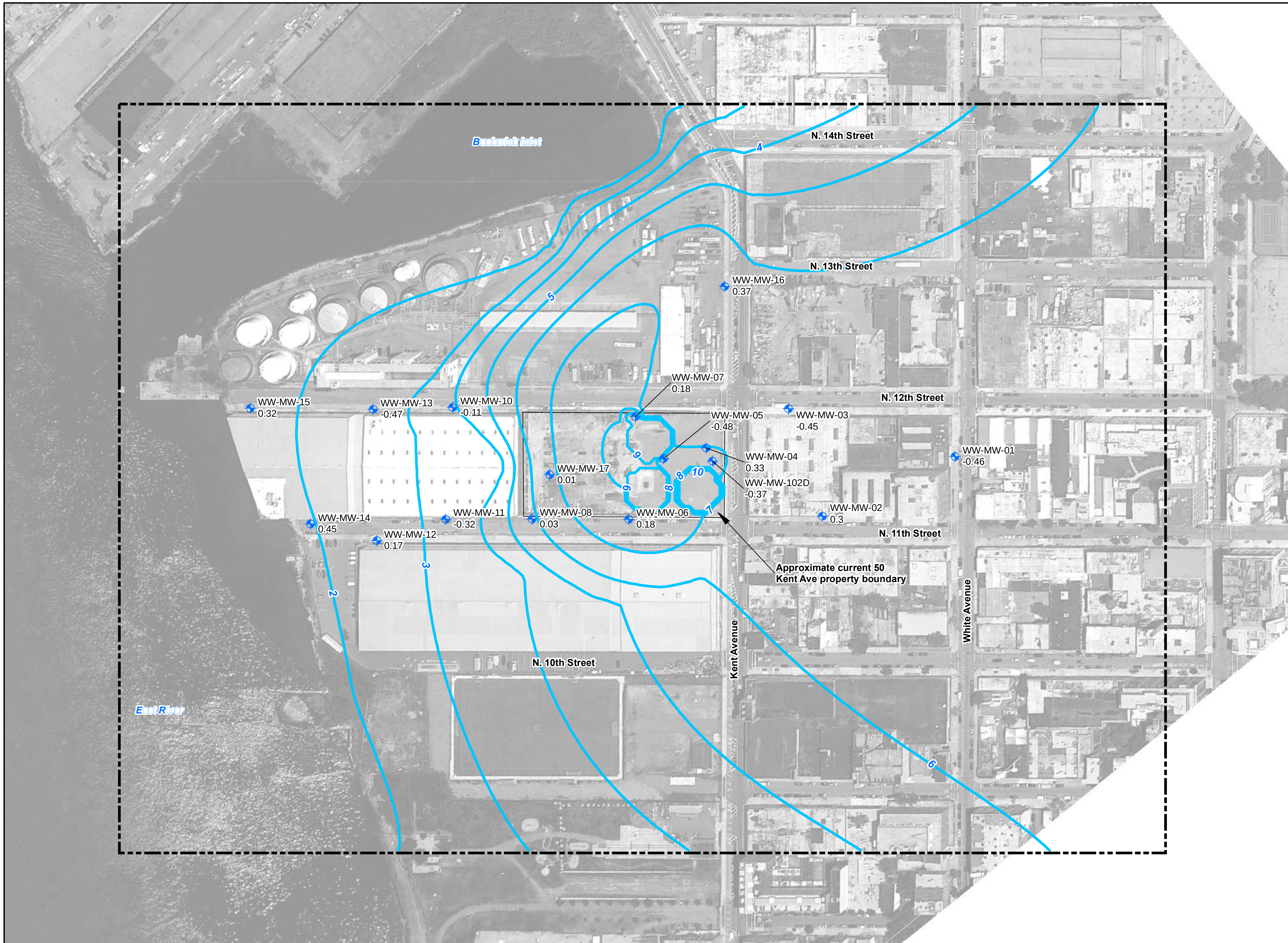


SOURCES:

1. DRAWING PROVIDED BY NAEVA GEOPHYSICS, INC., TITLED FIGURE 1: RESULTS OF A GEOPHYSICAL INVESTIGATION, DATED FEBRUARY 23, AND APRIL 30, 2012.

IRM PREDESIGN INVESTIGATION 50 KENT AVENUE PARCEL OF THE WILLIAMSBURG WORKS FORMER MGP SITE BOROUGH OF BROOKLYN, NEW YORK	URS	**SITE-WIDE UTILITIES (COMPOSITE)**
nationalgrid	Project 11176638.00008	AUGUST 2012 Figure 3-8

I:\11176638\CAD\FIGURE 3-8.DWG



Legend

Monitoring Well

WW-MW-06 0.18 — Monitoring Well ID, Calculated Residual

Simulate Quasi-Steady State Potentiometric Surface

Model Domain

PHOTOGRAPH OBTAINED FROM GOOGLE EARTH TM ©2009, IMAGE ©2010 DIGITAL GLOBE, ACCESSED ON 10/20/10.

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

nationalgrid

URS

Project 11176638

Quasi-Steady State Calibrated Groundwater Level Contours and Calibration Residuals

July, 2012

Figure 3-9

Path: W:\General\Williamsburg\GIS\Figures2012\FigL-3 Simulated GW.mxd

Path: W:\General\Williamsburg\GIS\Figures2012\FigK-5 SC1 Layer 2.mxd

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

nationalgrid

URS

Simulated Groundwater Levels by 11 days in Layer 2 for Senario 1

Project 11176638

February, 2013

Figure 4-1

Path: W:\General\Williamsburg\GIS\Figures2012\FigK-4 SC1 Layer 1.mxd

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

URS

nationalgrid

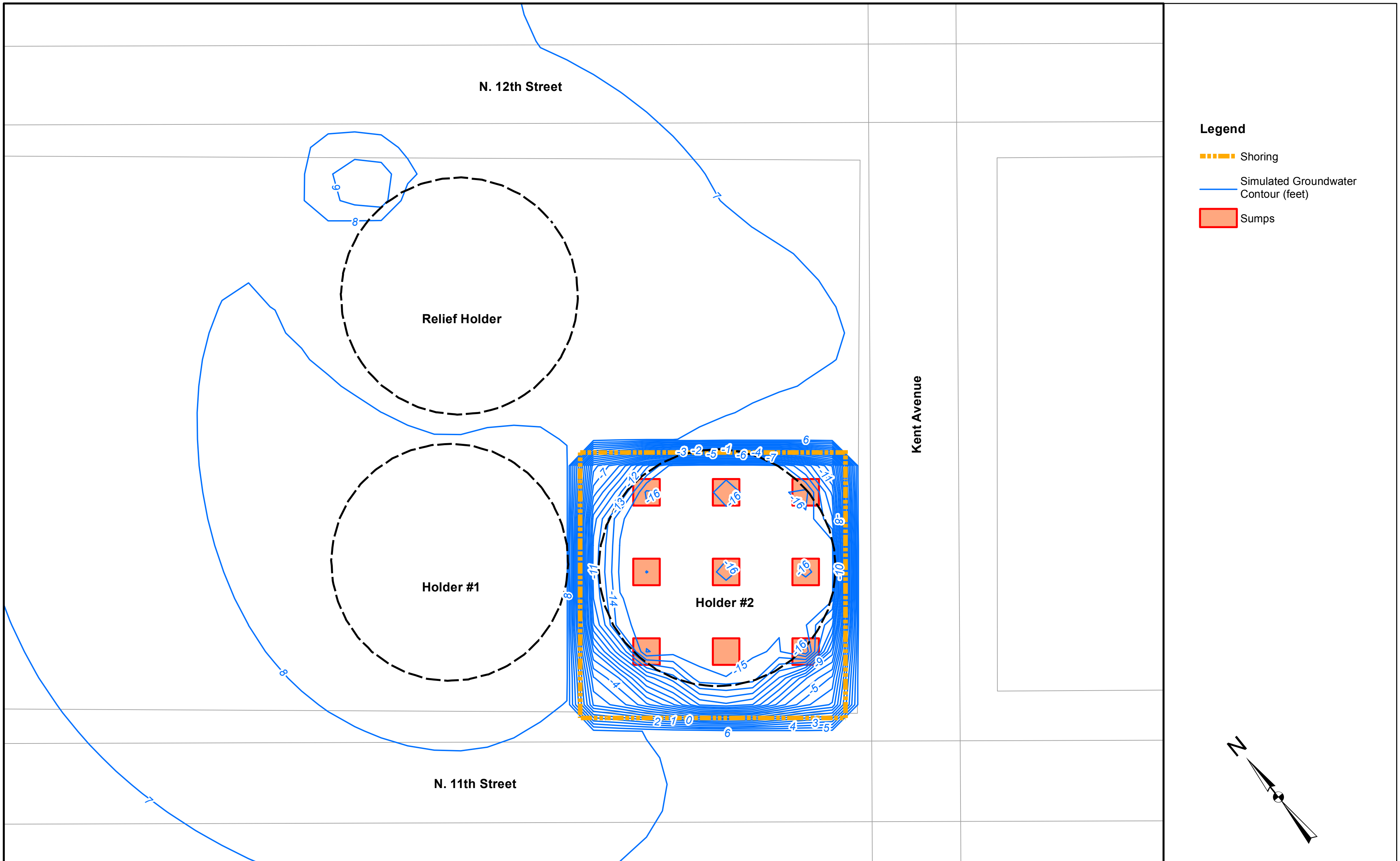
Simulated Groundwater Levels by 11 days in Layer 1 for Senario 1

Project 11176638

February, 2013

Figure 4-2

Path: W:\General\Williamsburg\GIS\Figures2012\FigK-6 SC2 Layer 1.mxd



IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

nationalgrid

URS

Simulated Groundwater Levels by 9 days in Layer 1 for Senario 2

Project 11176638

February, 2013

Figure 4-3

APPENDIX A

SOIL BORING LOGS

URS Corporation

TEST BORING LOG

BORING NO. :	WW-SB-100
SHEET:	1 OF 3
JOB NO. :	11176638.00001
NORTHING:	688817.2756
EASTING:	641888.2556
GROUND ELEVATION:	10.69
DATE STARTED:	3/30/2012
DATE FINISHED:	4/3/2012
DRILLER:	Mike Meade
GEOLOGIST:	Andreas Papaneocleous
REVIEWED BY:	Tim Burmeier

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg
CLIENT:	National Grid
BORING CONTRACTOR:	Fenley & Nicol

GROUNDWATER:

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		140 lb		
				FALL		24"		

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0 to -5										Boring hand cleared to 5 ft bgs
-5			1	7	2, 3, 4, 3	50	Brown	FILL: sand and silt, little gravel	21.3 10.5	100% NAPL saturation, heavy black coating, strong CT-like odor
			2	32	10, 14, 18, 19	0		No Recovery		
-10			3	33	11, 14, 19, 24	63		FILL: sand and silt, trace gravel, brick, clay and mica	72.6	Moist to wet 100% NAPL saturation, heavy black coating, strong CT-like odor
			4	40	12, 17, 23, 29	79			83.4 17.4	
			5	7	10, 4, 3, 10	58			11.1 8.2	100% NAPL saturation, heavy black coating, strong CT-like odor
-15			6	43	12, 19, 24, 28	42	Gray	Fine to medium SAND (SW), some gravel, trace silt and clay	24.1 18.8	
			7	31	9, 14, 17, 22	71	Brown	Fine to coarse SAND (SW), some silt, gravel and clay	2.6	100% NAPL saturation, light brown coating, strong CT-like odor, dry
-20			8	45	5, 19, 26, 33	33	Gray		1.8 2.1	Heavy coating, moderate CT-like odor
			9	80	21, 37, 43, 48	42		Fine SAND and SILT (SM), trace clay	0.5 0.2	
-25			10	70	24, 34, 36, 39	42			0.4 0.1	Moist

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-100

URS Corporation	**TEST BORING LOG**
	BORING NO. : WW-SB-100
PROJECT/PROJECT LOCATION: National Grid - Williamsburg	**SHEET:** 2 **OF** 3
CLIENT: National Grid	**JOB NO. :** 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11	70	18, 32, 38, 41	21			1.5	Heavy coating, strong CT-like odor
									3.1	
			12	79	48, 42, 37, 26	50			39.1	
									25.4	
-30			13	112	48, 51, 61, 63	33		SILT (ML), some fine sand, trace gravel, clay and mica	6.8	Heavy coating, moderate CT-like odor
									4.8	
			14	170	58, 70, 100/1, -	42		Fine to medium SAND (SW), some silt	3.7	Wet Strong gasoline odor, blebs
									2.1	
			15	126	41, 62, 64, 71	50		SILT (ML), some clay, trace fine sand and gravel	6.6	
									5.0	
-35			16	100	150, 100/3, -, -	33		Fine to coarse SAND and SILT (SW/ML), some gravel, trace mica	31.5	Heavy coating, strong CT-like odor, blebs
									29.1	
			17	100	100/2, -, -, -	8			438	100% NAPL saturation, strong CT-like odor
									226	
-40			18	100	90, 100/3, -, -	42			10	100% NAPL saturation, strong CT-like odor, blebs
									5.1	
			19	100	100/6, -, -, -	25		Fine to medium SAND (SW), some silt	361	100% NAPL saturation, strong CT-like odor
									171	
			20	100	100, 100/5, -, -	50		trace gravel	333	
									266	
-45			21	88	50, 35, 53, 33	75		Fine SAND (SP), some silt, trace mica	76.5	Heavy coating, strong CT-like odor
									110	
			22	111	37, 48, 63, 90	100			233	100% NAPL saturation, strong CT-like odor
									116	
-50			23	100	62, 100/3, -, -	42			50.2	
									60.1	
			24	112	38, 49, 63, 90	58		SILT (ML), some clay, trace fine sand and mica	50.7	Dry, product in spoon, heavy coating, blebs
									64.2	
			25	100	60, 100/5, -, -	50	Brown	Fine to medium SAND (SW), trace silt	104	Strong CT-like odor, heavy coating
-55								Fine to medium SAND and SILT (SM)	134	Wet
			26	98	135, 35, 63, 80	54		CLAY (CL), medium plasticity	22.6	Moderate CT-like odor, light coating

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-100

URS *Corporation*

TEST BORING LOG

BORING NO. : WW-SB-100

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
							24	Dry
	27	103	35, 50, 53, 47	42			28 23.7	Blebs, moderate CT-like odor
-60	SH1		-, -, -, -	-				Shelby Tube collected from 59 to 61 ft bgs
	28	126	57, 63, 63, 75	58	Gray to Orange	CLAY (CL), medium plasticity	5.3 3.5	Faint CT-like odor, light coating
	29	129	42, 63, 66, 100	100			36.8 28.1	
-65	30	196	73, 96, 100/3, -	83	Gray	Fine SAND and SILT (SM), some clay and mica CLAY (CL), medium plasticity	79 173	Moderate CT-like odor, heavy coating
	31	200	64, 100, 100/4, -	100		SILT and CLAY (ML/CL), some fine to coarse sand and mica	35.5 43.7	
-70	32	234	70, 134, 100/1, -	13		Fine SAND and SILT (SM), some clay and mica	9.8 7.7	Light coating, blebs, faint CT-like odor
	33	200	78, 100, 100/2, -	42			5.5 3.5	
	34	190	75, 90, 100/2, -	58			64.3 58	
-75	35	183	47, 83, 100/5, -	38			1.5 1.2	Faint CT-like odor, light coating
	36	86	21, 21, 65, 100/5	79			35.6 17.3	
-80	37	163	43, 63, 100/2, -	66		Fine SAND (SP), trace silt	20.2 17.5	Moist to wet, light coating, faint CT-like odor
						End of boring at 81 ft bgs.		
-85								

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-100

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-101

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**SHEET:** 1 **OF** 3	
CLIENT:	National Grid	**JOB NO. :**	11176638.00001
BORING CONTRACTOR:	Fenley & Nicol	**NORTHING:** 688837.9514	**EASTING:** 642005.5190
GROUNDWATER: 21'		**GROUND ELEVATION:**	9.47

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		140 lb		
				FALL		24"		

DATE STARTED:	3/26/2012
DATE FINISHED:	3/28/2012
DRILLER:	Mike Meade
GEOLOGIST:	Andreas Papaneocleous
REVIEWED BY:	Tim Burmeier

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0 to -5								Boring hand cleared to 5 ft bgs
-5	1	3	2, 1, 2, 1	0		No Recovery		
	2	2	1, 1, 1, 2	33	Brown	Fine to medium SAND (SW), some silt, trace gravel, very loose	9.0, 6.2	Moist Strong CT-like odor, slight sheen, moderate staining
-10	3	9	2, 3, 6, 5	13		Fine SAND and SILT (SM), trace clay, loose	9.0, 7.6	
	4	7	2, 3, 4, 3	79			100, 92.3	
	5	11	1, 3, 8, 8	0		No Recovery		
-15	6	39	36, 24, 15, 22	100		Fine to medium SAND and SILT (SW/ML), some clay and mica, dense	1.6, 0.5	Strong CT-like odor, slight sheen
	7	29	8, 10, 19, 20	29		medium dense	10.8, 7.7	Faint CT-like odor
	8	40	12, 22, 18, 18	50		Fine SAND (SP), some silt, clay and mica, dense	4.7, 3.1	Faint CT-like odor
-20	9	30	11, 14, 16, 17	58		Fine to medium SAND (SW), some silt, medium dense	900, 2,238	Wet 100% dark brown NAPL saturation, strong CT-like odor
-25	10	31	10, 11, 20, 20	75		dense		PID not working properly

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-101

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
	11	71	26, 32, 39, 41	75		trace silt and mica, very dense		Strong CT-like odor, moderate staining, slight sheen
	12	50	50/2, -, -, -	8		Fine to medium SAND and CLAY (SW/CL), trace silt and mica, very dense		Moderate CT-like odor
-30	13	125	45, 50, 75/3, -	50		Fine to coarse SAND and GRAVEL (SW/GW), trace silt, very dense		
	14	120	150, 120, -, -	25		Fine SAND (SP), some gravel, trace silt, very dense		
	15	100	80, 100/4, -, -	42		Fine SAND and SILT (SM), trace mica, very dense		100 % NAPL saturation, strong CT-like odor
-35	16	130	40, 50, 80, 100/4	75		some gravel		
	17	150	150/3, -, -, -	13			265	
-40	18	94	30, 42, 52, 80	21			600	
	19	98	35, 42, 56, 48	54	Gray	SILT (ML), some fine to coarse sand, very dense	130	Strong CT-like odor, 50-75% NAPL saturation
	20	56	18, 24, 32, 56	71			531 232	Light coating, strong CT-like odor
-45	21	56	18, 24, 32, 52	100	Brown	Fine to coarse SAND and SILT (SW/ML), trace mica, very dense	914 613	100% NAPL saturation, strong CT-like odor
	22	78	41, 55, 23, 45	92	Brown and Gray		82.9 57	100% NAPL saturation, strong CT-like odor
-50	23	50	24, 28, 22, 33	0		No Recovery		
	24	49	25, 28, 21, 29	38		SILT (ML), some clay, trace fine to medium sand and mica, dense	58.2 73.3	Moderate CT-like odor, light coating
	25	78	21, 32, 46, 53	42	Brown	Fine SAND (SP), trace silt and mica, very dense	15.5	
-55	26	94	40, 44, 50, 95	100		Fine to coarse SAND (SW), trace silt and mica, very dense	2.3	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : **WW-SB-101**

URS *Corporation*

TEST BORING LOG

BORING NO. : **WW-SB-101**

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 OF 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			27	138	50, 62, 76, 83	71		CLAY (CL), trace fine sand and mica, medium plasticity, hard	250 182	
-60			SH1	-	-, -, -, -	-				Shelby Tube collected from 59 to 61 ft bgs
								End of boring at 61 ft bgs.		
-65										
-70										
-75										
-80										
-85										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**BORING NO. :**	WW-SB-102
CLIENT:	National Grid	**SHEET:**	1 OF 4
BORING CONTRACTOR:	Fenley & Nicol	**JOB NO. :**	11176638.00001
GROUNDWATER:	5'	**NORTHING:** 688713.1900	**EASTING:** 642015.5750
		GROUND ELEVATION:	11.73
		DATE STARTED:	4/6/2012
		DATE FINISHED:	4/19/2012
		DRILLER:	Mike Meade
		GEOLOGIST:	Andreas P., Mira A.
		REVIEWED BY:	Tim Burmeier

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		140, 300		
				FALL		24"		

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0										Boring hand cleared to 5 ft bgs
-5			1	2	3, 1, 1, 7	25	Gray	FILL: sand and silt, trace gravel, clay and brick	0.0	Wet Faint CT-like odor, heavy staining
			2	6	9, 3, 3, 3	42			0.0	
-10			3	7	6, 4, 3, 3	33			0.0	
			4	21	4, 10, 11, 11	33			0.0	
			5	53	7, 13, 40, 10	33			0.0	
-15			6	42	15, 19, 23, 32	42		FILL: sand and gravel, some silt, trace mica and brick	0.1	Light coating, faint CT-like odor
			7	24	4, 10, 14, 19	50			0.0	
-20			8	8	2, 1, 7, 2	0		No Recovery		
			9	17	21, 10, 7, 7	17		FILL: silt and gravel, some brick	0.0	Faint CT-like odor
-25			10	60	35, 24, 36, 30	75			0.2	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig. 140 lb hammer used 5'-81'. 300 lb hammer used 81'-100'.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
	11	14	20, 7, 7, 7	42			0.0	
	12	6	7, 3, 3, 100/0	58		FILL: sand, trace silt and brick	36.4 29.2	Moderate CT-like odor, light coating
-30	13	100	120, 30, 70, 100/5	100		Fine to medium SAND and GRAVEL (SW/GW), trace silt and mica	57 46.1	Heavy gasoline odor, light coating, slight sheen
	14	58	12, 24, 34, 38	100			3.3 2.7	Moderate CT-like odor, light coating, slight sheen
	15	97	35, 44, 53, 60	100	Brown	Fine SAND (SM), some silt, trace mica	1.2 0.7	Dry Faint CT-like odor
-35	16	74	17, 24, 50, 60	100			1.2 0.8	
	17	97	41, 67, 30, 73	75		Fine to medium SAND (SW), trace silt and mica	0.0	Moist
-40	18	43	7, 19, 24, 76	50		Fine SAND (SP), trace silt and mica	0.0	
	19	79	25, 33, 46, 62	42			0.0	
	20	89	28, 43, 46, 59	100			2.2 1.6	Moderate CT-like odor
-45	21	84	28, 36, 48, 63	100			11.6 9.5	Faint CT-like odor
	22	52	21, 16, 36, 95	100		SILT (ML), trace fine sand and mica	7.7 6.5	
-50	23	59	14, 26, 33, 44	100		Fine to medium SAND (SW), trace silt and mica	3.3 2.8	
	24	155	25, 65, 90, 88	54		Fine SAND and SILT (SM), trace mica	0.0	Dry
	25	30	26, 15, 15, 17	75		Fine SAND (SP), trace silt and mica	1.1 0.3	
-55	26	31	7, 14, 17, 21	100			1.6	Moist

COMMENTS: Boring advanced using a Cantera CT-450 drill rig. 140 lb hammer used 5'-81'. 300 lb hammer used 81'-100'.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS *Corporation*

TEST BORING LOG

BORING NO. : WW-SB-102

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 **OF** 4

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			27	53	13, 18, 35, 60	71		some clay	13.1 7.2	Faint CT-like odor
-60			28	46	12, 20, 26, 31	29		CLAY (CL), medium plasticity	0.0	No odor, dry
			29	138	24, 68, 70, 51	63			0.0	
			SH1	-	-, -, -, -	-				Shelby Tube collected from 63 to 65 ft bgs
-65			30	69	20, 30, 39, 30	79		CLAY (CL), medium to high plasticity, some sand, trace silt some fine to coarse sand and silt	0.0	Faint CT-like odor
			31	62	23, 27, 35, 36	79			0.0	
-70			32	40	7, 15, 25, 37	71			0.0	No odor
			33	85	48, 33, 52, 76	79	Brown to Gray	CLAY (CL), medium to high plasticity	0.0	
			34	80	40, 40, 40, 28	83			0.0	
-75			35	47	17, 17, 30, 38	54			0.0	
			36	74	30, 34, 40, 56	100			0.0	
-80			37	101	39, 46, 55, 70	83			0.0	
			38	20	7, 10, 10, 11	33	Gray		0.0	Switch to mud rotary and 300 lb hammer
			39	35	11, 15, 20, 21	67		some silt and fine sand, trace mica	0.0	
-85			40	25	7, 10, 15, 16	100			0.0	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig. 140 lb hammer used 5'-81'. 300 lb hammer used 81'-100'.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : **WW-SB-102**

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-102

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 4 **OF** 4

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			41	36	11, 17, 19, 21	50			0.0	Moist
-90			42	69	11, 24, 45, 52	92	Gray to White	Fine to medium SAND and SILT (SM)	0.0	
			43	76	35, 26, 50, 63	100	Gray White	Fine to medium SAND (SW), trace silt and clay	0.0	Dry
			44	129	42, 63, 69, 115	79	Gray		0.0	
-95			45	91	24, 40, 51, 38	75			0.0	
			46	95	19, 38, 57, 52	66			0.0	
-100			47	65	11, 26, 39, 51	92		Weathered SCHIST BEDROCK	0.0	
								End of boring at 101 ft bgs.		
-105										
-110										
-115										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig. 140 lb hammer used 5'-81'. 300 lb hammer used 81'-100'.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	BORING NO. :	WW-SB-103
CLIENT:	National Grid	SHEET:	1 OF 3
BORING CONTRACTOR:	Fenley & Nicol	JOB NO. :	11176638.00001
		NORTHING:	688697.9628
		EASTING:	641892.6929
		GROUND ELEVATION:	11.75
		DATE STARTED:	3/21/2012
		DATE FINISHED:	3/23/2012
		DRILLER:	Mike Meade
		GEOLOGIST:	Mira A., Andreas P.
		REVIEWED BY:	Tim Burmeier

GROUNDWATER: 11'

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		140 lb		
				FALL		24"		

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0						Asphalt		Boring hand cleared to 5 ft bgs
						FILL: sand, silt and gravel		
-5	1	16	7, 8, 8, 10	42	Black	SILT (ML), some very fine sand and mica, medium dense	58.4	CT-like odor, slight sheen
							222	Moderate staining, moist to wet
	2	12	4, 4, 8, 6	83		trace clay	80	
							315	
	3	8	2, 4, 4, 8	83		loose	220	Moist Light NAPL coating, CT odor
-10					Green		338	
	4	14	4, 7, 7, 10	75		Very fine to fine SAND (SM), some silt, medium dense	65.6	Wet, Moderate CT-like odor, slight sheen
							51.6	
	5	18	11, 8, 10, 7	54	Brown		390	Heavy staining
-15							794	
	6	21	4, 7, 14, 19	42		some mica	500	Heavy staining, CT-like odor, slight sheen
							196	
	7	60	18, 24, 36, 24	25		Fine to medium SAND (SM), some silt, very dense	11.7	Faint CT-like odor, slight sheen
							38.3	
-20	8	30	22, 20, 10, 17	42		Sandy SILT (ML), some fine to medium sand, trace fine gravel, medium dense	110	
							28.7	
	9	29	8, 14, 15, 20	58		Clayey SILT (ML), trace fine gravel and mica, medium dense	111	Faint CT-like odor
							36.8	
	10	47	13, 24, 23, 24	50		Fine SAND (SM), some silt, trace medium sand, fine gravel and mica, dense	3.8	
-25							2.7	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-103

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-103

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11	85	19, 35, 50/4, -	0		No Recovery		
			12	100	100/1, -, -, -	4	Gray	SILT (ML), some clay, trace fine sand, mica and wood, very dense		No odor, dry
-30			13	100	100/5, -, -, -	21			33.1 44.2	
			14	50	50/4, -, -, -	8		Silty SAND (SM), some silt, trace clay, very dense	46 3.0	
			15	50	42, 50/3, -, -	21	Brown	Fine to medium SAND (SW), some silt, very dense	123 36.9	CT-like odor, slight sheen
-35			16	50	50/4, -, -, -	0		No Recovery		
			17	58	32, 24, 34, 38	75		Fine to medium SAND (SW), trace silt and mica, very dense	32.6 10	CT-like odor, slight sheen
-40			18	36	21, 18, 18, 29	54		1" clay lens dense	543 840	CT-like odor, light staining
			19	50	31, 50/3, -, -	46		some silt, very dense	53.1 28.7	
			20	38	21, 19, 19, 26	33		dense	38.5 45.7	No odor
-45			21	37	18, 19, 18, 21	100		Fine SAND (SP), trace silt and mica, dense	1.9 1.3	CT-like odor, wet
			22	25	19, 18, 17, 20	100			28 1.3	
-50			23	30	9, 15, 15, 21	100		medium dense	3.2 3.1	Slight sheen, blebs
			24	36	15, 18, 18, 20	100		Fine to coarse SAND (SW), trace silt, dense	0.6 0.5	CT-like odor, slight sheen
			25	57	32, 28, 29, 36	100		Fine SAND (SP), trace silt, clay and mica, very dense	9.2 2.3	Moderate CT-like odor
-55			26	52	31, 24, 28, 36	100		Fine SAND and SILT (SM), trace mica, very dense	3.5	Dry

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-103

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION: National Grid - Williamsburg	**BORING NO. :** WW-SB-103
	SHEET: 3 **OF** 3
CLIENT: National Grid	**JOB NO. :** 11176638.00001

DEPTH FEET	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
						Fine to medium SAND (SW), trace silt and mica, very dense	8.6	
	27	50	31, 25, 25, 29	100			15.3	
						SILT (ML), some clay, trace fine to coarse sand and mica, dense	11.7	
	28	49	15, 18, 31, 36	100			57.1	
-60						Fine to medium SAND (SW), trace silt, dense	45.1	
	29	28	15, 16, 12, 19	75		CLAY (CL), plastic, very stiff	1.8	Faint CT-like odor
						SILT (ML), some fine sand, trace mica, medium dense	0.6	
	30	44	19, 21, 23, 25	100			0.5	
						CLAY (CL), some fine sand, hard	18	
-65	31	63	36, 31, 32, 28	100		Fine to medium SAND (SW), trace silt, dense	4.5	Faint CT-like odor
						CLAY and SILT (CL/ML), trace fine to medium sand and mica, hard	39	
	32	66	36, 42, 24, 28	100		Fine to coarse SAND (SW), some silt, trace mica, very dense	4.1	
							3.6	
	33	54	18, 23, 31, 29	100			5.9	
-70						3" clay layer	3.3	
	34	28	19, 13, 15, 19	100		CLAY (CL), very stiff	0.5	Faint CT-like odor
						Fine to medium SAND and CLAY (SC), some silt, trace mica, medium dense	0.8	
	35	53	31, 25, 28, 32	75			0.5	
						CLAY (CL), some silt, medium to high plasticity, hard	0.2	
-75	SH1	-	-, -, -, -	50		Fine to medium SAND (SW), some silt, trace mica, very dense		Collected Shelby Tube from 75 to 77 ft bgs
	36	35	12, 14, 21, 14	83	Brown to Lt Gray	CLAY (CL), medium to high plasticity, hard	0.3	Faint CT-like odor
							0.1	
	37	44	21, 18, 26, 24	100			0.3	
-80							0.1	
						End of boring at 81 ft bgs.		
-85								

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-103

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**BORING NO. :**	WW-SB-104
CLIENT:	National Grid	**SHEET:**	1 OF 3
BORING CONTRACTOR:	Fenley & Nicol	**JOB NO. :**	11176638.00001
GROUNDWATER:	7'	**NORTHING:**	688760.5699
		EASTING:	641992.0355
		GROUND ELEVATION:	10.67
		DATE STARTED:	3/19/2012
		DATE FINISHED:	3/19/2012
		DRILLER:	Mike Meade
		GEOLOGIST:	Megan Dascoli
		REVIEWED BY:	Tim Burmeier

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		300 lb		
				FALL		24"		

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0						Concrete		Boring hand cleared to 5 ft bgs
					Dk Brown	FILL: sand, silt and gravel trace glass and brick at 2' concrete and cobbles from 2 to 4'	0.0	
-5	1		2, 2, 2, 2	100	Med Brown			
	2		1, 1, 1, 1	92		trace wood	0.0 0.0	Wet
-10	3		1, 4, 2, 1	50	Lt Brown with Gray	SILT (ML), some very fine sand and clay	3.7 3.7 8.2	Faint CT-like odor
	4		11, 14, 6, 30	83	Med Brown	some wood	10.8	
	5		1, 6, 4, 2	13	Black	Very fine SAND (SP), some silt, trace very coarse sand some red and gray fine gravel	8.1	
-15	6		1, 5, 4, 5	33	Med Brown	Very fine to medium SAND (SW), some silt, trace very coarse sand	8.6 207	Anaerobic odor Faint CT-like odor Light NAPL coating, strong CT-like odor, strong sheen
	7		2, 2, 6, 10	42		Silty very fine to fine SAND (SM), trace fine gravel	74.3 24.1	Faint CT-like odor
	8		2, 2, 2, 2	88		Very fine SAND (SP), some silt	178	100% NAPL saturation
-20						Silty CLAY (CL) with mica		
	9		4, 6, 8, 11	50			387 20.4	
	10		4, 8, 9, 13	50		Very fine SAND (SP), some silt and mica	6.9	Moderate CT-like odor
-25					Orange to Dk Brown	SILT (ML) with mica, some very fine sand	119	Strong CT-like

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-104

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-104

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 OF 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11		5, 8, 12, 24	63	Med Brown	Very fine SAND (SP), some silt and mica	215 66.7	odor, slight sheen Slight sheen
			12		4, 6, 8, 9	63	Dk Brown	Very fine sandy SILT (ML) with mica, trace gravel	244 34.8	Moderate CT-like odor
-30			13		5, 6, 15, 14	54			50.3 37.7	
			14		4, 8, 12, 18	71	Red Brick Red		17.3 13.3	
			15		1, 3, 4, 1	100	Dk Brown	Very fine to fine SAND (SP)	1594 940	50% NAPL saturation, strong CT-like odor
-35			16		4, 8, 13, 15	100		trace silt with mica	889 4119	Strong sheen
			17		7, 10, 13, 14	100			663 1037	Light NAPL coating
-40			18		25, 56, 12, 15	58		some silt	196 836	Moderate CT-like odor
			19		12, 12, 12, 15	75	Med Brown	Very fine SAND (SP), some silt SILT (ML), some clay and mica	183 235	Heavy NAPL coating
			20		24, 54/2, -, -	25		Very fine SAND (SP), some silt and mica	2.7 13.6	Moderate CT-like odor
-45			21		10, 14, 14, 15	42		1" silt lens with mica at 46.5'	20.3 3.7	Very faint CT-like odor
			22		100/3, -, -, -	13	Dk Brown	Very fine to fine SAND (SP), some silt	7.4	No odor
-50			23		25, 18, 20, 14	100	Med Brown	trace medium to coarse sand	111 72.8	Faint CT-like odor, slight sheen
			24		9, 12, 12, 11	100			81.7 306	
			25		3, 4, 3, 5	96			167 167	Moderate CT-like odor, slight sheen
-55			26		13, 15, 11, 14	100		3-1" clay lenses from 56 to 56.5'	276	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-104

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
								Very fine SAND (SP)	39.5	
			27		10, 6, 8, 11	50		Very fine SAND (SP), some silt with mica, trace medium to coarse sand	5.0	Very faint CT-like odor
									5.0	
			28		4, 4, 4, 8	42	Dk Brown	4-~1" clay lenses interspersed throughout	2.8	
-60									2.2	
			29		5, 6, 8, 11	75		Very fine to fine SAND (SP) with mica	0.0	No odor
							Red	CLAY (CL)	0.0	
								End of boring at 63 ft bgs.		
-65										
-70										
-75										
-80										
-85										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

BORING NO. :	WW-SB-105		
PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**SHEET:**	1 OF 2
CLIENT:	National Grid	**JOB NO. :**	11176638.00001
BORING CONTRACTOR:	Fenley & Nicol	**NORTHING:** 688868.6194	**EASTING:** 641868.1283
GROUNDWATER:	7'	**GROUND ELEVATION:**	10.25
		DATE STARTED:	3/14/2012
		DATE FINISHED:	3/16/2012
		DRILLER:	Mike Meade
		GEOLOGIST:	Megan Dascoli
		REVIEWED BY:	Tim Burmeier

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		300 lb		
				FALL		24"		

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0						Concrete	0.0	Boring hand cleared to 5 ft bgs
					Med Brown	FILL: sand, silt, gravel and asphalt, some brick	0.0	
						FILL: angular gravel (road base)	0.0	
						FILL: sand, silt, gravel and brick, concrete cobbles at 2.5'	0.0	
							0.0	
-5	1		1, 1, 2, 5	1	Red	FILL: brick and cobbles, some silt and sand	0.0	Moist, petroleum and CT-like odor
					Black		0.0	
	2		5, 7, 5, 6	50	Red	FILL: brick, trace sand and silt	0.0	Wet
					Black	FILL: silt and wood, some sand and gravel	452	Strong petroleum and CT-like odor
-10	3		50/0, -, -, -	0		COBBLES (GW)		Drilled to 13 ft bgs to get past cobbles
	4		-, -, -, -	--				
	5		2, 2, 1, 1	0				
-15	6		2, 3, 2, 2	54	Dk Gray	Very fine to fine SAND (SP), some silt, trace gravel	9.5	Faint CT-like odor
					Med Brown		10.9	50% NAPL saturation
	7		6, 10, 12, 6	46		Very fine SAND (SP), some silt, trace fine gravel	0.0	No odor
							0.0	
	8		1, 5, 5, 6	54			0.0	
-20							0.0	
	9		2, 4, 90/4, -	0				
	10		16, 12, 6, 6	0				
-25								

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-105

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-105

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 OF 2

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11		3, 6, 9, 9	38	Dk Brown	Clayey SILT (ML), trace fine gravel, very fine to coarse sand and mica	0.0 0.0	Faint CT-like odor
			12		4, 8, 9, 9	0				
-30			13		6, 7, 7, 9	50	Dk Gray to Brown	some fine to medium subangular gravel	0.0 0.0	No odor
			14		6, 9, 9, 13	25			0.0 0.0	
			15		3, 6, 6, 13	42	Dk Gray	SILT (ML), some clay and mica, trace fine subangular gravel	6.6 0.0	Moderate naphthalene odor
-35			16		6, 100/1, -, -	8		COBBLES (GW), some very fine sand and silt	66.1	Naphthalene and CT-like odor, blebs
			17		9, 11, 13, 15	58	Med Gray	Very fine to fine SAND (SP), trace silt	148 128 338	Strong CT-like odor, strong sheen, blebs
-40			18		8, 9, 9, 10	63		Fine to medium SAND (SW), trace coarse sand and silt	90.6	
			19		6, 7, 7, 9	75		Very fine SAND (SP), some silt	555 158	Strong CT-like odor, slight sheen
			20		6, 4, 7, 8	42	Med Brown	SILT (ML), some mica some black staining	55.3 59.6	Faint CT-like odor
-45			21		8, 8, 12, 12	46	Med Brown to Gray	CLAY (CL), some silt	24.5 51.6	No odor
			22		12, 3, 4, 8	63	Med Gray		14.1 15.1	Moderate CT-like odor
-50			23		10, 11, 23, 28	71		Very fine to fine SAND (SP), some mica, trace medium to coarse sand and silt	12.1 55.6	
			24		8, 11, 13, 16	67		Very fine to medium SAND (SW), trace coarse sand, silt and mica	36.5 65	Strong CT-like odor
			25		5, 7, 7, 7	63		CLAY (CL)	16.7 12.8	100% NAPL saturation, strong CT-like odor
-55								End of boring at 55 ft bgs.		

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-105

URS Corporation

TEST BORING LOG

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**BORING NO. :**	WW-SB-106
CLIENT:	National Grid	**SHEET:**	1 OF 3
BORING CONTRACTOR:	Fenley & Nicol	**JOB NO. :**	11176638.00001
GROUNDWATER:	11'	**NORTHING:** 688924.5794	**EASTING:** 641859.7369
		GROUND ELEVATION:	9.91
		DATE STARTED:	3/2/2012
		DATE FINISHED:	3/5/2012
		DRILLER:	Mike Meade
		GEOLOGIST:	Megan Dascoli
		REVIEWED BY:	Tim Burmeier

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		140, 300		
				FALL		24"		

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0							Med Brown	Concrete	0.0	Boring hand cleared to 5 ft bgs
								FILL: sand, silt, gravel and brick	0.0	
								FILL: gravel, some silt, sand and brick	0.0	
									0.0	Moist
									0.0	
-5			1	14	4, 7, 7, 9	8		FILL: sand and silt, some gravel, brick and cobbles, medium dense	1.2	Wet
			2	79	14, 45, 34, 42	25		very dense	24.1	
							Black		29.5	Black stained
									14.6	Faint burnt petroleum odor, moist
-10			3	51	19, 24, 27, 28	38	Med Gray to Brown	SILT (ML), very dense	21.9	Faint gasoline odor
									10.3	Wet, no odor
			4	48	15, 22, 26, 24	25		COBBLES (GW), loose		
			5	9	3, 5, 4, 2	42	Med Brown	Silty SAND (SM), loose	18.2	Faint old diesel odor
									26.3	
-15			6	3	2, 2, 1, 3	58	Dk Gray	Silty CLAY (CL), soft, plastic	26.0	Faint old diesel odor, black staining
									28.5	
			7	28	4, 11, 17, 18	42	Med Gray to Brown	Very fine to fine Silty SAND (SM), trace fine subangular gravel, medium dense	1.6	Very faint odor
								COBBLES (GW), very dense	0.9	
			8	130	29, 58, 72, 68	29		Very fine SAND (SP), some silt, very dense	1.0	No odor
-20									0.1	
			9	50	88, 30, 20, 28	0		SILT (ML), trace clay, fine subrounded gravel and mica, very dense		
								No Recovery		
			10	130	21, 26, 104, --	0				
-25								COBBLES (GW), some silt and very fine sand,		

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-106

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-106

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11	60	32, 31, 29, 41	50		very dense SILT (ML), some very fine sand, very dense	0.0 0.0	
			12	66	34, 30, 36, 46	60	Med Gray	trace clay, very fine sand, fine to coarse subangular gravel and mica, very dense cobbles	0.0 0.0	
-30			13	97	36, 52, 45, 46	29			0.0 0.0	
			14	104	27, 34, 70, 67	8		cobbles	0.0 0.0	
			15	132	61, 80, 52, 64	79	Dk Gray	SILT (ML), trace very fine to medium sand and gravel, very dense	0.0 0.0	
-35			16	159	68, 82, 77, 81	17			0.0 0.0	
			17	26	59, 19, 7, 7	46	Dk Brown	Very fine to fine SAND (SP), trace silt and mica, medium dense	18.2 22.5	CT-like odor
-40			18	71	32, 26, 45, 70	75		some silt and subangular gravel, very dense	40.7 22.6	Moderate CT-like odor, slight sheen
			19	175	48, 78, 97, --	75		medium dense	31.9 51.2	
			20		9, 12, 15, 19	50		SILT (ML), trace very fine sand 1/2" mica layer	25.1 70.9	Switched to 300lb hammer Organic odor
-45			21		46, 28, 42, 19	8		Very fine SAND (SP), some silt and mica, trace fine subrounded gravel	5.4 	Used 140lb hammer 47-48 ft bgs
			22		33, 70, 12, 15	70			126 223	Heavy NAPL coating
-50			23		15, 16, 23, 26	75			258 231	100% NAPL saturation 75% NAPL saturation
			24		35, 26, 33, 28	75		Sandy SILT (ML)	498 470	100% NAPL saturation Heavy NAPL coating
			25		4, 9, 12, 18	100		Very fine to fine SAND (SP), some silt	113 182	
-55			26		10, 16, 18, 18	46		SILT (ML) some very fine sand	74.5	Moderate CT-like odor, slight sheen

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-106

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 OF 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
							Dk Gray	CLAY (CL)	60.6	
			27		4, 5, 12, 8	50	Med Brown	Very fine SAND (SP), some silt	32	Faint CT-like odor
							Med Gray	CLAY (CL)	20.8	
-60								End of boring at 59 ft bgs.		
-65										
-70										
-75										
-80										
-85										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-106

URS *Corporation*

TEST BORING LOG

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**BORING NO. :**	**WW-SB-107**
CLIENT:	National Grid	**SHEET:**	**1 OF 3**
BORING CONTRACTOR:	Fenley & Nicol	**JOB NO. :**	11176638.00001
		NORTHING: 688889.2963	**EASTING:** 641833.7093

GROUNDWATER:					**CAS.**	**SAMPLER**	**CORE**	**TUBE**
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Split Spoon		
				DIA.		2"		
				WT.		140, 300		
				FALL		24"		

GROUND ELEVATION:	10.03
DATE STARTED:	3/5/2012
DATE FINISHED:	3/6/2012
DRILLER:	Mike Meade
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	Tim Burmeier

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0					Med Gray	Concrete	0.0	Boring hand cleared to 5 ft bgs
					Med Brown	FILL: sand, silt and gravel, some brick	0.0	Moist Wet
							0.0	
							0.0	
							0.0	
-5	1	10	3, 5, 5, 6	4		loose		Dry
	2	85	8, 19, 66, 68	29	Black	very dense	0.2	Wet, slight sheen, faint petroleum odor
-10	3		18, 10, 4, 4	46	Lt Gray		11.2 20.6	Petroleum and CT-like odor Used 300lb hammer from 9 to 13'
	4		1, 1, 1, 1	0		No Recovery		
	5	7	3, 2, 5, 3	71	Med Brown to Gray	Clayey SILT (ML), trace fine sand and gravel, loose	6.3 12.3	
-15	6	21	6, 9, 12, 12	46	Med Gray	Very fine to fine SAND (SP), some silt, trace shells, medium dense	6.5 2.3	Petroleum and CT-like odor, slight sheen
	7	46	12, 18, 28, 32	50	Med Brown	Clayey SILT (ML), trace sand and fine gravel, med dense	223 7.7	Moderate CT-like odor
					Lt Gray	Very fine to fine Sandy SILT (ML), trace gravel, dense		
-20	8	19	8, 19, -, -	42	Med Brown	Clayey SILT (ML), some very fine to fine sand, dense	13.1	Faint CT-like odor, slight sheen
	9	88	150, 50, 38, 27	50		Very fine to med Sandy CLAY (CL), trace med to coarse rounded gravel, med plasticity, hard	30.7 41.7	
	10	34	19, 20, 14, 17	42		Very fine to fine SAND (SP), some clay and fine to coarse subangular gravel, very dense	24.6 13.1	
-25						Very fine to fine Sandy CLAY (CL), hard		Faint CT-like

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-107

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-107

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11	53	6, 22, 31, 100/3	4			10.2	odor
			12		28, 15, 18, 12	13	Med Gray	CLAY (CL), some coarse subangular gravel Very fine to coarse SAND (SW), some silt and coarse gravel	1.4	Switched to 300lb hammer
-30			13		6, 8, 21, 14	25		Clayey SAND (SC), some silt	1.3	No odor
			14		9, 10, 13, 15	0		No Recovery		
			15		19, 13, 14, 8	13		Clayey SAND (SC), some silt	2.5	
-35			16		5, 13, 16, 22	42	Dk Gray	SILT (ML), some very fine to medium sand, trace clay and fine gravel cobble at 36'	0.0 0.0	Dry
			17		7, 100/1, -, -	25		Sandy SILT and COBBLES (ML/GW), trace fine gravel	0.0 0.0	Moist
-40			18		25, 22, 18, 18	17	Dk Brown	Very fine to fine SAND (SP), some silt	0.0	
			19		11, 17, 1, 1	100	Med Brown	Very fine to medium SAND (SW), trace silt and very fine to medium gravel	4.3 4.9	Faint CT-like odor
			20		8, 12, 14, 25	50		Very fine SAND and SILT (SP/ML)	7.2 5.2	Wet
-45			21		3, 7, 13, 14	42		Very fine to fine SAND (SP), trace silt	15.7 70.8	Light NAPL coating, moderate CT-like odor
			22		7, 10, 14, 17	67			46.1 72	Heavy NAPL coating, strong CT-like odor
-50			23		15, 26, 48, 100/5	92		SILT (ML)	71.2 30.1	100% NAPL saturation
			24		4, 6, 26, 53	100		some very fine sand	449 2,285	100% NAPL saturation
			25		25, 22, 33, 37	96		Very fine to medium SAND (SW), trace silt	2,485 1,295	Strong CT-like odor
-55			26		11, 17, 33, 51	100		Very fine to fine SAND (SP), trace coarse sand and fine gravel	1,663	100% NAPL saturation

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-107

URS *Corporation*

TEST BORING LOG

BORING NO. : WW-SB-107

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
									1,111	
			27		17, 33, 37, 12	54	Med Gray	SILT (ML)	27.2	Light NAPL coating
								CLAY (CL)	40.7	
-60			28		17, 25, 22, 21	63	Lt to Med Gray	some intermittent medium brown sand lenses	0.0	
							Med Gray	3" layer of clayey silt	0.0	
								End of boring at 61 ft bgs.		
-65										
-70										
-75										
-80										
-85										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-108

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**SHEET:** 1 **OF** 3	
CLIENT:	National Grid	**JOB NO. :**	11176638.00001
BORING CONTRACTOR:	Fenley & Nicol	**NORTHING:** 688839.0799	**EASTING:** 641797.2341

GROUNDWATER: 5'					**CAS.**	**SAMPLER**	**CORE**	**TUBE**
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Split Spoon		
				DIA.		2"		
				WT.		140, 300		
				FALL		24"		

GROUND ELEVATION:	10.19
DATE STARTED:	3/7/2012
DATE FINISHED:	3/29/2012
DRILLER:	Mike Meade
GEOLOGIST:	Megan D., Andreas P.
REVIEWED BY:	Tim Burmeier

DEPTH FEET	SAMPLE "S" NO.	SAMPLE "N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0						Concrete		Boring hand cleared to 5 ft bgs Dry
						FILL: gravel, asphalt, concrete and cinders		
						FILL: brick		
-5	1	100	57, 100/2, -, -	38	Red	FILL: brick, concrete and cobbles, some sand, silt, gravel and asphalt, very dense	0.2	Wet
	2	50	28, 50/5, -, -	25			15.8	Switched to 300lb hammer, gasoline odor
-10				--				Drilled through concrete to 11 ft bgs
	3	4	5, 2, 2, 1	42	Dk Gray	Clayey SILT (ML), trace brick	0.0 0.3	
	4	2	1, 1, 1, 2	38		cobble some fine to medium angular gravel, trace very fine sand	0.1 0.1	
-15	5	2	1, 1, 1, 1	29	Black	Very fine SAND (SP), some silt	1.3 1.9	Faint gasoline and CT-like odors
	6	12	1, 5, 7, 7	83	Med Gray	trace clay	0.1 0.4	
						Very fine to fine SAND (SP), some silt trace fine gravel and clay	0.6	Faint CT-like odor
-20	7	4	1, 2, 2, 3	54		SILT (ML), some very fine sand, trace medium to coarse sand	1.3	
	8	9	4, 4, 5, 8	4		No Recovery. cobble in shoe		
	9	6	1, 3, 3, 28	38		Very fine to medium SAND and SILT (SW/ML), trace coarse sand and fine gravel	27 0.6	
-25								

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-108

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-108

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
	10	35	28, 21, 14, 16	38		COBBLES (GW), some very fine sand, trace silt	1.7 11.1	
	11	27	28, 14, 13, 10	0		No Recovery COBBLES (GW)		
-30	12	22	16, 12, 10, 11	42	Med Gray to Brown	SILT (ML), some very fine to medium sand, trace clay and coarse gravel	0.0 0.0	
	13	20	16, 10, 10, 11	25			0.0 0.0	Moist
	14	25	9, 12, 13, 19	8			1.8 0.0	
-35	15	64	8, 7, 57, 50/6	4		cobble in shoe	0.0 0.0	
	16	29	1, 12, 17, 100/1	67	Dk Gray	some very fine to medium sand, trace fine to coarse gravel	0.2 0.4	
-40	17	76	15, 34, 42, 62	58	Brown	Fine to coarse SAND and SILT (SW/ML), some clay and gravel, trace mica	0.0	Faint CT-like odor, light coating
	18	116	34, 46, 70/6, -	63			0.0	
	19	95	15, 32, 63, 35	100		Fine to coarse SAND (SW), some silt and mica	0.0	Moderate CT-like odor
-45	20	40	15, 18, 32, 45	100			0.0	
	21	99	18, 37, 62, 71	100			0.0	
-50	22	80	60, 80/3, -, -	42		Fine to medium SAND (SW), some gravel, trace silt	0.8 0.2	Moderate CT-like odor, slight sheen
	23	52	18, 26, 26, 40	100			3.6 1.2	Strong CT-like odor, sheen
	24	95	35, 45, 50, 63	67		Fine to medium SAND and SILT (SW/ML)	13.6 9.5	
-55	25	101	35, 43, 58, 68	58	Br. Orange to Gray	CLAY (CL), medium plasticity	13.6	Moderate CT-like odor, light coating

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-108

URS *Corporation*

TEST BORING LOG

PROJECT/PROJECT LOCATION: National Grid - Williamsburg	**BORING NO. :** WW-SB-108
	SHEET: 3 **OF** 3
CLIENT: National Grid	**JOB NO. :** 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
									7.5	
								End of boring at 57 ft bgs.		
-60										
-65										
-70										
-75										
-80										
-85										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : **WW-SB-108**

URS Corporation

TEST BORING LOG

BORING NO.: WW-SB-109

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg	**SHEET:**	1 OF 2
CLIENT:	National Grid	**JOB NO.:**	11176638.00001
BORING CONTRACTOR:	Fenley & Nicol	**NORTHING:** 688869.7424	**EASTING:** 641696.3812

GROUNDWATER: 5'					**CAS.**	**SAMPLER**	**CORE**	**TUBE**
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Split Spoon		
				DIA.		2"		
				WT.		140, 300		
				FALL		24"		

GROUND ELEVATION:	9.81
DATE STARTED:	3/12/2012
DATE FINISHED:	3/13/2012
DRILLER:	Mike Meade
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	Tim Burmeier

DEPTH FEET	"S" NO.	BLOW COUNT	REC%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0				Med Brown	FILL: sand, silt, cobbles, concrete and brick	0.0	Boring hand cleared to 5 ft bgs Dry
					Concrete	0.0	
					FILL: sand, silt, concrete and brick, trace metal	0.0	
						0.0	
						0.0	
-5	1	1, 3, 2, 2	46	Dk Gray	FILL: sand, silt and gravel	6.1	Wet
					Very fine to fine SAND (SP)	52.8	30% NAPL saturation, petroleum and CT-like odor
	2	1, 1, 2, 5	42	Med Gray	SILT (ML), some very fine to medium sand	8.4	
						4.8	Moderate NAPL odor, blebs, sheen
	3	1, 1, 1, 1	0		COBBLES (GW)		
-10							
	4	-, -, -, -	0			0.2	Drilled through cobbles to 13 ft bgs
						0.8	
	5	1, 1, 1, 1	0		No Recovery		
					SILT (ML), some very fine sand, trace coarse sand		
-15	6	1, 1, 1, 1	54			0.2	Faint CT-like odor
					CLAY (CL), trace fine sand, highly plastic	0.8	
	7	7, 9, 2, 2	33		Very fine to fine SAND (SP), some silt, trace fine gravel	1.1	Moderate CT-like odor
					some cobbles from 18 to 19'	2.3	
	8	2, 3, 4, 4	63			2.4	
-20						4.8	
	9	37, 13, 10, 10	17		COBBLES (GW), some very fine to fine sand	0.8	No odor
	10	10, 10, 12, 16	42	Lt Gray / Med Brown	SILT (ML), some very fine to fine and coarse sand	1.1	Faint CT-like odor
-25						3.8	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO.: WW-SB-109

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-109

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 2

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11		12, 8, 4, 7	33	Med Gray	COBBLES (GW) SILT (ML), some very fine to fine and coarse sand	1.2 5.0	Faint CT-like odor
			12		13, 11, 12, 11	8		Very fine SAND (SP), some silt Very fine to coarse SAND (SW), some silt	1.2	
-30			13		22, 8, 7, 12	83	Med Brown to Gray	Very fine to medium SAND (SW), trace silt and medium gravel	1.5 10.8	
			14		16, 15, 13, 17	67	Med Brown	Very fine SAND (SP), trace silt and coarse gravel	15.1 8.8	
			15		62, 51, 21, 17	100		medium dense	6.3 3.7	
-35			16	19	3, 8, 11, 13	100			5.6 21.5	Moderate CT-like odor
			17	26	16, 13, 13, 17	50		very dense	7.5 18.3	Light black staining
-40			18	51	23, 25, 26, 23	100		medium dense	22.1 16.7	Faint CT-like odor
			19	15	4, 4, 11, 16	100			8.5 22.5	
			20	27	5, 9, 18, 31	100	Med Gray to Brown	Very fine to fine SAND (SP), trace medium sand and silt, medium dense	18.1 23.5	Moderate CT-like odor, sheen
-45			21	51	20, 25, 26, 28	100	Med Brown	very dense	16 219	Strong CT-like odor, sheen, light coating
			22	10	3, 4, 6, 10	100	Med Gray to Brown	loose trace fine gravel CLAY (CL), stiff	16.1 122	
-50			23	33	3, 6, 27, 32	38	Med Brown	Very fine to fine SAND (SP), trace silt, clay pockets, dense	128 30.7	Moderate CT-like odor
			24	59	17, 27, 32, 17	42		CLAY (CL), hard Very fine SAND (SP), trace silt, very dense	25.3 35.8	
-55			25	12	4, 4, 8, 11	46	Med Gray to Brown Red	CLAY (CL), stiff some very fine sand	0.0 0.0	No odor
								End of boring at 55 ft bgs.		

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-109

URS *Corporation*

TEST BORING LOG

BORING NO. : WW-SB-110

PROJECT/PROJECT LOCATION:	National Grid - Williamsburg
CLIENT:	National Grid
BORING CONTRACTOR:	Fenley & Nicol

SHEET:	1 **OF** 3
JOB NO. :	11176638.00001
NORTHING:	688940.0666
EASTING:	641763.6288
GROUND ELEVATION:	10.09
DATE STARTED:	2/28/2012
DATE FINISHED:	3/1/2012
DRILLER:	Mike Meade
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	Tim Burmeier

GROUNDWATER: 6'

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Split Spoon		
				DIA.		2"		
				WT.		140 lb		
				FALL		24"		

DEPTH FEET	"S" NO.	"N" NO.	BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
0					Med Brown	FILL: concrete, brick, gravel and asphalt, some sand and silt	0.0	Boring hand cleared to 5 ft bgs
-1							0.0	
-2					Dk Brown		0.0	
-3							4.6	Moist Petroleum odor
-4							10.6	
-5	1	5	1, 3, 2, 1	31		FILL: sand and silt, trace gravel, loose	100	Moderate petroleum odor, black staining
-6					Black		123	Wet
-7	2	7	3, 3, 4, 5	54			296	Strong petroleum odor, moderate coating
-8							321	
-9	3	24	3, 4, 20, 40	67		SILT and very fine SAND (SM), trace fine gravel, medium dense	248	Moist Petroleum odor
-10					Med Brown		35.5	
-11	4	46	28, 14, 32, 30	63		Silty SAND (SM), dense	59.2	Wet Black staining, CT-like odor
-12							89.8	
-13	5	17	1, 6, 11, 7	46		Very fine to medium Sandy SILT (ML), medium dense	60	Faint CT-like odor
-14							349	
-15	6	7	2, 3, 4, 7	100			108	
-16						trace gravel, loose	35.7	Heavy NAPL coating
-17	7	5	2, 2, 3, 5	71	Med Gray	CLAY (CL), soft	55.5	50% CT saturation
-18						some very fine sand and silt plastic, hard	59	Faint CT-like odor
-19	8	74	24, 32, 42, 39	22			12.5	
-20						some fine to medium sand, trace angular gravel	97.1	
-21	9	34	56, 20, 14, 16	92			70.8	
-22							10	
-23	10	27	8, 12, 15, 15	50		Very fine to medium SAND (SW), some silt, medium dense	32.4	
-24					Reddish Brown		335	75% NAPL
-25								

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-110

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-110

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 2 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
			11	34	4, 13, 21, 22	96	Med Brown	SILT (ML), some very fine to medium sand, trace fine to medium subangular gravel, medium dense	640 26.5	saturation, strong CT-like odor
			12	67	8, 12, 55, 30	42		Silty SAND (SM), very dense	35.8 39.8	Moderate CT-like odor
-30			13	47	6, 25, 22, 31	29	Med Brown to Gray	CLAY and SILT (CL/ML), some very fine to medium sand, trace very fine to medium angular gravel, dense	4.5 6.7	No odor
			14	49	6, 9, 40, 44	0		No Recovery		
			15	48	9, 21, 27, 60	42	Med Gray	Very fine to fine Sandy SILT (ML), trace medium gravel, dense	14.9 12.1	
-35			16	51	5, 11, 40, 100/3	42		Coarse angular GRAVEL (GW), some very fine to medium sand, silt and clay, very dense Very fine to medium sandy SILT (ML), trace clay and fine to medium gravel, very dense	3.3 3.9	
			17	100	100/6, -, -, -	0		No Recovery	11.1 12.5	Faint CT-like odor
-40			18	98	28, 47, 51, 62	67	Med Brown to Gray	Very fine to fine SAND (SP), some silt, very dense		Moderate CT-like odor
			19	28	10, 12, 16, 28	58		medium dense	76.4 57.9	
			20	65	22, 33, 32, 37	58	Med Gray Med Gray to Brown	very dense	48.3 68.4	Faint CT-like odor
-45			21	100	26, 40, 60, 57	58		Silty SAND (SM), very dense Sandy SILT (ML), very dense	33.7 63.2	
			22	208	44, 110, 98, 132	75	Med Brown	Very fine to coarse SAND (SW), some silt, very dense	27.7 15.1	
-50			23	119	15, 51, 68, 78	88	Med Gray	SILT (ML), very dense	46.2 35.7	Faint CT-like odor
			24	141	23, 37, 104, 156	96	Med Gray to Brown	Very fine to medium SAND (SW), trace silt and coarse sand, very dense	27 12	
			25	122	6, 22, 100/2, -	67		some clay	2.7 14.7	
-55			26	90	15, 35, 55, 68	100		Very fine Sandy SILT (ML), very dense	17.1	

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-110

URS Corporation

TEST BORING LOG

BORING NO. : WW-SB-110

PROJECT/PROJECT LOCATION: National Grid - Williamsburg

SHEET: 3 **OF** 3

CLIENT: National Grid

JOB NO. : 11176638.00001

DEPTH FEET	STRATA	VISUAL IMPACTS	SAMPLE "S" NO.	SAMPLE "N" NO.	SAMPLE BLOW COUNT	REC% / RQD%	COLOR	MATERIAL DESCRIPTION	PID	REMARKS
							Med Brown	trace clay	12.2	
			27	75	5, 16, 59, 91	17		Very fine to medium SAND (SW), some silt, very dense	19.4	
									9.4	
-60			28	65	33, 28, 37, 38	38	Med Gray		23.4	Faint CT-like odor
							Med Brown	trace coarse sand		
			29	54	50, 54, -, -	100		CLAY (CL), hard	30.4	
			30	35	8, 10, 25, 46	50	Med Gray to Brown	Very fine to fine SAND (SP), some silt, dense	2.5	
							Lt Gray	CLAY (CL), hard	0.0	
-65								End of boring at 64 ft bgs.		
-70										
-75										
-80										
-85										

COMMENTS: Boring advanced using a Cantera CT-450 drill rig.

CT = Coal Tar

NAPL = Non-Aqueous Phase Liquid

BORING NO. : WW-SB-110

APPENDIX B

GEOTECHNICAL LABORATORY TESTING RESULTS

URS Corporation #11176638
National Grid - Williamsburg Works Former MGP Site
LABORATORY TESTING DATA SUMMARY

SAMPLE IDENTIFICATION			INDEX TESTS							ENGINEERING TESTS							REMARKS
BORING NO.	SAMPLE NO.	DEPTH (ft)	USCS SYMB. (1)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	SIEVE MINUS NO. 200 (%)	HYDRO. % MINUS 2 µm (%)	ORGANIC CONTENT (burnoff) (%)	TEST TYPE	WATER CONTENT (%)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	HYDRAULIC CONDUCTIVITY (cm/sec)	PEAK COMP. STRESS (psi)	STRAIN @ PEAK STRESS (%)	
SB-100	S-3,4,5	9-15	SC-SM	22	17	5	40.0	9		w	17.1						
SB-100	S-10,11,12	23-29	SM	np	np	np	41.5	11		w	14.5						
SB-100	S-18,19,20	39-45	SC-SM	26	21	5	40.3	10		w	15.3						
SB-100		59-61								UW		126.6					
SB-100		59.35								w	30.1						
SB-100	A	59.6								K	24.0	128.4	103.6	2.1E-8			P9395
SB-100		59.9								w	23.6						
SB-100	B	60.15	CL	48	23	25	91.5	41		UC	21.8	131.0	107.6		32.6	8.4	UC122b
SB-100		60.45								w	20.2						
SB-100	S-31,32,33	67-73	SC-SM	24	18	6	47.2	6		w	23.8						
SB-100	S-35,36	75-79	SM	27	22	5	47.3	8		w	29.9						
SB-101	S-2,3,4	7-13	SM	np	np	np	27.7	5		w	15.5						
SB-101	S-8,9,10	19-25	SM	np	np	np	21.3	5		w	15.7						
SB-101	S-17,18,21	37-47	SC	30	19	11	37.4	11		w	16.0						
SB-101	S-20	43-45	SC	30	18	12	49.2	12		w	12.0						
SB-101		59-61								UW		128.7					
SB-101	A	59.4	CL	45	25	20	90.0	41		w	27.2						
SB-101		59.7								w	27.0						

Prepared by: JR
Reviewed by: GET
Date: 5/17/2012

TerraSense, LLC
45H Commerce Way
Totowa, NJ 07512

Project No.: T11176638
File: Indx1.xls

URS Corporation #11176638
National Grid - Williamsburg Works Former MGP Site
LABORATORY TESTING DATA SUMMARY

SAMPLE IDENTIFICATION			INDEX TESTS							ENGINEERING TESTS							REMARKS
BORING NO.	SAMPLE NO.	DEPTH (ft)	USCS SYMB. (1)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	SIEVE MINUS NO. 200 (%)	HYDRO. % MINUS 2 μm (%)	ORGANIC CONTENT (burnoff) (%)	TEST TYPE	WATER CONTENT (%)	TOTAL UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	HYDRAULIC CONDUCTIVITY (cm/sec)	PEAK COMP. STRESS (psi)	STRAIN @ PEAK STRESS (%)	
SB-102	S-5,6,7	13-19	SM	np	np	np	15.9	2		w	19.4						
SB-102	S-9,10,11	21-27	SP-SM	np	np	np	11.5	2		w	23.9						
SB-102	S-16,17,18	35-41	SP-SM	np	np	np	11.6	2		w	21.3						
SB-102		63-65								UW		111.3					
SB-102		63.4								w	20.4						
SB-102	B	63.65								K	31.5	122.6	93.2	5.8E-8			P9396
SB-102		63.95								w	31.5						
SB-102	C	64.2	CL	47	22	25	83.2	41		UC	26.7	126.2	99.6		10.3	15.0	UC123e
SB-102	S-33,34,35	71-77	CL	41	23	18	97.9	33		w	29.0						
SB-102	S-38,39,40	81-87	CL	32	20	12	55.7	32	4.4	w	23.5						
SB-103	S-5,6,7	13-19	SM	np	np	np	29.7	4		w	16.4						
SB-103	S-10,12,13	23-31	CL	33	17	16	64.4	11		w	17.0						
SB-103	S-20,21,22	43-49	SP-SM	np	np	np	10.3	2		w	17.9						
SB-103	S-26,27,28	55-61	SC	26	17	9	43.1	7		w	24.2						
SB-103	S-33,34,35	69-75	CL	26	15	11	59.7	15		w	24.7						
SB-103		75-77								UW		125.3					
SB-103	A	75.15								K	26.2	125.9	99.8	2.3E-8			P9394
SB-103		75.4								w	25.8						
SB-103	B	75.65	CL	37	22	15	94.3	20		UC	23.2	129.5	105.2		23.0	15.0	UC122a

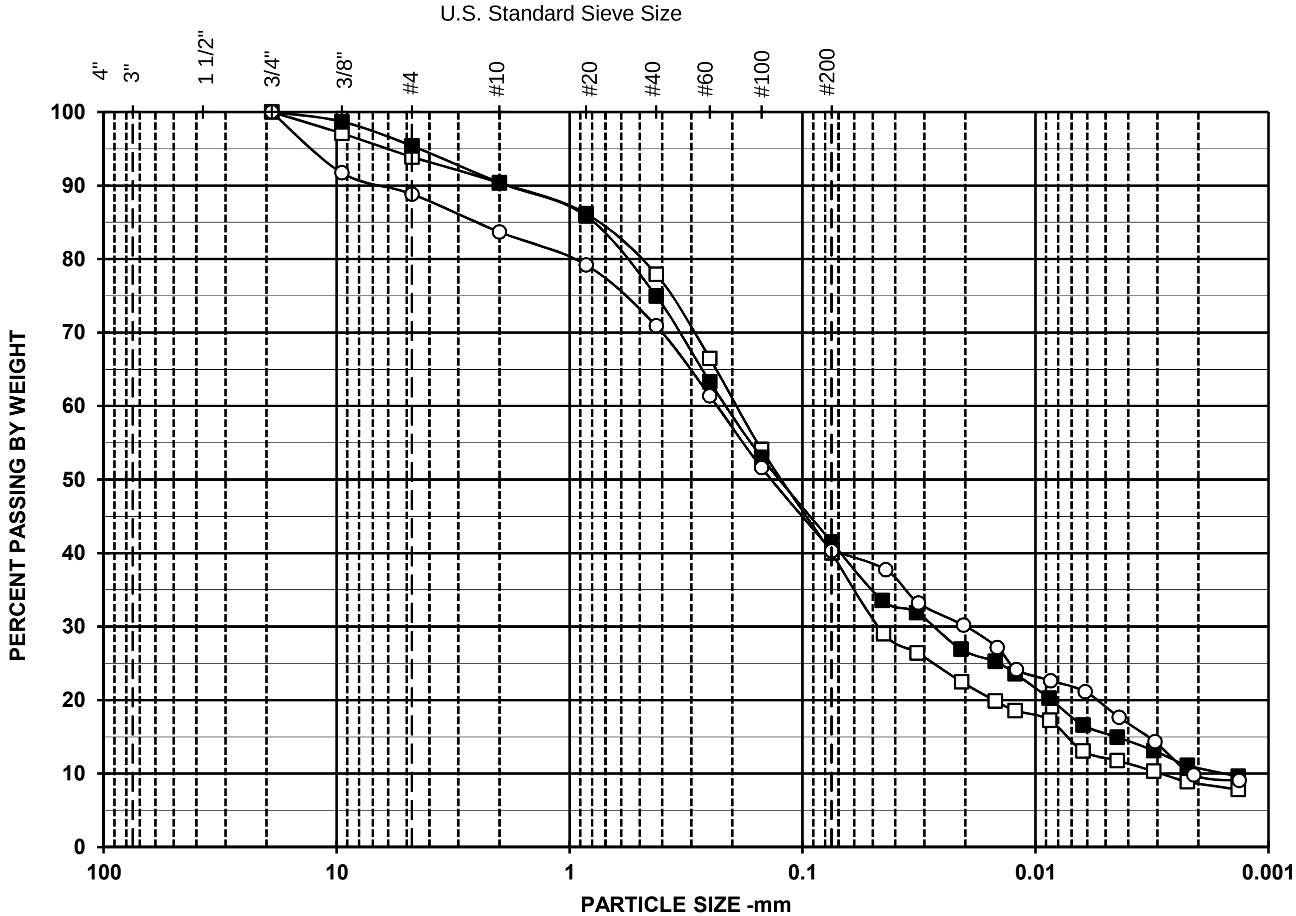
Note: (1) USCS symbol based on visual observation, Sieve results, and Atterberg limits reported.

Prepared by: JR
Reviewed by: GET
Date: 5/17/2012

TerraSense, LLC
45H Commerce Way
Totowa, NJ 07512

Project No.: T11176638
File: Indx1.xls

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	SB-100	SB-100	SB-100
Sample	S-3,4,5	S-10,11,12	S-18,19,20
Depth	9-15	23-29	39-45
% +3"	0.0	0.0	0.0
% Gravel	6.1	4.6	11.2
% SAND	53.9	53.9	48.5
%C SAND	3.5	5.0	5.1
%M SAND	12.4	15.4	12.8
%F SAND	37.9	33.5	30.6
% FINES	40.0	41.5	40.3
% -2μ	9	11	10
D_{100} (mm)	19.00	19.00	19.00
D_{60} (mm)	0.20	0.22	0.24
D_{30} (mm)	0.05	0.03	0.02
D_{10} (mm)			
Cc			
Cu			

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"			
3/4"	100.0	100.0	100.0
3/8"	97.1	98.7	91.7
4	93.9	95.4	88.8
10	90.4	90.4	83.7
20	86.2	85.9	79.2
40	77.9	75.0	70.9
60	66.5	63.3	61.4
100	54.1	53.0	51.6
200	40.0	41.5	40.3

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	17.1	22	17	5	SC-SM	Brown, Silty, clayey sand	4/30/2012
■	14.5	np	np	np	SM	Brown, Silty sand	4/30/2012
○	15.3	26	21	5	SC-SM	Gray, Silty, clayey sand	4/30/2012

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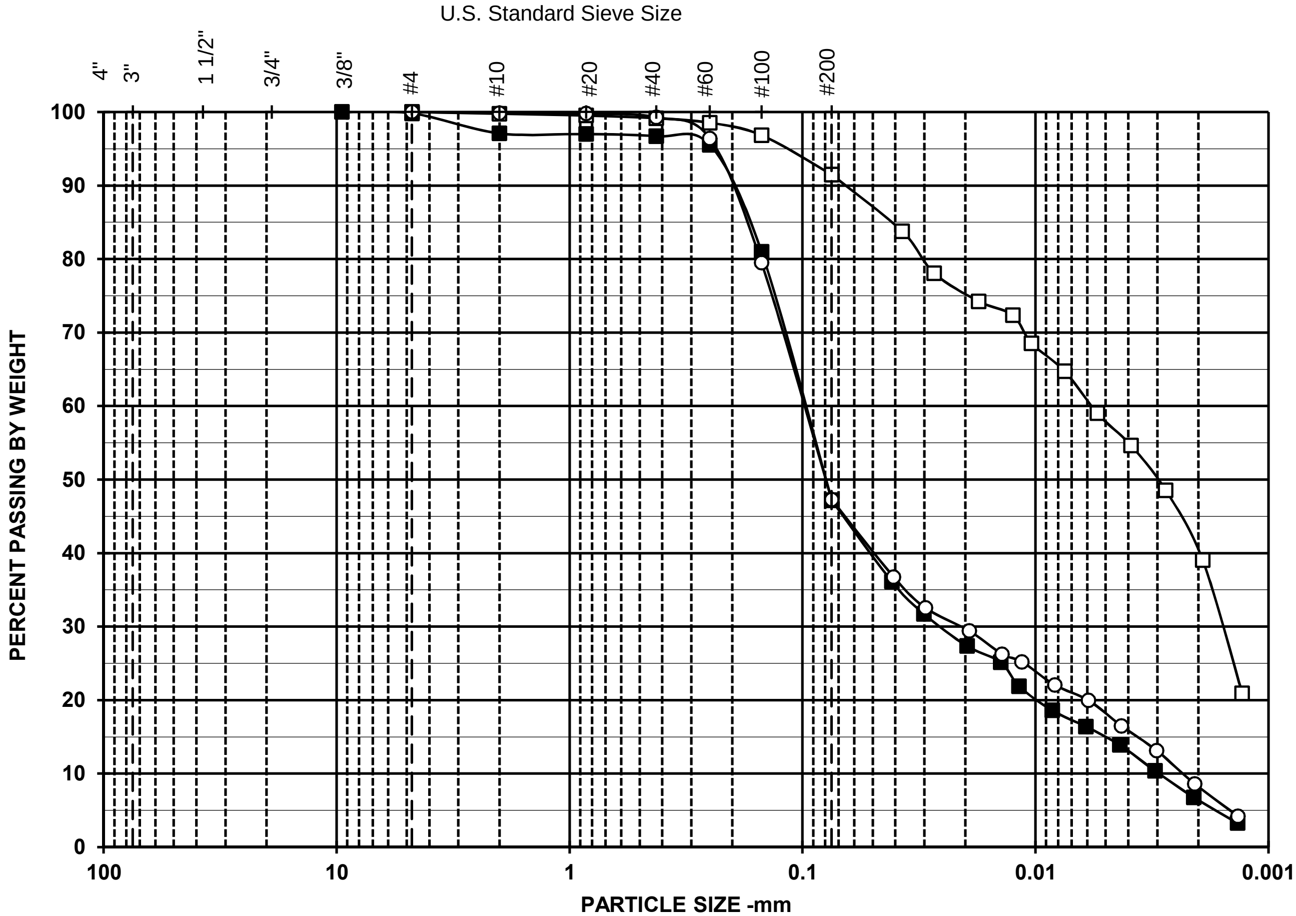
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□		48	23	25	CL	Reddish brown, Lean clay	5/2/2012
■	23.8	24	18	6	SC-SM	Gray, Silty, clayey sand	4/30/2012
○	29.9	27	22	5	SM	Gray, Silty sand	4/30/2012

Symbol	□	■	○
Boring	SB-100	SB-100	SB-100
Sample	B	S-31,32,33	S-35,36
Depth	60.15	67-73	75-79
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.2	0.0
% SAND	8.5	52.6	52.7
%C SAND	0.2	2.7	0.1
%M SAND	0.6	0.4	0.6
%F SAND	7.7	49.5	52.0
% FINES	91.5	47.2	47.3
% -2µ	41	6	8
D_{100} (mm)	4.75	9.50	4.75
D_{60} (mm)	0.01	0.10	0.10
D_{30} (mm)	0.00	0.03	0.02
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	
4	100.0	99.8	100.0
10	99.8	97.1	99.9
20	99.5	97.0	99.8
40	99.2	96.7	99.3
60	98.5	95.5	96.4
100	96.8	81.0	79.5
200	91.5	47.2	47.3

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Analysis File: 3SV-MasterRev3

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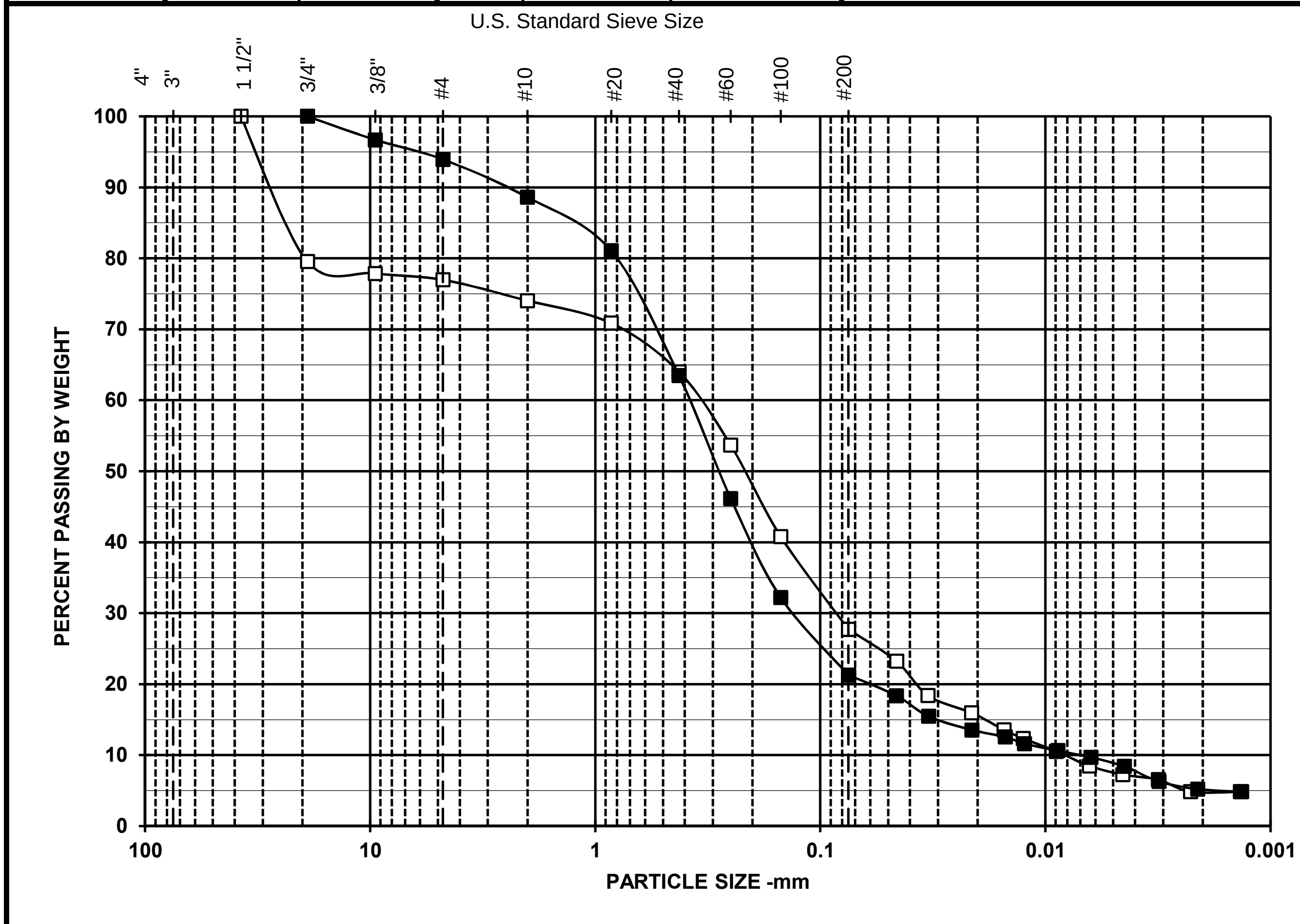

Symbol	□	■	○
Boring	SB-101	SB-101	
Sample	S-2,3,4	S-8,9,10	
Depth	7-13	19-25	
% +3"	0.0	0.0	
% Gravel	23.0	6.1	
% SAND	49.3	72.6	
%C SAND	2.9	5.3	
%M SAND	10.0	25.1	
%F SAND	36.3	42.2	
% FINES	27.7	21.3	
% -2μ	5	5	
D_{100} (mm)	37.50	19.00	
D_{60} (mm)	0.36	0.39	
D_{30} (mm)	0.09	0.13	
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	79.5	100.0	
3/8"	77.9	96.7	
4	77.0	93.9	
10	74.0	88.6	
20	70.9	81.1	
40	64.0	63.5	
60	53.7	46.1	
100	40.8	32.2	
200	27.7	21.3	

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	15.5	np	np	np	SM	Black, Silty sand with gravel	5/1/2012
■	15.7	np	np	np	SM	Brown, Silty sand	4/30/2012
○							

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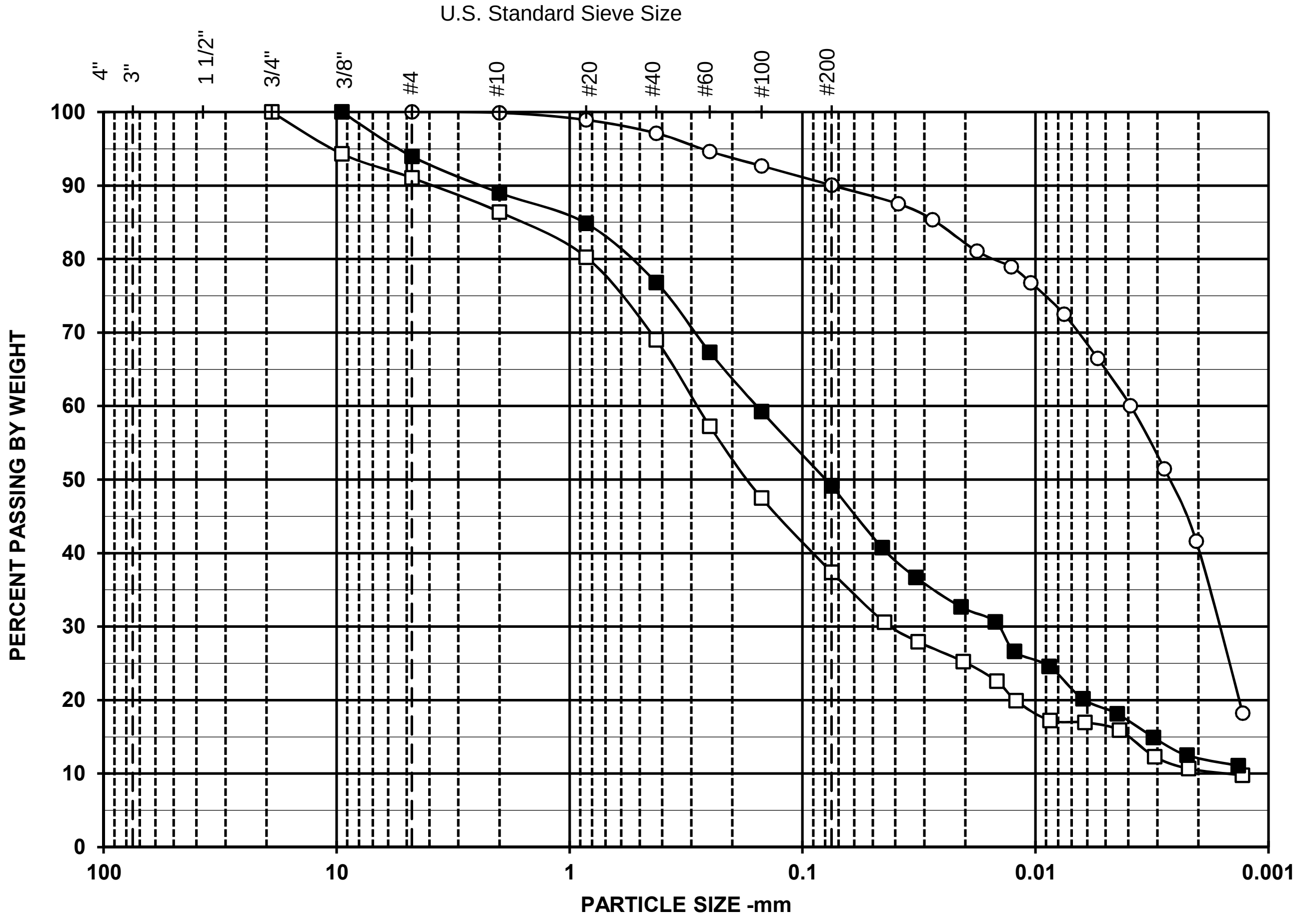
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	16.0	30	19	11	SC	Gray, Clayey sand	4/30/2012
■	12.0	30	18	12	SC	Brown, Clayey sand	4/30/2012
○		45	25	20	CL	Red, Lean clay	3/7/2012

Symbol	□	■	○
Boring	SB-101	SB-101	SB-101
Sample	S-17,18,21	S-20	A
Depth	37-47	43-45	59.4
% +3"	0.0	0.0	0.0
% Gravel	9.0	6.0	0.0
% SAND	53.6	44.8	10.0
%C SAND	4.6	5.0	0.1
%M SAND	17.4	12.2	2.8
%F SAND	31.6	27.7	7.1
% FINES	37.4	49.2	90.0
% -2μ	11	12	41
D_{100} (mm)	19.00	9.50	4.75
D_{60} (mm)	0.29	0.16	0.00
D_{30} (mm)	0.04	0.01	0.00
D_{10} (mm)			
Cc			
Cu			

Particle Size (Sieve #)	PERCENT FINER □	PERCENT FINER ■	PERCENT FINER ○
4"			
3"			
1 1/2"			
3/4"	100.0		
3/8"	94.3	100.0	
4	91.0	94.0	100.0
10	86.4	89.0	99.9
20	80.3	84.9	98.9
40	69.0	76.8	97.1
60	57.2	67.3	94.6
100	47.5	59.3	92.7
200	37.4	49.2	90.0

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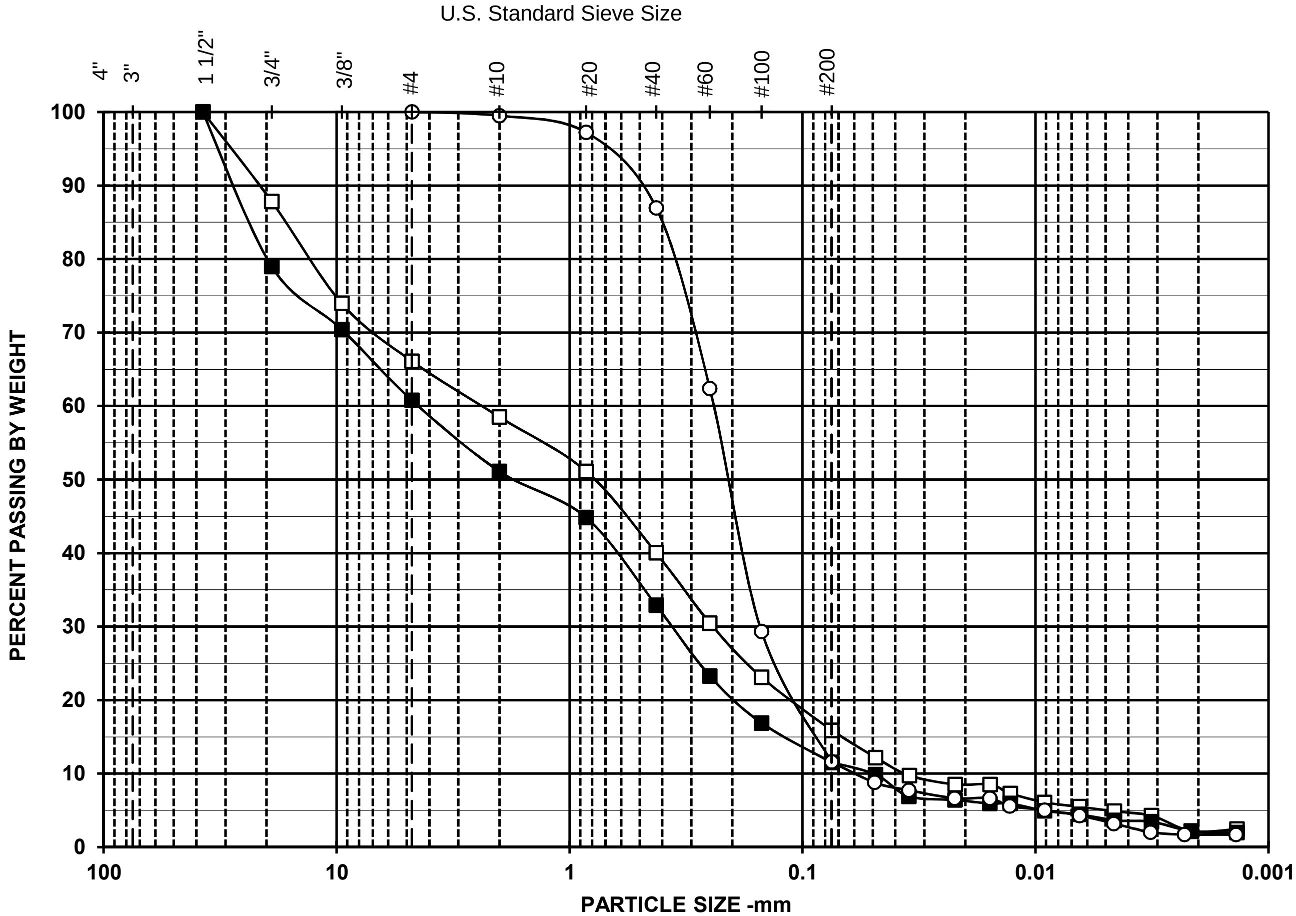
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	SB-102	SB-102	SB-102
Sample	S-5,6,7	S-9,10,11	S-16,17,18
Depth	13-19	21-27	35-41
% +3"	0.0	0.0	0.0
% Gravel	33.9	39.2	0.0
% SAND	50.2	49.3	88.4
%C SAND	7.6	9.7	0.5
%M SAND	18.5	18.2	12.5
%F SAND	24.2	21.4	75.4
% FINES	15.9	11.5	11.6
% -2µ	2	2	2
D_{100} (mm)	37.50	37.50	4.75
D_{60} (mm)	2.54	4.53	0.24
D_{30} (mm)	0.24	0.37	0.15
D_{10} (mm)		0.05	0.06
Cc		0.6	1.6
Cu		89.6	4.0

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"	100.0	100.0	
3/4"	87.8	79.0	
3/8"	74.0	70.4	
4	66.1	60.8	100.0
10	58.5	51.1	99.5
20	51.1	44.9	97.2
40	40.0	32.9	87.0
60	30.5	23.3	62.4
100	23.1	16.9	29.3
200	15.9	11.5	11.6

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	19.4	np	np	np	SM	Brown, Silty sand with gravel	4/30/2012
■	23.9	np	np	np	SP-SM	Brown, Poorly-graded sand with silt and gravel	4/30/2012
○	21.3	np	np	np	SP-SM	Brown, Poorly-graded sand with silt	4/30/2012

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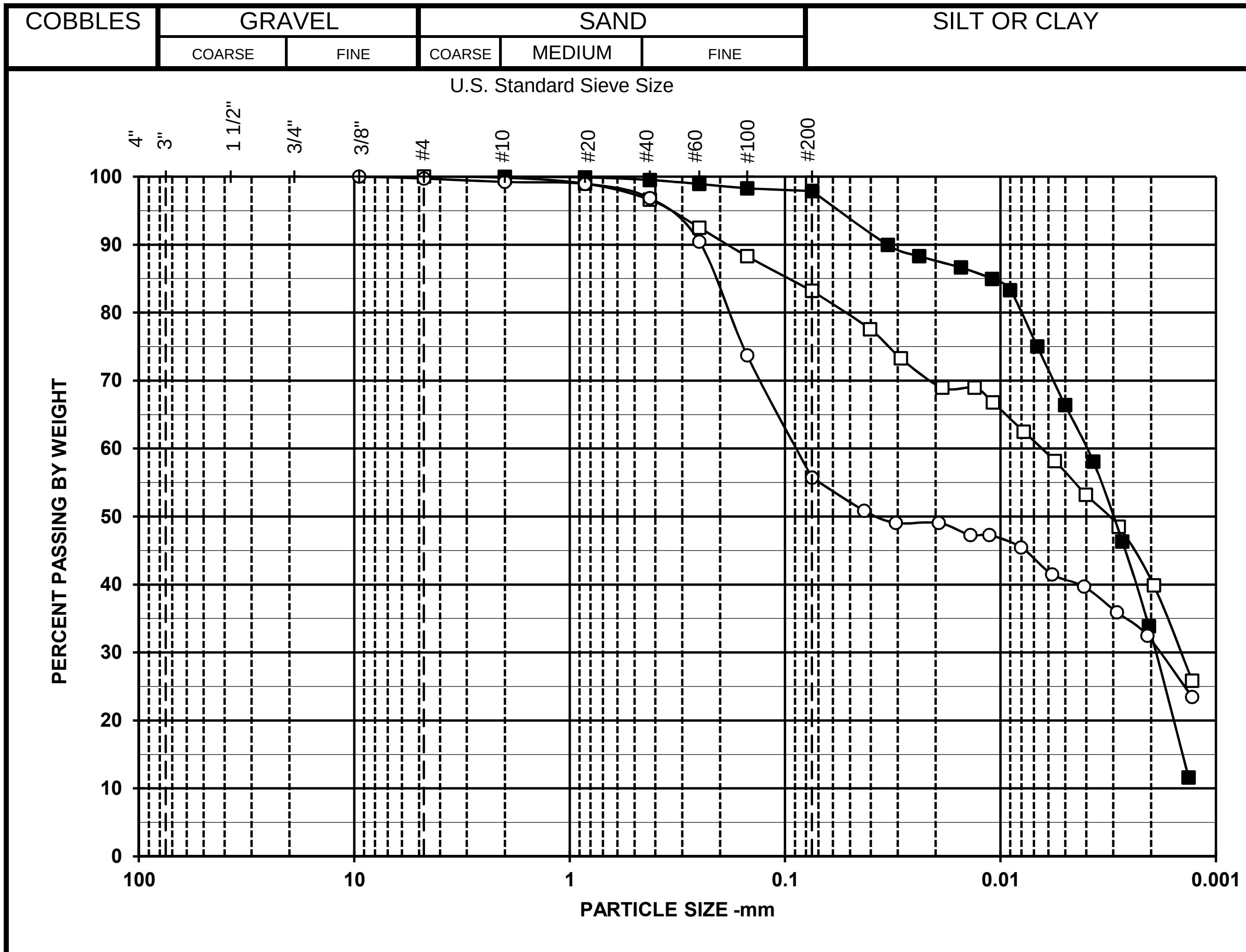

Symbol	□	■	○
Boring	SB-102	SB-102	SB-102
Sample	C	S-33,34,35	S-38,39,40
Depth	64.2	71-77	81-87
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.3
% SAND	16.8	2.1	44.0
%C SAND	0.1	0.0	0.5
%M SAND	3.2	0.5	2.4
%F SAND	13.4	1.6	41.1
% FINES	83.2	97.9	55.7
% -2μ	41	33	32
D_{100} (mm)	4.75	4.75	9.50
D_{60} (mm)	0.01	0.00	0.09
D_{30} (mm)	0.00	0.00	0.00
D_{10} (mm)			
Cc			
Cu			

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"			100.0
4	100.0		99.7
10	99.9	100.0	99.2
20	99.0	99.9	99.0
40	96.6	99.5	96.9
60	92.5	98.9	90.4
100	88.3	98.3	73.7
200	83.2	97.9	55.7

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□		47	22	25	CL	Reddish brown, Lean clay with sand	5/2/2012
■	29.0	41	23	18	CL	Gray, Lean clay	5/1/2012
○	23.5	32	20	12	CL	Gray, Sandy lean clay	5/1/2012

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PARTICLE SIZE DISTRIBUTION

National Grid - Williamsburg Works Former MGP Site

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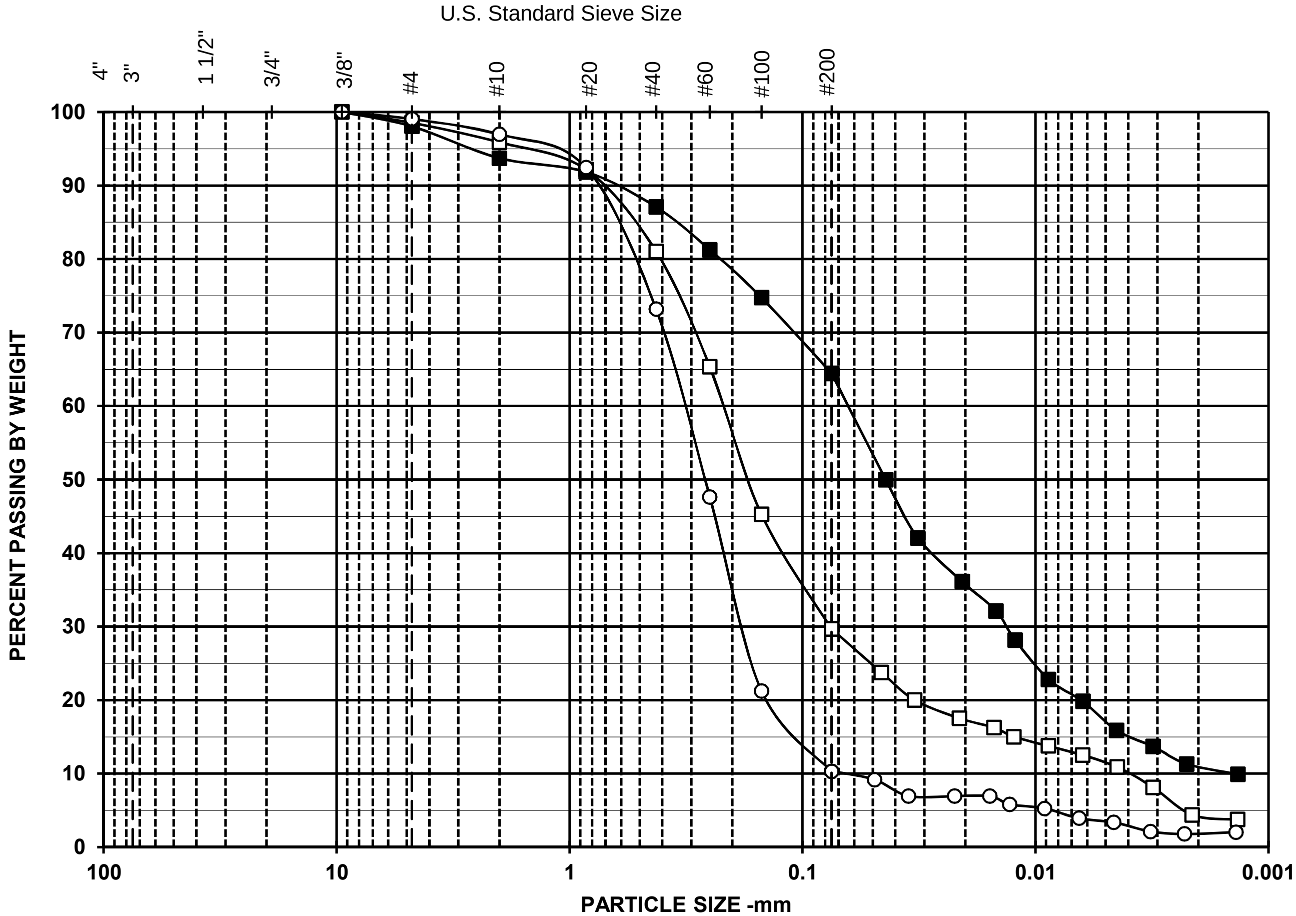
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	SB-103	SB-103	SB-103
Sample	S-5,6,7	S-10,12,13	S-20,21,22
Depth	13-19	23-31	43-49
% +3"	0.0	0.0	0.0
% Gravel	1.5	2.0	1.0
% SAND	68.8	33.6	88.7
%C SAND	2.6	4.3	2.1
%M SAND	14.9	6.7	23.8
%F SAND	51.4	22.6	62.9
% FINES	29.7	64.4	10.3
% -2µ	4	11	2
D_{100} (mm)	9.50	9.50	9.50
D_{60} (mm)	0.22	0.07	0.33
D_{30} (mm)	0.08	0.01	0.18
D_{10} (mm)			0.07
Cc			1.5
Cu			4.9

Particle Size (Sieve #)	PERCENT FINER □	PERCENT FINER ■	PERCENT FINER ○
4"			
3"			
1 1/2"			
3/4"			
3/8"	100.0	100.0	100.0
4	98.5	98.0	99.0
10	95.9	93.7	97.0
20	92.2	91.8	92.4
40	81.0	87.1	73.2
60	65.3	81.3	47.6
100	45.3	74.7	21.2
200	29.7	64.4	10.3

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	16.4	np	np	np	SM	Brown, Silty sand	4/30/2012
■	17.0	33	17	16	CL	Brown, Sandy lean clay	5/1/2012
○	17.9	np	np	np	SP-SM	Brown, Poorly-graded sand with silt	5/1/2012

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PARTICLE SIZE DISTRIBUTION

National Grid - Williamsburg Works Former MGP Site

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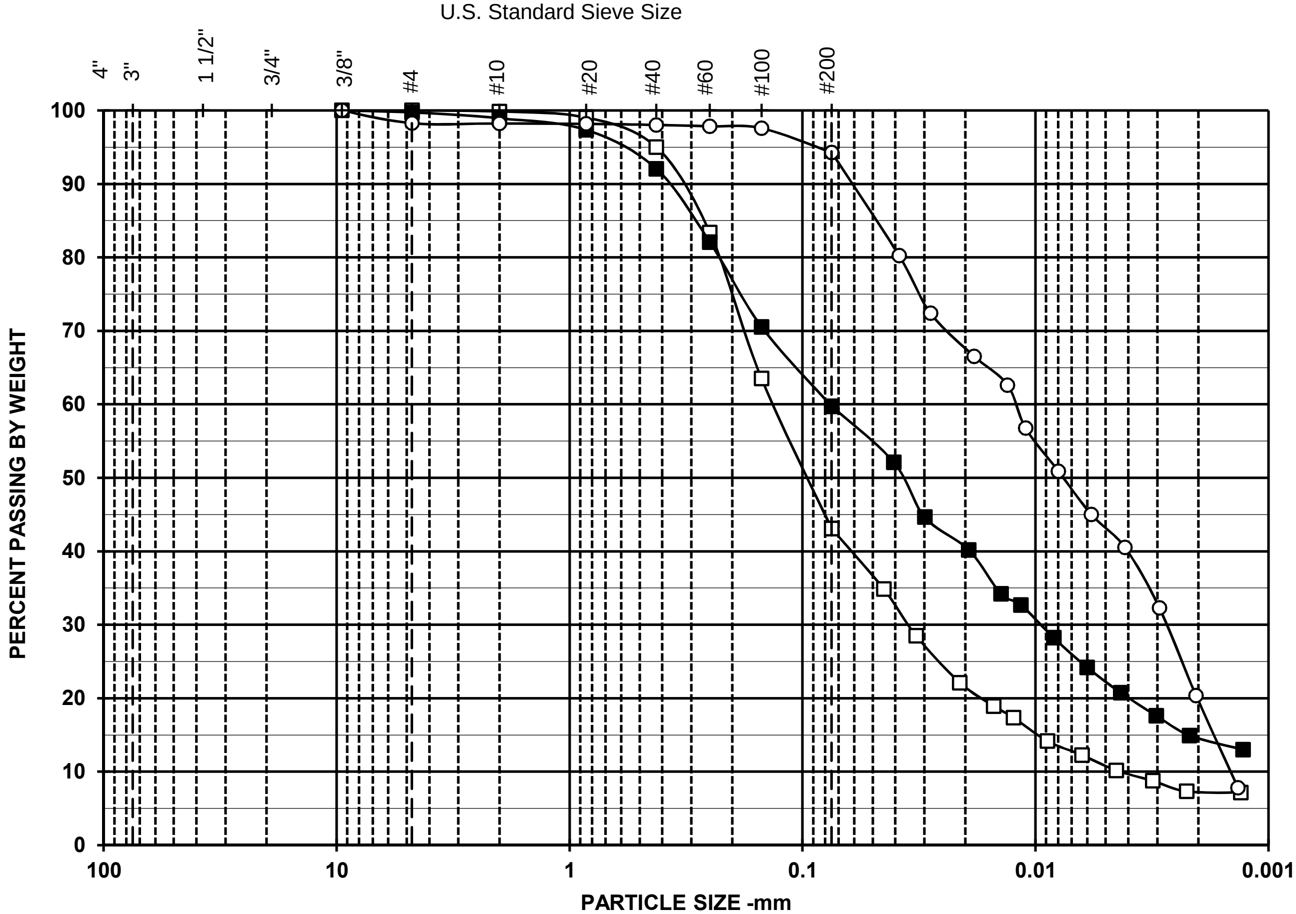
siev1g.xls 5/17/2012

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	24.2	26	17	9	SC	Brown, Clayey sand	5/3/2012
■	24.7	26	15	11	CL	Brown, Sandy lean clay	5/3/2012
○		37	22	15	CL	Gray, Lean clay	5/2/2012

Symbol	□	■	○
Boring	SB-103	SB-103	SB-103
Sample	S-26,27,28	S-33,34,35	B
Depth	55-61	69-75	75.65
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.3	1.7
% SAND	56.9	40.0	4.0
%C SAND	0.1	0.8	0.0
%M SAND	4.8	6.9	0.2
%F SAND	51.9	32.4	3.8
% FINES	43.1	59.7	94.3
% -2μ	7	15	20
D_{100} (mm)	4.75	9.50	9.50
D_{60} (mm)	0.14	0.08	0.01
D_{30} (mm)	0.04	0.01	0.00
D_{10} (mm)			
Cc			
Cu			

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	100.0
4	100.0	99.7	98.3
10	99.9	98.9	98.2
20	99.0	97.4	98.2
40	95.0	92.1	98.0
60	83.4	82.1	97.8
100	63.5	70.5	97.6
200	43.1	59.7	94.3

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T11176638	11176638

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National Grid - Williamsburg Works Former MGP Site

Analysis File: 3SV-MasterRev3

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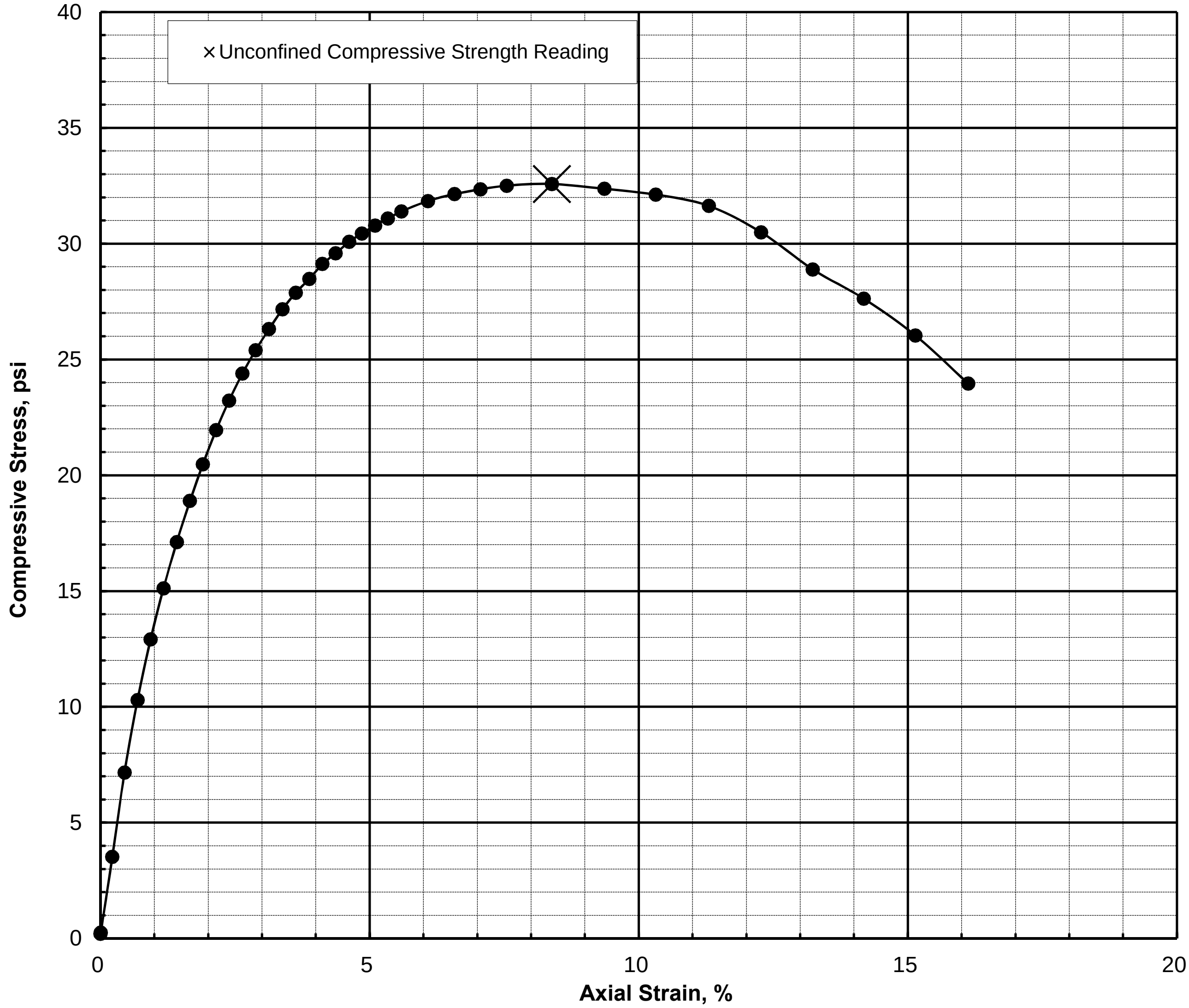
UNCONFINED COMPRESSIVE STRENGTH TEST, ASTM METHOD D2166



Specimen and Material Property Information

Sample Type: Intact

Description and/or Classification: CL, reddish brown lean clay; slickenside noted at failure surface

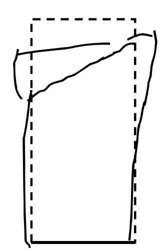
	Water Content (%) (1)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf) (1)	Void Ratio (-) (2)	Saturation (%) (2)	Length (inch)	Diameter (inch)	L/D (-)	LL (-)	PI (-)	Specific Gravity (-) (2)
Initial	21.8	131.0	107.6	0.60	100.3	6.026	2.851	2.1	48	25	2.76

Failure Summary

UC Compressive Strength, q_u (psi)	UC Shear Strength, s_u (psi)	Strain to to Peak (%)	Strain Rate (%/min)
32.6	16.3	8.4	0.72

Tested by: DT
Test Date: 5/1/2012

Reviewed by: CMJ
Review Date: 5/7/2012



FAILURE SKETCH

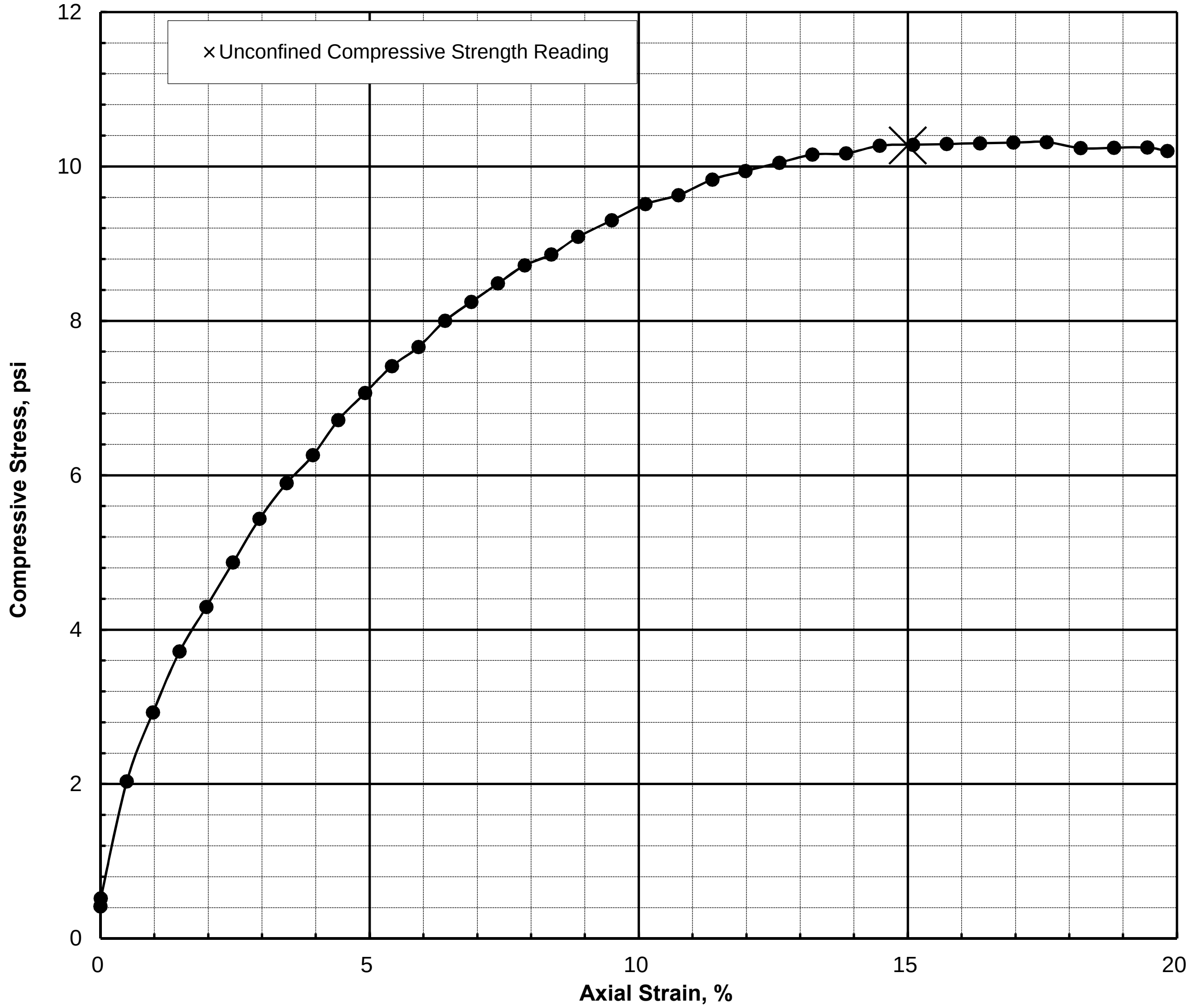
Remarks and Notes:

(1) Water Content determined after shear from partial specimen.

(2) Assumed specific gravity

URS Corporation **Project # 11176638** **TerraSense, LLC** **Project # T11176638**	**National Grid Williamsburg Works Former MGP Site**	**UNCONFINED COMPRESSION TEST** **Boring: SB-100 Sample: Section: B Depth: 60.15 ft.**

UNCONFINED COMPRESSIVE STRENGTH TEST, ASTM METHOD D2166



Specimen and Material Property Information

Sample Type: Intact

Description and/or Classification: CL, reddish brown lean clay with sand

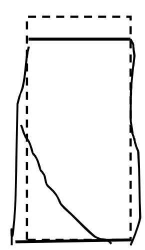
	Water [1] Content (%)	Wet Unit Weight (pcf)	Dry Unit [1] Weight (pcf)	Void [2] Ratio (-)	Saturation [2] (%)	Length (inch)	Diameter (inch)	L/D (-)	LL (-)	PI (-)	Specific [2] Gravity (-)
Initial	26.7	126.2	99.62	0.74	100.1	3.935	2.005	2.0	47	25	2.78

Failure Summary

UC Compressive Strength, q_u (psi)	UC Shear Strength, s_u (psi)	Strain to to Peak (%)	Strain Rate (%/min)
10.3	5.15	15.0	0.74

Tested by: DT
Test Date: 5/2/2012

Reviewed by: CMJ
Review Date: 5/7/2012



FAILURE SKETCH

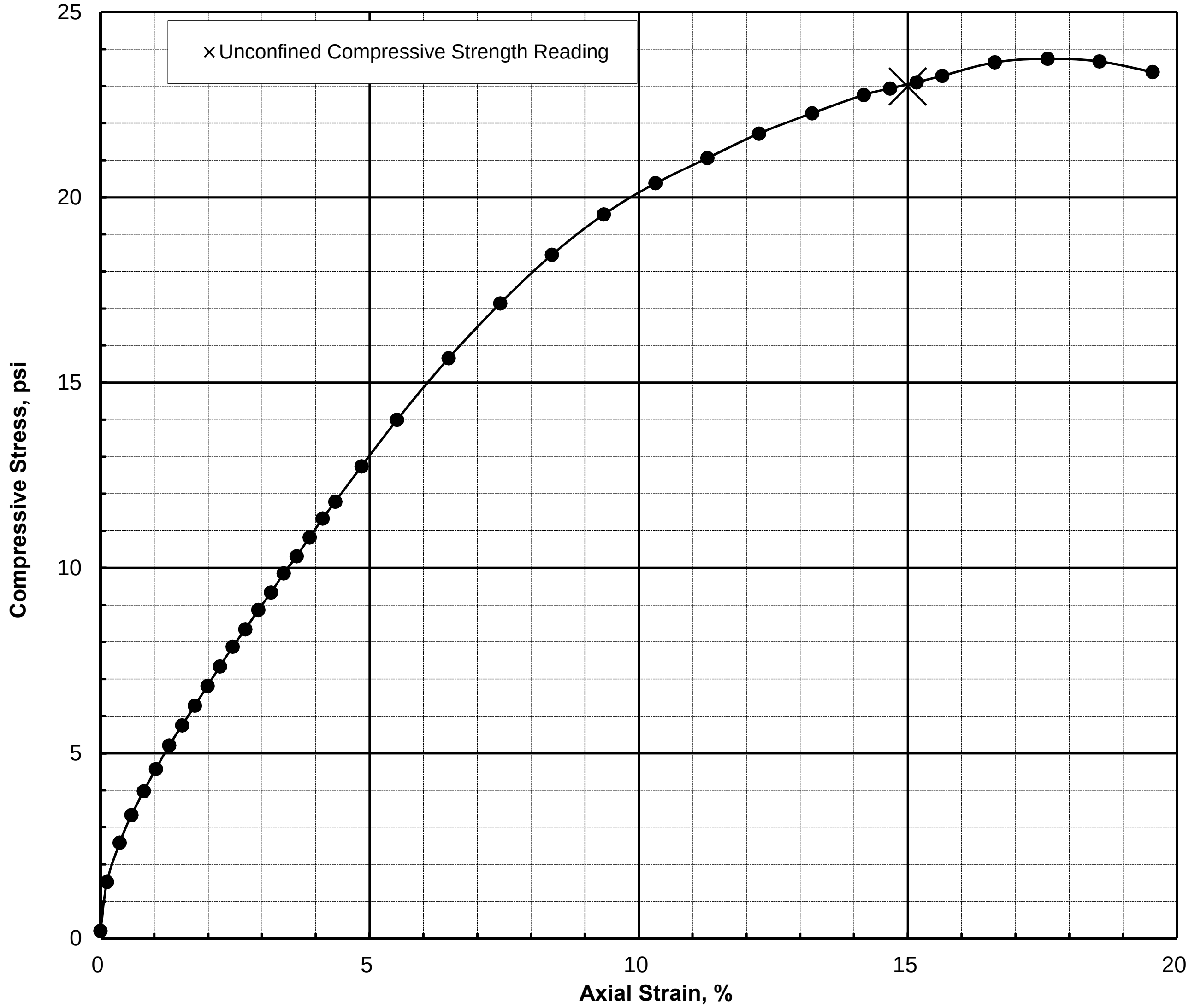
Remarks and Notes:

(1) Water Content determined after shear from partial specimen.

(2) Assumed specific gravity

URS Corporation **Project # 11176638** **TerraSense, LLC** **Project # T11176638**	**National Grid Williamsburg Works Former MGP Site**	**UNCONFINED COMPRESSION TEST** **Boring: SB-102 Sample: Section: C Depth: 64.2 ft.**

UNCONFINED COMPRESSIVE STRENGTH TEST, ASTM METHOD D2166



Specimen and Material Property Information

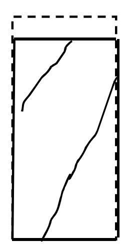
Sample Type: Intact

Description and/or Classification: CL, gray lean clay

	Water (1) Content (%)	Wet Unit Weight (pcf)	Dry Unit (1) Weight (pcf)	Void(2) Ratio (-)	Saturation(2) (%)	Length (inch)	Diameter (inch)	L/D (-)	LL (-)	PI (-)	Specific (2) Gravity (-)
Initial	23.2	129.5	105.2	0.64	100.4	6.030	2.839	2.1	37	15	2.76

Failure Summary

UC Compressive Strength, q_u (psi)	UC Shear Strength, s_u (psi)	Strain to to Peak (%)	Strain Rate (%/min)
23.0	11.5	15.0	0.72



FAILURE SKETCH

Remarks and Notes:

(1) Water Content determined after shear from partial specimen.

(2) Assumed specific gravity

Tested by: DT   Reviewed by: CMJ

Test Date: 5/1/2012   Review Date: 5/7/2012

URS Corporation **Project # 11176638** **TerraSense, LLC** **Project # T11176638**	**National Grid Williamsburg Works Former MGP Site**	**UNCONFINED COMPRESSION TEST** **Boring: SB-103 Sample: Section: B Depth: 75.65 ft.**

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE
ASTM D 5084 - Method F

Project No.: T11176638 BORING: SB-100 Test No.: P9395

Project Name: National Grid SAMPLE: A DEPTH (ft): 59.6

Specimen - Apparatus set-up - Test Information Cell No. 4 Apparatus No. 7 Stage No.: 3

Preliminary Length/Area Calculations

Lo =	3.991	in	Lo=	10.138	cm
dLc=	-0.020	in	Ao =	41.94	cm^2
Lc=	4.011	in	Vo =	425.13	cm^3
			Lc=	10.188	cm
dVc = 3 Vo * (dLc/Lo)			dVc=	-6.39	cm^3
			Vc =	431.52	cm^3
Sc =	0.241	cm^{-1}	Ac=	42.354	cm^2

1) Specimen Tested in :	x	Triaxial Cell or		Compaction Mold or	
	x	with stones or		Stones with filter paper or	top + bottom
2) Specimen orientation for:	x	Vertical or		Horizontal permeability determination	
3) During saturation: Water flushed up sides of specimen to remove air	x	No		Yes	
4) During consolidation:	x	Top and bottom drainage or		Top	Bottom only
5) Direction of permeant :	x	Up during or		Down during permeation	
6) Permeant: water used	x	Tap		Distilled	
or		Demineralized		0.005 N calcium sulfate (CaSO4)	

Equations Used

Kt = - 0.0000760 * Sc/dT(min) * ln (ho/hf)

RT = (-0.02452*(ave. temp in C) + 1.495)

K @ 20 ºC = RT * Kt TubeC= 1.3158

Consol Stage- Trial No.	Temp. º C	Date	Time hr	min	sec	Initial σ_c psi	Ub psi	U-tube Reading Head (cm) (cc)	Tail (cm) (cc)	Flow in/out gradient	Permeability Preliminary Final at 20ºC cm/sec Dev. from Ave.
initial	23.5	5/2/12	09	28	00	105.0	100.0	58.01	42.24	0.98	3.26E-08
final	23.6	5/2/12	10	34	00			56.68	42.67		3.00E-08
1	RT = 0.918	dT =	66.00 min			σ'c =	0.7 ksf	0.100	0.103	io= 19.5	45%
initial	23.6	5/2/12	10	35	00	105.0	100.0	58.13	42.20	0.96	2.39E-08
final	23.7	5/2/12	11	45	00			57.07	42.55		2.20E-08
2	RT = 0.915	dT =	70.00 min			σ'c =	0.7 ksf	0.080	0.084	io= 19.7	6%
initial	23.7	5/2/12	11	46	00	105.0	100.0	58.02	42.24	1.03	2.28E-08
final	23.8	5/2/12	13	06	00			56.88	42.59		2.09E-08
3	RT = 0.913	dT =	80.00 min			σ'c =	0.7 ksf	0.086	0.084	io= 19.5	1%
initial	23.8	5/2/12	13	07	00	105.0	100.0	58.23	42.19	0.96	2.22E-08
final	24.0	5/2/12	14	13	00			57.29	42.50		2.03E-08
4	RT = 0.909	dT =	66.00 min			σ'c =	0.7 ksf	0.071	0.074	io= 19.8	-2%
initial	24.0	5/2/12	14	16	00	105.0	100.0	59.30	41.88	1.06	2.17E-08
final	24.0	5/2/12	15	46	00			57.96	42.28		1.97E-08
5	RT = 0.907	dT =	90.00 min			σ'c =	0.7 ksf	0.101	0.096	io= 21.5	-5%
initial											
final											
6		dT =				σ'c =					

TEST SUMMARY

Final Specimen and Test Conditions

Lc =	10.188	cm	ε_{axial} =	-0.5%
Ac =	42.216	cm^2		
Vc=	430.11	cm^3	ε_{vol} =	-1.2%
Sc =	0.241	cm^{-1}	Sc = Lc / Ac , final	

	w (%)	γ_τ (pcf)	γ_d (pcf)	S (%)
Initial	23.96	128.4	103.6	97.5
PreTest	25.28	128.2	102.4	100.0

HYDRAULIC CONDUCTIVITY SUMMARY

Averages for trials: 2-5

ave K @ 20 ºC: **2.07E-08** cm/sec

(i_o)ave = 20.1

Tested By: DT Reviewed By: G. Thomas

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE
ASTM D 5084 - Method F

Project No.: T11176638 | BORING: SB-102 | Test No.: P9396

Project Name: National Grid | SAMPLE: B | DEPTH (ft): 63.65

Specimen - Apparatus set-up - Test Information | Cell No. 1 | Apparatus No. 4 | Stage No.: 3

Preliminary Length/Area Calculations

Lo =	4.002	in	Lo=	10.165	cm
dLc=	0.024	in	Ao =	41.43	cm^2
Lc=	3.978	in	Vo =	421.14	cm^3
			Lc=	10.104	cm
dVc = 3 Vo * (dLc/Lo)			dVc=	7.58	cm^3
			Vc =	413.56	cm^3
Sc =	0.247	cm^{-1}	Ac=	40.932	cm^2

1) Specimen Tested in :	x	Triaxial Cell or		Compaction Mold or
	x	with stones or		Stones with filter paper or top + bottom
2) Specimen orientation for:	x	Vertical or		Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air	x	No		Yes
4) During consolidation:	x	Top and bottom drainage or		Top / Bottom only
5) Direction of permeant :	x	Up during or		Down during permeation
6) Permeant: water used	x	Tap		Distilled
or		Demineralized		0.005 N calcium sulfate (CaSO4)

Equations Used

Kt = - 0.0000750 * Sc/dT(min) * ln (ho/hf)

RT = (-0.02452*(ave. temp in C) + 1.495)

K @ 20 ºC = RT * Kt TubeC= 1.3181

Consol Stage-Trial No.	Temp. º C	Date	Time hr	min	sec	Initial σ_c psi	Ub psi	U-tube Reading Head (cm) (cc)	Tail (cm) (cc)	Flow in/out gradient	Permeability Preliminary Final at 20ºC cm/sec Dev. from Ave.
initial	23.6	5/2/12	09	25	00	105.0	100.0	59.80	45.51	1.01	6.50E-08
final	23.6	5/2/12	10	12	00			58.15	46.03		5.93E-08
1	RT = 0.916	dT =	47.00 min			σ'_c =	0.7 ksf	0.123	0.122	io= 17.8	3%
initial	23.6	5/2/12	10	13	00	105.0	100.0	59.58	45.57	1.01	6.37E-08
final	23.8	5/2/12	11	03	00			57.90	46.10		5.79E-08
2	RT = 0.914	dT =	50.00 min			σ'_c =	0.7 ksf	0.125	0.124	io= 17.4	0%
initial	23.8	5/2/12	11	04	00	105.0	100.0	59.80	45.51	1.01	6.27E-08
final	23.8	5/2/12	11	55	00			58.08	46.05		5.69E-08
3	RT = 0.911	dT =	51.00 min			σ'_c =	0.7 ksf	0.128	0.127	io= 17.8	-2%
initial	23.8	5/2/12	11	56	00	105.0	100.0	59.73	45.52	1.01	6.30E-08
final	24.0	5/2/12	13	04	00			57.50	46.22		5.70E-08
4	RT = 0.909	dT =	68.00 min			σ'_c =	0.7 ksf	0.166	0.164	io= 17.7	-1%
initial											
final											
5		dT =				σ'_c =					
initial											
final											
6		dT =				σ'_c =					

TEST SUMMARY

Final Specimen and Test Conditions

Lc =	10.104	cm	ε_{axial} =	0.6%
Ac =	41.122	cm^2		
Vc=	415.48	cm^3	ε_{vol} =	1.3%
Sc =	0.246	cm^{-1}	Sc = Lc / Ac , final	

	w (%)	γ_τ (pcf)	γ_d (pcf)	S (%)
Initial	31.49	122.6	93.2	98.7
PreTest	30.99	123.8	94.5	100.0

HYDRAULIC CONDUCTIVITY SUMMARY

Averages for trials: 1-4

ave K @ 20 ºC: **5.78E-08** cm/sec

(i_o)ave = 17.7

Tested By: DT Reviewed By: G. Thomas

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE
ASTM D 5084 - Method F

Project No.: T11176638 BORING: SB-103 Test No.: P9394
Project Name: National Grid SAMPLE: A DEPTH (ft): 75.15

Specimen - Apparatus set-up - Test Information Cell No. D Apparatus No. 1 Stage No.: 3

Preliminary Length/Area Calculations

Lo =	3.021	in	Lo=	7.674	cm
dLc=	0.015	in	Ao =	40.30	cm^2
Lc=	3.006	in	Vo =	309.26	cm^3
			Lc=	7.636	cm
dVc = 3 Vo * (dLc/Lo)			dVc=	4.61	cm^3
			Vc =	304.65	cm^3
Sc =	0.191	cm^{-1}	Ac=	39.898	cm^2

1) Specimen Tested in : [x] Triaxial Cell or [ ] Compaction Mold or
[x] with stones or [ ] Stones with filter paper or top + bottom
2) Specimen orientation for: [x] Vertical or [ ] Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air [x] No [ ] Yes
4) During consolidation: [x] Top and bottom drainage or [ ] Top [ ] Bottom only
5) Direction of permeant : [x] Up during or [ ] Down during permeation
6) Permeant: water used [x] Tap [ ] Distilled
or [ ] [ ] Demineralized [ ] 0.005 N calcium sulfate (CaSO4)

Equations Used

Kt = - 0.0000757 * Sc/dT(min) * ln (ho/hf)
RT = (-0.02452*(ave. temp in C) + 1.495)
K @ 20 ºC = RT * Kt TubeC= 1.3127

Consol Stage-Trial No.	Temp. º C	Date	Time hr	min	sec	Initial σ_c psi	Ub psi	U-tube Reading Head (cm) (cc)	Tail (cm) (cc)	Flow in/out gradient	Permeability Preliminary Final at 20ºC cm/sec Dev. from Ave.
initial	23.5	5/2/12	09	32	00	105.0	100.0	55.10	39.03	1.01	2.66E-08
final	23.6	5/2/12	10	36	00			53.74	39.45		2.43E-08
1	RT = 0.918	dT =	64.00 min			σ'c =	0.7 ksf	0.102	0.101	io= 26.5	5%
initial	23.6	5/2/12	10	37	00	105.0	100.0	55.00	39.04	0.92	2.54E-08
final	23.7	5/2/12	11	43	00			53.67	39.49		2.31E-08
2	RT = 0.915	dT =	66.00 min			σ'c =	0.7 ksf	0.100	0.108	io= 26.3	0%
initial	23.7	5/2/12	11	44	00	105.0	100.0	55.20	39.01	1.02	2.50E-08
final	23.8	5/2/12	13	03	00			53.63	39.49		2.27E-08
3	RT = 0.913	dT =	79.00 min			σ'c =	0.7 ksf	0.118	0.115	io= 26.7	-2%
initial	23.8	5/2/12	13	04	00	105.0	100.0	55.20	39.01	1.02	2.52E-08
final	24.0	5/2/12	14	08	00			53.90	39.41		2.28E-08
4	RT = 0.909	dT =	64.00 min			σ'c =	0.7 ksf	0.097	0.096	io= 26.7	-2%
initial											
final											
5		dT =				σ'c =					
initial											
final											
6		dT =				σ'c =					

TEST SUMMARY

Final Specimen and Test Conditions

Lc = 7.636 cm ε_{axial} = 0.5%
Ac = 40.103 cm^2
Vc= 306.21 cm^3 ε_{vol} = 1.0%
Sc = 0.190 cm^{-1} Sc = Lc / Ac , final

	w (%)	γ_t (pcf)	γ_d (pcf)	S (%)
Initial	26.19	125.9	99.8	97.5
PreTest	26.25	127.2	100.8	100.0

HYDRAULIC CONDUCTIVITY SUMMARY

Averages for trials: 1-4
ave K @ 20 ºC: **2.32E-08** cm/sec
(i_o)ave = 26.5

Tested By: DT Reviewed By: G. Thomas

LABORATORY LOG OF TUBE SAMPLE

Proj. No.	T11176638	Boring No.	SB-100
Date Opened	5/1/2012	Sample No.	
Opened By:	DT	Depth	59-61

Tube Seals	Wax	Mech.	Good	Fair	Loose	Leaking Water	Leaking Soil
Top							
Bottom							

Tube Scale (ft)	Depth (ft)	Sample Use	Jar No.	Description of Soil and Remarks
0.2		0.42' Void		
0.4				
0.6		discard		
0.8				
	59.35	w		
1.0			A	CL, Mottled puple and red silty CLAY trace fine sand
1.2	59.6	Perm		
1.4	59.9	w		
			B	
1.6		UC, PI		CL, Mottled puple and red silty CLAY trace fine sand
	60.15	S/H		
1.8	60.45	w		
2.0			C	CL, Mottled puple and red silty CLAY changing to gray CLAY with purple mottles
2.2	60.7			
2.4		0.07' Void		

Measured Length of tube	2.5 ft	Wgt. soil + tube	7530 gm
End Voids	0.49 ft	Wgt tube	2319.6 gm
I.D. Cutting edge (De)	2.869 in.	Wgt. wet soil	5210.4 gm
I.D. Tube (Di)	2.886 in.		
Recovery	2.01 ft		
Inside Clearance Ratio:	0.6%		

Total Unit Weight by

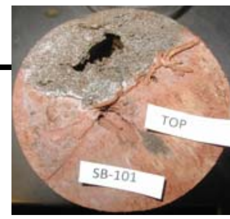
Cutting Edge (De)	Tube (Di)	Ave.
127.3	125.8	126.6 lb/ft3

LABORATORY LOG OF TUBE SAMPLE

Proj. No. 31737757-270 | Boring No. SB-101
Date Opened 5/1/2012 | Sample No.
Opened By: DT | Depth 59-61

Tube Seals	Wax	Mech.	Good	Fair	Loose	Leaking Water	Leaking Soil
Top							
Bottom							

Tube Scale (ft)	Depth (ft)	Sample Use	Jar No.	Description of Soil and Remarks
	59	.08 void discard		
0.2				
0.4	59.4	PI, S/H	A	top disturbed with sand pockets CL, stiff, red brown CLAY
0.6				
0.8	59.7	w		
1.0	59.95		B	CL, stiff, red brown CLAY
1.2				
1.4		0.0 void		
1.6				
1.8				
2.0				
2.2				
2.4		0.03' Void		



Measured Length of tube 1.3 ft | Wgt. soil + tube 4378.5 gm
End Voids 0.08 ft | Wgt tube 1190.9 gm
I.D. Cutting edge (De) 2.844 in. | Wgt. wet soil 3187.6 gm
Tube (Di) 2.886 in.
Recovery 1.22 ft
Inside Clearance Ratio: 1.5%

Total Unit Weight by		
Cutting Edge (De)	Tube (Di)	Ave.
130.6	126.8	128.7 lb/ft3

LABORATORY LOG OF TUBE SAMPLE

Proj. No. T11176638 | Boring No. SB-102
Date Opened 5/1/2012 | Sample No.
Opened By: DT | Depth 63-65

Tube Seals	Wax	Mech.	Good	Fair	Loose	Leaking Water	Leaking Soil
Top							
Bottom							

Tube Scale (ft)	Depth (ft)	Sample Use	Jar No.	Description of Soil and Remarks
0.2		0.94' Void		
0.4				
0.6				
0.8				
1.0	63			
1.2			A	SP-SM, brown fine SAND, trace silt
1.4	63.4	w		
1.6	63.65	Perm	B	CL, red-brown silty CLAY, trace sand
1.8				
2.0	63.95	w		
2.2	64.2	UC PI, S/H	C	CL, red-brown silty CLAY, trace sand
2.4	65	0.07' Void		

Measured Length of tube 2.5 ft
End Voids 1.01 ft
I.D. Cutting edge (De) 2.837 in.
I.D. Tube (Di) 2.881 in.
Recovery 1.49 ft
Inside Clearance Ratio: 1.6%

Wgt. soil + tube 5704.8 gm
Wgt tube 2353.6 gm
Wgt. wet soil 3351.2 gm

Total Unit Weight by

Cutting Edge (De)	Tube (Di)	Ave.
113.0	109.5	111.2 lb/ft3

LABORATORY LOG OF TUBE SAMPLE

Proj. No. 31737757-270 | Boring No. SB-103
Date Opened 5/1/2012 | Sample No.
Opened By: DT | Depth 75-77

Tube Seals	Wax	Mech.	Good	Fair	Loose	Leaking Water	Leaking Soil
Top							
Bottom							

Tube Scale (ft)	Depth (ft)	Sample Use	Jar No.	Description of Soil and Remarks
	75	.0 void		
0.2	75.15	Perm	A	
0.4	75.4	w		CL, mottled red and gray CLAY
0.6	75.65	UC PI, S/H	B	CL, gray silty CLAY
0.8				
1.0	76	0.12 void		
1.2				
1.4				
1.6				
1.8				
2.0				
2.2				
2.4		0.03' Void		

Measured Length of tube	1.02 ft	Wgt. soil + tube		3229.4 gm	
End Voids	0.12 ft	Wgt tube		912.2 gm	
I.D. Cutting edge (De)	dented in.	Wgt. wet soil		2317.2 gm	
Tube (Di)	2.882 in.	Total Unit Weight by			
Recovery	0.9 ft	Cutting Edge (De)	Tube (Di)	Ave.	
Inside Clearance Ratio:		dented	125.3	125.3 lb/ft3	

APPENDIX C

MONITORING WELL CONSTRUCTION LOGS

DRILLING SUMMARY

Geologist:
Andreas Papaneocleous

Drilling Company:
Fenley & Nicol Environmental, Inc.

Driller:
Mike Meade

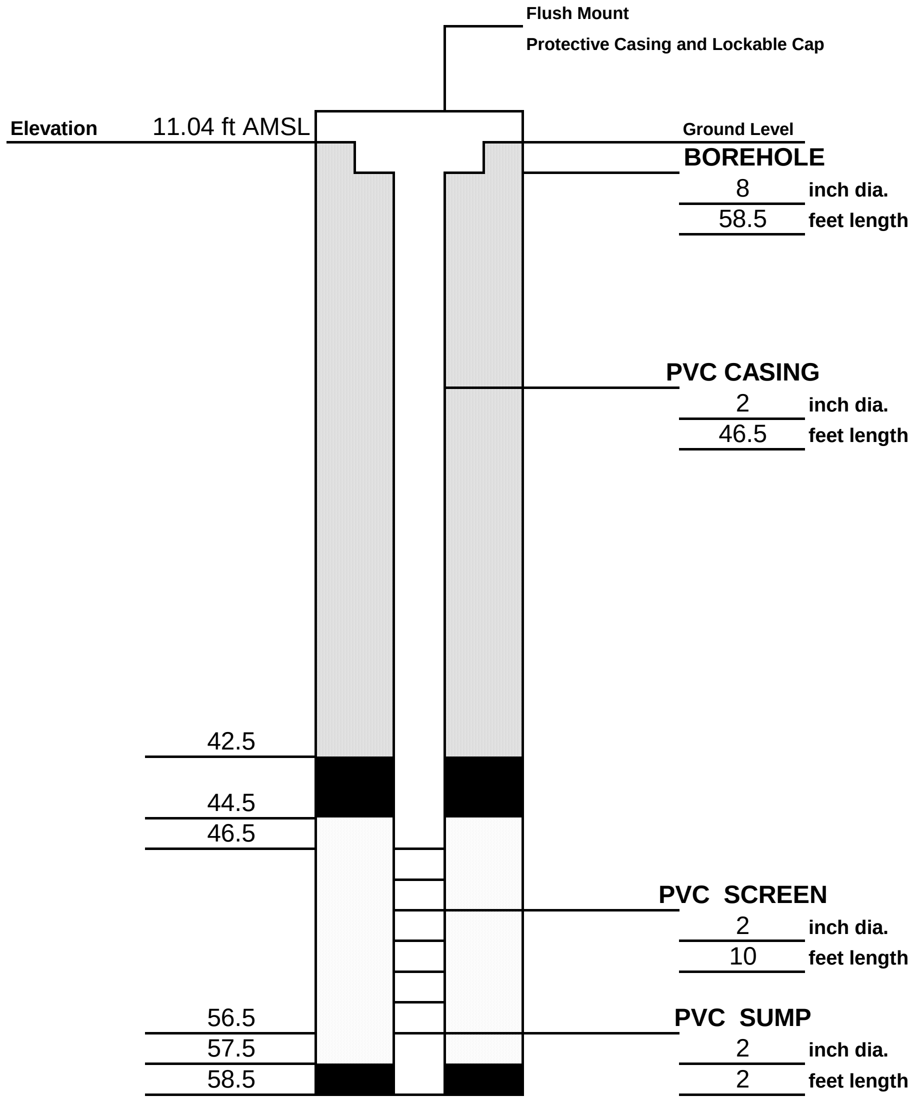
Rig Make/Model:
Canterra CT-450

Date:
4/2/2012

GEOLOGIC LOG

Depth(ft.)	Description
	See Boring Log for Lithologic Description.

D E P T H (FT)



WELL DESIGN

CASING MATERIAL		SCREEN MATERIAL		FILTER MATERIAL			
Surface:	8" Flush mount steel grade box	**Type:**	2" Schedule 40 PVC	**Type:**	#2 Sand	**Setting:**	44.5-57.5 ft
				SEAL MATERIAL			
Monitor:	2" Schedule 40 PVC	**Slot Size:**	0.010"	**Type:**	Bentonite	**Setting 1:**	42.5-44.5 ft
						Setting 2:	57.5-58.5 ft

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Williamsburg Site**	**Project No.: 11176638.00008**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: WW-MW-100I**

DRILLING SUMMARY

Geologist:
Mira Abdelaziz

Drilling Company:
Fenley & Nicol Environmental, Inc.

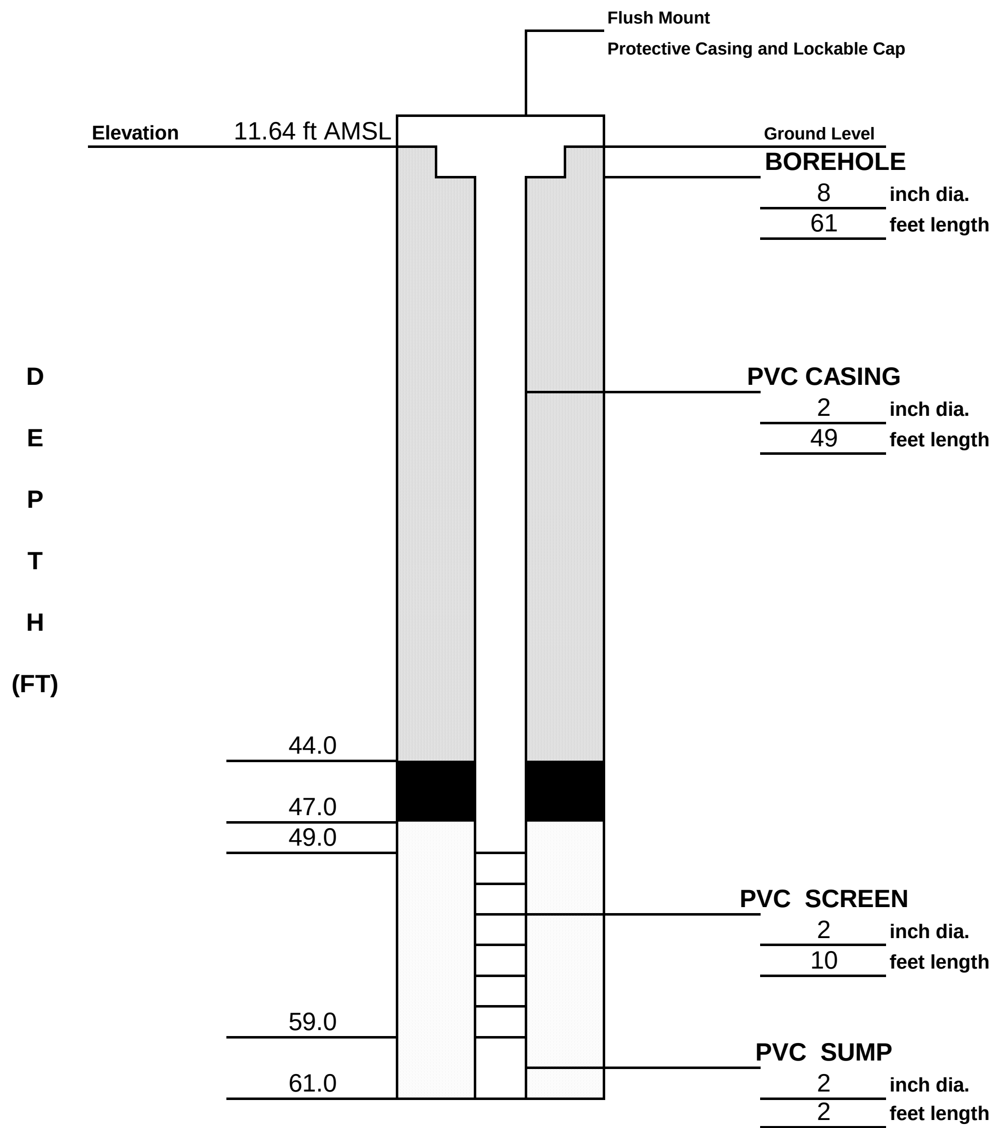
Driller:
Mike Meade

Rig Make/Model:
Canterra CT-450

Date:
4/17/2012

GEOLOGIC LOG

Depth(ft.)	Description
	See Boring Log for Lithologic Description.



WELL DESIGN

CASING MATERIAL		SCREEN MATERIAL		FILTER MATERIAL
Surface:	8" Flush mount steel grade box	**Type:**	2" Schedule 40 PVC	**Type:** #2 Sand **Setting:** 47.0-61.0 ft
				SEAL MATERIAL
Monitor:	2" Schedule 40 PVC	**Slot Size:**	0.010"	**Type:** Bentonite **Setting :** 44.0-47.0 ft

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Williamsburg Site**	**Project No.: 11176638.00008**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number: WW-MW-102I**

DRILLING SUMMARY

Geologist:
Andreas Papaneocleous

Drilling Company:
Fenley & Nicol Environmental, Inc.

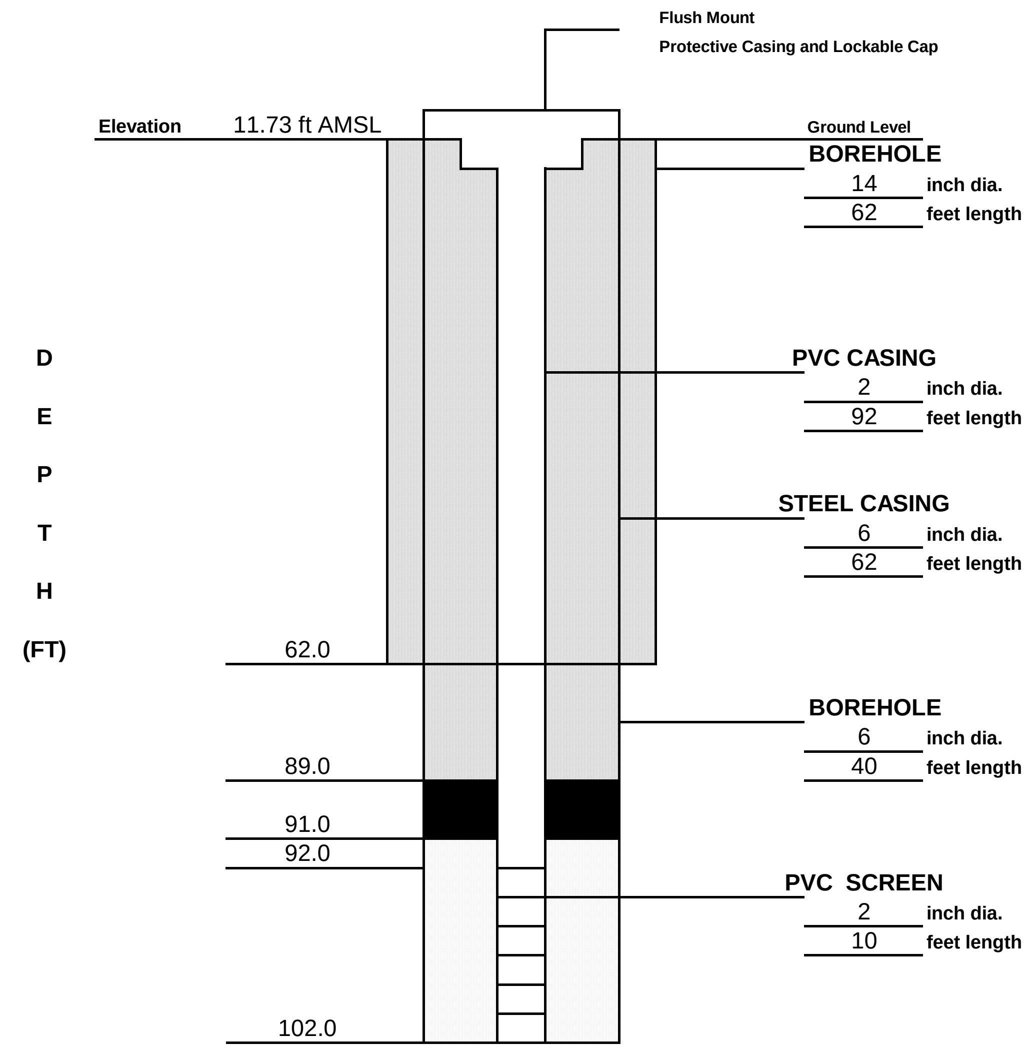
Driller:
Mike Meade

Rig Make/Model:
Canterra CT-450

Date:
4/19/2012

GEOLOGIC LOG

Depth(ft.)	Description
	See Boring Log for Lithologic Description.



WELL DESIGN

CASING MATERIAL		SCREEN MATERIAL		FILTER MATERIAL			
Surface:	8" Flush mount steel grade box	**Type:**	2" Schedule 40 PVC	**Type:**	#2 Sand	**Setting:**	91.0-102.0 ft
				SEAL MATERIAL			
Monitor:	2" Schedule 40 PVC	**Slot Size:**	0.010"	**Type:**	Bentonite	**Setting :**	89.0-91.0 ft

COMMENTS:
6" permanent steel casing was installed to 62 ft bgs.

LEGEND
- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Williamsburg Site**	**Project No.: 11176638.00008**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:** **WW-MW-102D**

APPENDIX D

TEST PIT LOGS/TEST PIT PHOTO LOGS

URS Corporation
77 Goodell Street
Buffalo, New York 14203
(716) 856-5636

TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	213' west of Kent Ave fence,
DATE STARTED:	3/20/2012		140' south of N. 12th St fence
DATE COMPLETED:	3/21/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-100**	**GEOLOGIST:**	Megan Dascoli / Mira Abdelaziz

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0'-5" - concrete
1		5"-1' - coarse, angular gravel (road base)
		1'-6.5' - dk brown FILL - sand and silt; 30% bricks, paving stones; 20% gravel
2		
3		
4		
		4' - 4" pipe running SE to NW, possible drain line
5		
		5'-6.5' - same as above, black stained, fuel oil and anaerobic odor
6		
		6' - water pooling
7		
		6.5'-7.8' - flat, hard bottom, possible concrete, visual inspection hindered by pooling water
8		Test Pit ended at 7.8' bgs.
9		
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.
Obstructions Noted: Possible concrete flooring at 6.5' bgs.
Note: 0'-6.5' dug on 3/20/12 with Megan Dascoli.
6.5'-7.8' jackhammered on 3/21/12 with Mira Abdelaziz. Stopped due to 18" of pooling water.

URS Corporation
77 Goodell Street
Buffalo, New York 14203
(716) 856-5636

TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	213' west of Kent Ave fence,
DATE STARTED:	3/20/2012		68' south of N. 12th St fence
DATE COMPLETED:	3/20/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-101**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0'-5" - concrete
1		5"- 1.3' - coarse, angular gravel (road base)
		1' - dk brown NAPL free product in middle of pit
2		1.3'-9.3' - med brown FILL - silt, sand with 10% bricks, 10% f-c gravel, trace wood beam, concrete
3		
4		3.5'-4' - med gray staining
		4'-9.3' - dk gray staining, strong CT-like odor (PID=218 ppm)
5		
6		
		6'-8' - 1' x 1' boulder and 2' x 3' brick structure
7		
8		
9		
		Test Pit ended at 9.3' bgs.
10		
11		
12		

COMMENTS: PID readings from 4'-9.3' were approximately 218 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: None

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TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	207' west of Kent Ave fence,
DATE STARTED:	3/19/2012		10' south of N. 12th St fence
DATE COMPLETED:	3/19/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-102**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0'-6" - concrete
1		6"-1.5' - dk brown FILL - sand, silt, bricks
2		1.5'-2.25' - coarse, angular gravel layer
		2.25'-8' - dk brown FILL- sand and silt, with 30% bricks, cobbles, paving stones, 20% gravel
3		
4		
5		
		5' - CT-like odor, water seeping into test pit
6		5.5' - pipe coming into site from N 12th Street through the middle of test pit
7		
8		8' - PID= 322 ppm
		Test pit ended at 8' bgs.
9		
10		
11		
12		

COMMENTS: PID readings on 0'-5' bgs were 0 ppm. At 8' bgs, PID=322 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: Pipe coming into site at 5.5' bgs from N 12th Street.

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TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	157' west of Kent Ave fence,
DATE STARTED:	3/19/2012		10' south of N. 12th St fence
DATE COMPLETED:		**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-103**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-1' - grass and rubble
2		1'-6' - dk brown FILL - 60% sand and silt, sub-angular coarse gravel with bricks and cobbles, stained black, moderate petroleum/fuel oil-like odor
3		2.5' - two metal walls, with rivets, possibly part of Holder Tank
4		3'-6' - brick structure on NW end of test pit 3.5' - 1' diameter water pipe and concrete wall running NE-SW street side, parallel with N 12th Street
5		
6		
7		6' - water pooling, flat concrete bottom
8		Test pit covered with plywood, will attempt to use hammer bit to drill through concrete
9		
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: Water pipe at 3.5' bgs parallel to N 12th Street. Concrete floor throughout at 6' bgs.

Note: 0'-6' dug on 3/19/12 with Megan Dascoli, not present past this date.

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TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	107' west of Kent Ave fence,
DATE STARTED:	3/15/2012		10' south of N. 12th St fence
DATE COMPLETED:	3/15/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-104**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-4" - asphalt; 4"-7" - coarse, angular gravel (road base) 7"-2' - med brown FILL- vf-c sand and silt, f-c gravel, cobbles, boulders, bricks, paving stones, trace metal; trace wood at 2'
2		1'-3.5' - a 2' diameter pipe entering site from N 12th St, looks like a sewer clean-out 2'-6.5' - med brown soft, moist, vf-m SAND with 30% silt, 20% f-m gravel, 10% cobbles
3		
4		
5		
6		5' - same lithology, with medium gray staining and sheen on grains, heavy coating, moderate odor that's a mix of CT-like and fuel oil-like (PID=0 ppm)
7		6.5'-9' - lt brown SILT, with 20% vf-m sand, 10% cobbles 7' - light to heavy coating of grains with dk brown NAPL, strong CT-like odor
8		with black stained wood fragments (PID=3.6 ppm) 8'-9' - heavy NAPL impacts - staining, heavy coating, strong odor (PID=4.9 ppm)
9		
10		Test Pit ended at 9' bgs, bottom of test pit is caving in.
11		
12		

COMMENTS: Highest PID reading was 4.9 ppm at 8'-9', strong odors and visual impacts from 7'-9'.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: Two foot diameter pipe found entering site from N 12th Street at 1'-3.5' bgs.

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TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	58' west of Kent Ave fence,
DATE STARTED: 3/15/2012			10' south of N. 12th St fence
DATE COMPLETED:		**OPERATOR:**	Mike Ryan
TRENCH NUMBER: **WW-TP-105**		**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-4" - asphalt; 4"-1' - coarse, angular gravel (road base)
2		1'-2.5' - thick concrete flooring
3		2.5'-6.8'- med brown FILL- vf-c sand with 30% silt, 20% f-c gravel, 5% cobbles
4		
5		
6		
7		at 6.5' water pooling at 6.8'- flat bottom, possibly concrete, visual inspection hindered by pooling water Will attempt to use hammer bit to drill through concrete
8		
9		
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: Possible concrete flooring at 6.8' bgs.

Note: 2"-6.8' dug on 3/20/12 with Megan Dascoli, not present past this date.

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TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT:	National Grid	**JOB NUMBER:**	11176638.00001
CONTRACTOR:	Fenley & Nicol	**LOCATION:**	10' west of Kent Ave fence,
DATE STARTED:	3/20/2012		10' south of N. 12th St fence
DATE COMPLETED:	3/20/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-106**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0'-6" - concrete/asphalt layer
1		6"-1.3' coarse, angular gravel (road base)
		1.3'-8.4' - on north side of test pit, a concrete wall, bottom not found
2		on south side - med brown FILL - vf-c sand with bricks, concrete, paving stones and gravel
3		
4		
5		
6		
7		
8		7'-8.4' - same lithology, with dark gray staining, strong fuel oil odor (PID=22.9 ppm)
9		Test Pit ended at 8.4'.
10		
11		
12		

COMMENTS: PID readings from 0'-7' bgs were 0 ppm. From 7'-8.4' bgs PID=22.9ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: On north side of test pit, a concrete wall from 16"-8.4' bgs, bottom not found.

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TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	10' west of Kent Ave fence,
DATE STARTED:	3/16/2012		68' south of N. 12th St fence
DATE COMPLETED:	3/16/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-107**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0'-3" - asphalt; 3"-9" - coarse, angular gravel (road base)
1		9"-1.5' - med brown FILL- sand, silt, bricks, gravel, concrete cobbles, rock cobbles
2		1.5' - Concrete foundations found. Two parallel concrete foundations found with a 16" opening between them that runs parallel to Kent Avenue.
3		1.5'-6.5' - between concrete - FILL- silt, sand and gravel, trace bricks
4		
5		
6		
		Water pooling at 6.5' bgs
7		Cleared to 6.5' bgs between the concrete foundations. Bottom of concrete not found.
8		
9		
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: Two concrete foundations with a 16" space between them from 1.5' to below 6.5' bgs.

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TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT:	National Grid	**JOB NUMBER:**	11176638.00001
CONTRACTOR:	Fenley & Nicol	**LOCATION:**	10' west of Kent Ave fence,
DATE STARTED:	3/15/2012		140' south of N. 12th St fence
DATE COMPLETED:	3/15/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-108**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0' -3" - asphalt; 3"-6" - coarse, angular gravel (road base)
1		6"-1' - med brown FILL - vf-vc sand with bricks and cobbles
		1'-8' - FILL - bricks, paving stones, cinder blocks, with 20% vf-vc sand and 10% silt, 10% f-c gravel
2		
3		2.5' - on east side (Kent Ave side), a foundation built of bricks and mortar found intact on the west side, possible side of Holder Tank No. 2 found, made of sheet metal and rivets containing bricks, concrete and other rubble inside
4		
5		
6		
7		6.5' - water pooling, NAPL odor on water
8		
9		Test pit ended at 8', under water, some bricks and fill material are coming up.
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: Brick foundation on east side, Holder Tank No 2 on west side,
bottom of either not found at 8' bgs.

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TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT:	National Grid	**JOB NUMBER:**	11176638.00001
CONTRACTOR:	Fenley & Nicol	**LOCATION:**	10' west of Kent Ave fence,
DATE STARTED:	3/16/2012		203' south of N. 12th St fence
DATE COMPLETED:	3/19/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-109**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-3" - asphalt; 3"-9" coarse, angular gravel (road base) 9"-4' - med brown FILL- vf-vc sand and 10% silt, 20% bricks and cobbles
2		
3		
4		3.5' - 1' diameter pipe 3.9' - trace metal and wood
5		4'-4.4' - concrete floor 4.4'-8' - FILL mostly silt, 10% sand, 10% f-c gravel, 10% boulders, trace wood, loose
6		
7		7'-8.3' - lt gray color, strong gasoline/petroleum odor (PID=115ppm)
8		
9		Test Pit cleared to 8'3".
10		
11		
12		

COMMENTS: PID readings for 0'-7' bgs were 0 ppm. PID=115 from 7'-8.3' bgs.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: 4" concrete flooring at ~4'bgs, concrete structures on west side.
1' diameter pipe found at 3.5' bgs.

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TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	58' west of Kent Ave fence,
DATE STARTED:	3/16/2012		203' south of N. 12th St fence
DATE COMPLETED:	3/16/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-110**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-4.5" - asphalt, 4.5"-11.5" - coarse, angular gravel (road base) 11.5"-6.5' - dk brown FILL- mostly bricks, cobbles and gravel, 30% sand and silt
2		1.5' - on north side of test pit, possible side of Holder Tank No. 2, metal rivets in sheet metal
3		
4		
5		4' - brick foundation found on the N 11th Street side, the south side of test pit. There is a 10" gap between the brick foundation and the Holder Tank side. Used post-hole diggers to clear to 6.5' bgs, could be advanced further.
6		
		6.5' - water pooling
7		
8		
9		
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: From 1.5'-6.5' bgs, brick foundation & Holder Tank No. 2 metal side with 10" gap between them.

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TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	107' west of Kent Ave fence,
DATE STARTED:	3/16/2012		203' south of N. 12th St fence
DATE COMPLETED:	3/16/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-111**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-8" - asphalt 8"-1.3' - coarse, angular gravel (road base)
2		1.3'-4' - med brown FILL - sand with 20% bricks and cobbles, 20% silt ↓
3		
4		
5		4'-7' - med brown SILT with 10% vf-m sand, 20% gravel and cobbles, 20% boulders, 20% clay ↓
6		
7		
8	■	7'-10' - dk gray SILT, 10% sand, 30% gravel to boulders, 20% clay, strong CT-like odor, sheen, and staining (PID=132 ppm) ↓
9	■	
10	■	
11		Test Pit ended at 10' bgs.
12		

COMMENTS: PID readings on material from 0'-7' were 0 ppm. From 7'-10', strong CT-like odor and staining.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: None

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TEST PIT LOG

PROJECT: National Grid Williamsburg			Sheet 1 of 1
CLIENT: National Grid		**JOB NUMBER:**	11176638.00001
CONTRACTOR: Fenley & Nicol		**LOCATION:**	157' west of Kent Ave fence,
DATE STARTED:	3/19/2012		203' south of N. 12th St fence
DATE COMPLETED:	3/19/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-112**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
		0'-6" - asphalt
1		6"-1' - coarse, angular gravel (road base)
		1'-8' - FILL-bricks with 40% sand and silt with concrete cobbles, paving stones
2		
3		
		3'->8' - brick wall on south side
4		
5		4.5' - water pooling, water has sheen on it
		4.5'-8' - mix of petroleum-like, CT-like, anaerobic odors; w/ black petroleum blebs on water
6		
7		
8		
		Test Pit ended at 8' bgs.
9		
10		
11		
12		

COMMENTS: PID readings on recovered material were 0 ppm.
Rubber tire backhoe used- Case 590K.
Obstructions Noted: Brick wall on south side from 3' bgs- beyond 8' bgs.

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TEST PIT LOG

PROJECT: National Grid Williamsburg		Sheet 1 of 1	
CLIENT:	National Grid	**JOB NUMBER:**	11176638.00001
CONTRACTOR:	Fenley & Nicol	**LOCATION:**	207' west of Kent Ave fence,
DATE STARTED:	3/19/2012		203' south of N. 12th St fence
DATE COMPLETED:	3/19/2012	**OPERATOR:**	Mike Ryan
TRENCH NUMBER:	**WW-TP-113**	**GEOLOGIST:**	Megan Dascoli

DEPTH (FT)	VISUAL IMPACTS	DESCRIPTION
1		0'-5" - concrete 5"-1' - coarse, angular gravel (road base)
2		1'-9' - med brown FILL - silt, vf-vc sand, 30% sub rounded f-c gravel, 20% cobbles, bricks, concrete, paving stones
3		
4		~3' - med gray staining, petroluem odor (PID=46.1 ppm)
5		
6		
7		
8		7'-9' - med gray staining, sheen on grains, strong CT-like and petroleum-like odor, PID=125 ppm, wet, water seeping into pit from 6'-7' bgs.
9		
10		Test Pit ended at 9' bgs.
11		
12		

COMMENTS: Staining and odors from 3'-9' bgs.
Rubber tire backhoe used- Case 590K.

Obstructions Noted: None

PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-100**	**Project No.** **11176638.00001**

Photo No. 1	**Date:** 3/20/12	
Description: Looking northeast, brick wall/ foundation found at 18" bgs on the south side and concrete foundation found on the west side..		
Photo No. 2	**Date:** 3/20/12	
Description: Looking southwest, test pit cleared to 4' bgs. Brick wall on far end, concrete wall on the right.		

URS	PHOTOGRAPHIC LOG

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-100	Project No. 11176638.00001

Photo No. 3	Date: 3/20/12

Description:

Looking northeast, location cleared to 6.5' bgs. Contamination found from 5'-6.5' bgs. Possible concrete bottom found at 6.5' bgs.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-101**	**Project No.** **11176638.00001**

Photo No. 1

Date: 3/20/12

Description:

Looking northwest at WW-TP-101, cleared to 9.3' bgs.

PHOTOGRAPHIC LOG		
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-101**	**Project No.** **11176638.00001**

Photo No. 2	**Date:** 3/20/12

Description:

Looking southeast, WW-TP-101 cleared to 9.3'.

URS	PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-101**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/20/12

Description:

Looking north at stockpile of material recovered from test put. Stained material found from 3.5' to 9.3' bgs.

URS	PHOTOGRAPHIC LOG	
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-102**	**Project No.** **11176638.00001**

Photo No. 1	**Date:** 3/19/12

Description:

Looking northwest at overview of WW-TP-102 location.

Photo No. 2	**Date:** 3/19/12

Description:

Looking southeast at 2' diameter pipe coming onto site from N 12th Street at 5.5' bgs.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-102**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/19/12

Description:

Looking southeast at pipe traversing test pit. Test pit cleared to 8' bgs.

PHOTOGRAPHIC LOG	

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-103	Project No. 11176638.00001

Photo No. 1 **Date:** 3/19/12

Description:

Looking north at stockpile and WW-TP-103 dug about 2' bgs.

Photo No. 2 **Date:** 3/19/12

Description:

Looking southwest at metal wall on south side of test pit, possibly part of the Holder Tank that starts about 2.5' bgs. Pooling water at about 3' bgs.

URS		**PHOTOGRAPHIC LOG**
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-103**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/19/12	

Description:

Looking northwest. Metal wall visible on the left side of photo, on south side of trench. Location cleared to 6' bgs, where there is an apparent concrete floor.

Photo No. 4	**Date:** 3/19/12	

Description:

Looking northwest at water pipe running parallel to N 12th Street, on north side of trench.

URS	PHOTOGRAPHIC LOG	
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-103**	**Project No.** **11176638.00001**

Photo No. 5	**Date:** 3/19/12
Description: Looking southeast at trench with water pipe on the left and metal wall on the right of photo.	

URS	PHOTOGRAPHIC LOG	
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-104**	**Project No.** **11176638.00001**

Photo No. 1

Date: 3/15/12

Description:

Test Pit WW-TP-104 with asphalt cover removed, exposing coarse gravel, road base.

Looking S.

Photo No. 2

Date: 3/15/12

Description:

Top of two feet diameter pipe uncovered. Possible "clean-out" about 0.5' bgs. Main pipe about 1' bgs.

Looking SE.

PHOTOGRAPHIC LOG

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-104	Project No. 11176638.00001

Photo No.	Date:
3	3/15/12

Description:

Two feet diameter pipe approximately one foot from grade.

Looking E.

Photo No.	Date:
4	3/15/12

Description:

Test pit dug to 9' bgs. Petroleum and NAPL staining from 7'-9'.

Looking NNW.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-104**	**Project No.** **11176638.00001**

Photo No. 5	**Date:** **3/15/12**

Description:

Petroleum and NAPL contaminated soil from 7'-9'. Test Pit ended at 9'.

Looking NE.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-105**	**Project No.** **11176638.00001**

Photo No.	**Date:**
1	3/20/12

Description:

Looking southwest, 18" concrete/brick flooring about 1' bgs.

Photo No.	**Date:**
2	3/20/12

Description:

Looking northwest, concrete wall on the south side of trench. Cleared to 6' 10" bgs, possible concrete slab.

URS	PHOTOGRAPHIC LOG	
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-105**	**Project No.** **11176638.00001**

Photo No.	**Date:**
3	3/20/12

Description:

Looking southeast, concrete wall on south side.

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PHOTOGRAPHIC LOG

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-106	Project No. 11176638.00001

Photo No. 1

Date: 3/20/12

Description:

Looking northeast at WW-TP-106 location.

Photo No. 2

Date: 3/20/12

Description:

Looking southeast at test pit cleared to 8.4' bgs. Concrete wall on right side, parallel to N. 12th Street, bottom not found.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-106**	**Project No.** **11176638.00001**

Photo No. 3 | **Date:** 3/20/12

Description:

Looking east southeast at a concrete wall parallel to Kent Avenue. Wall extends to a depth of 4' 10" bgs only.

Photo No. 4 | **Date:** 3/20/12

Description:

Looking southeast, test pit cleared to8.4' bgs.

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PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-107**	**Project No.** **11176638.00001**

Photo No. 1

Date: 3/16/12

Description:

Test pit WW-TP-107, excavated to 18" : two parallel concrete foundations found with a 12" gap between them. Test pit is parallel to Kent Ave.

Looking SE.

Photo No. 2

Date: 3/16/12

Description:

Concrete found 18" bgs.

Looking SE.

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PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-107**	**Project No.** **11176638.00001**

Photo No. 3

Date: 3/16/12

Description:

Concrete foundation on NW side of test pit, dug 5' down from start, bottom not found. This is approximately 6.5' bgs, water just starting to pool.

Photo No. 4

Date: 3/16/12

Description:

Concrete foundation on SE side of test pit (Kent Avenue side), dug 5' down from start, bottom not found. This is approximately 6.5' bgs, water just starting to pool.

URS

PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-108**	**Project No.** **11176638.00001**

Photo No. 1

Date: 3/15/12

Description:

Test Pit WW-TP-108 with asphalt cover removed, exposing coarse gravel, road base, and bricks.

Looking SW.

Photo No. 2

Date: 3/15/12

Description:

Holder No 2 wall (double metal sheets) containing bricks, concrete cobbles, paving stones, and few sand and silt.

Looking NW.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-108**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/15/12

Description:

Brick wall/foundation on the Kent Avenue side of the test pit.

Looking ENE.

URS

PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-108**	**Project No.** **11176638.00001**

Photo No. 4

Date: 3/15/12

Description:

WW-TP-108 excavated to about 5' below grade with fill, Holder Tank No. 2 on left and brick wall on right.

Looking NNW.

Photo No. 5

Date: **3/15/12**

Description:

Water came in at about 6.5' bgs. Excavation came up with fill until 8' bgs when test pit excavation was finished.

Looking W.

URS	**PHOTOGRAPHIC LOG**

Client Name: National Grid	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-108**	**Project No.** 11176638.00001

Photo No. 6

Date: 3/15/12

Description:

WW-TP-108 backfilled.

Looking SE.

PHOTOGRAPHIC LOG

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-109	Project No. 11176638.00001

Photo No. 1

Date: 3/16/12

Description:

Looking SE toward Kent Avenue. Overview of test pit dug to 4' bgs.

Photo No. 2

Date: 3/16/12

Description:

Looking SE toward Kent Avenue. Concrete in foreground and concrete at bottom of boring at 4' bgs.

PHOTOGRAPHIC LOG		
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-109**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/16/12

Description:

Looking NW, concrete at bottom at 4' bgs.

Photo No. 4	**Date:** 3/16/12

Description:

Looking SE toward Kent Avenue. Pipe seen on street side, see photo 5.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-109**	**Project No.** **11176638.00001**

Photo No.	**Date:**
5	3/16/12

Description:

Looking East at east side of test pit. Pipe visible adjacent to Kent Avenue.

Photo No.	**Date:**
6	3/19/12

Description:

Looking northeast, test pit cleared to 8' bgs.

URS	PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-109**	**Project No.** **11176638.00001**

Photo No. 7

Date: 3/19/12

Description:

Looking down into text pit, pipe at 42" bgs, seen on right.
4" Concrete flooring seen at 4' bgs.
Stained and contaminated fill at 4'-8' bgs.

Photo No. 8

Date: 3/19/12

Description:

Looking SE at test pit. Concrete structures on southeast end of test pit. Pipe and concrete floor seen at 3.5' and 4' bgs.

	PHOTOGRAPHIC LOG

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-109**	**Project No.** **11176638.00001**

Photo No. 9	**Date:** 3/19/12

Description:

Looking SW at stockpile of removed material, stained and contaminated from 4'-8' bgs.

URS

PHOTOGRAPHIC LOG

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-110	Project No. 11176638.00001

Photo No. 1 **Date:** 3/16/12

Description:

WW-TP-110 overview.

Looking SSE.

Photo No. 2 **Date:** 3/16/12

Description:

Brick foundation at 4.5' bgs. Holder Tank No. 2 on right side.

Looking SE.

URS	PHOTOGRAPHIC LOG

Client Name: National Grid	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-110**	**Project No.** 11176638.00001

Photo No. 3	**Date:** 3/16/12

Description:

Brick foundation at 4.5' bgs. Holder Tank No. 2 on right side.

Looking SE.

URS	PHOTOGRAPHIC LOG	
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-110**	**Project No.** **11176638.00001**

Photo No. 4

Date: 3/16/12

Description:

Used post-hole diggers to advance two feet below brick foundation (at 4.5' bgs). Could not advance diggers further because of obstruction. Bottom of brick foundation not found.

Looking NW.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-110**	**Project No.** **11176638.00001**

Photo No. 5	**Date:** 3/16/12	
Description: Looking down at pooling water at about 6.5' bgs.		

	PHOTOGRAPHIC LOG

Client Name: National Grid	**Site Location:** 50 Kent Ave, B'klyn, NY **Location:** WW-TP-111	**Project No.** 11176638.00001

Photo No. 1

Date: 3/16/12

Description:

WW-TP-111 contains a very dense silt layer about 4.5' bgs. Adjacent to N 11 th Street.

Looking NW.

Photo No. 2

Date:

Description:

WW-TP-111 contamination starts 7' bgs. Contamination has strong NAPL odor, sheen and staining.

Looking SW.

URS	**PHOTOGRAPHIC LOG**

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-111**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/16/12	
Description: WW-TP-111 excavated to 10' bgs. Lookig SW.		

URS	PHOTOGRAPHIC LOG	
Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-112**	**Project No.** **11176638.00001**

Photo No. 1	**Date:** 3/19/12

Description:

Looking west at WW-TP-112.

Photo No. 2	**Date:** 3/19/12

Description:

Looking WNW at WW-TP-112 and stockpile of removed material.

PHOTOGRAPHIC LOG	

Client Name: **National Grid**	**Site Location: 50 Kent Ave, B'klyn, NY** **Location: WW-TP-112**	**Project No.** **11176638.00001**

Photo No. 3	**Date:** 3/19/12

Description:

Looking SW at brick wall on south side of test pit. Water pooling at 4.5' bgs.

Photo No. 4	**Date:** 3/19/12

Description:

Looking to the northwest at side of test pit where wood debris and bricks have accumulated.

URS

PHOTOGRAPHIC LOG

Client Name:
National Grid

Site Location: 50 Kent Ave, B'klyn, NY

Location: WW-TP-112

Project No.
11176638.00001

Photo No. 5

Date: 3/19/12

Description:

Looking southwest at brick wall and water accumulated at the bottom of WW-TP-112. Pit cleared to 8' bgs.

Photo No. 6

Date: 3/19/12

Description:

Wood debris and brick fill in WW-TP-112, looking west.

PHOTOGRAPHIC LOG

Client Name: National Grid	Site Location: 50 Kent Ave, B'klyn, NY Location: WW-TP-113	Project No. 11176638.00001

Photo No. 1

Date: 3/19/12

Description:

Looking northwest at test pit cleared to 3' bgs.

Photo No. 2

Date: 3/19/12

Description:

Looking northwest at test pit cleared to 9' bgs. Contamination of staining and odors start at 3' bgs and continue past 9' bgs.

APPENDIX E

CAMP FIELD NOTES

2

CONTENTS

PAGE	REFERENCE	DATE

3

Location 50 Kent Ave Friday Date 2/24/12

Project / Client Brooklyn, N. Grid

weather: overcast periodic rain, 47°
~~mod~~ ~~strong~~ wind from west.

(taken from Book #1)

6³⁰ zero/initialize 2 DataRam 4's.
8 am Arrive on-site.
955 start jackhammering.
1010 start Upwind (UW) CAMP
DR4 $\mu g/m^3$ = 22.8
PID ppm = 0
1015 start Downwind (DW) CAMP
PID has an error message.
1022 Take PID out of UW + put
in DW station.
DW DR4 = 13.1
PID = 0.0
1025 start Exclusion Zone (EZ) CAMP
monitoring. This station doesn't
datalog - readings will be
recorded by hand in this
notebook.
EZ DustTrak = 16 $\mu g/m^3$
MultiRae
HCN = 0 VOC = 0 H_2S = 0

Location ______ Date 2/24/12

Project / Client ______

CAMP stations

$\boxed{UW}$ DataRam 4 #08754

MiniRae2000 PID #08803 from 1010-1020
none from 1020-1256
#03582 from 1256-end

$\boxed{DW}$ DataRam 4 pine# 03408
MiniRae2000 PID pine# 08803

$\boxed{EZ}$ DustTrak 8520 pine# 10319
MultiRae pine# 18834

CAMP Readings

Time	station	particulates	VOC	HCN	H_2S
1045	UW	22.3	—	—	—
1046	DW	11.1	0		
1047	EZ	17	0	0	0
	- clearing SB-108				
1055					
	UW	20.6			
	DW	15.1	0		
	EZ	19	0	0	0
	Jack hammering SB-107				

Location ______ Date 2/24/12

Project / Client ______

CAMP

Time	station	part.	VOC	HCN	H_2S
1120					
	UW	23.1	~~X~~		
	DW	25	0		
	EZ	12.9	0	0	0
		clearing SB-107			
1150					
	UW	27.1			
	DW	21.5			
	EZ	32	0	0	0
1256	2#	clearing SB-107 3'-4'			
	UW	41.8	0		
1302	EZ	48	0	0	0
1303	DW	35.5	0		

From 12-1300 I calibrate 2 PIDs with error messages. After some tinkering they both work. possibly rain/humidity disturbed them.

1345. CAMP stations turned off

Chegan Lee [signature]

Location 50 Kent Ave Mon Date 2/27/12

Project / Client Brooklyn, NY

weather: sunny, clear, 35°-45°, light wind from SE.

5 30 - 6 10 Calibrate CAMP.
zero/initialize DataRams.
calibrate PIDs
w/ Isobutylene lot # 0422FA11
exp date 6/15
part # 6P011012

02545 = 99.5
03582 = 100.0
08803 = 100.0

MultiRae #
VOC: 100.0

7 25 I arrive at site
calibrate MultiRae #
H_2S = 24 LEL = 49 O_2 = 20.9
with Multi gas Lot # BAM-412P-1
manf date 1/12

850 F&N arrive.
902 start UW CAMP datalogging.
904 start DW CAMP datalogging.
907 Start EZ CAMP monitors.

UW DR4 # 08754 PID # 03582
DW DR4 # 03408 PID # 02545 PID 08803 >1245

Location Date 2/27/12

Project / Client

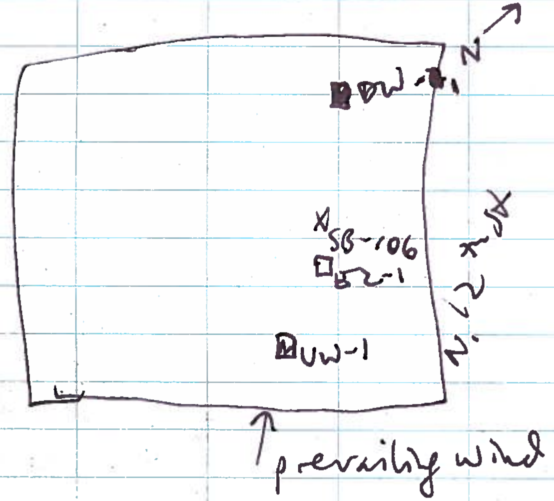
Time	Station	part. ug/m³	VOC	HCN	H_2S
907	DW	14.4	0.3		
	No work - set up only.				
909	EZ	22	0	0-1	0
910	UW	21.7	0		
	No work - set up only.				
915	start jackhammering at SB-106				
929	EZ	31	0	0-1	0
	DW	17.6	0-0.3		
	UW	30.0	0		
	air knifing @ SB-106. 1-2'				
1000					
	EZ	20	0	0-1	0
	DW	14.5	pump message, restart: 0.0		
	UW	23.4	0		
	clearing SB-106 4-5'				
	restart DW PID #02545				
1005	Cleared SB-106 to 5'!				
1010	Now move to SB-110 move CAMPs.				
1020	UW	23.1	0		
	DW	18.8	0		
	EZ	15	0	0-1	0
	air knife @ SB-110 0-1				

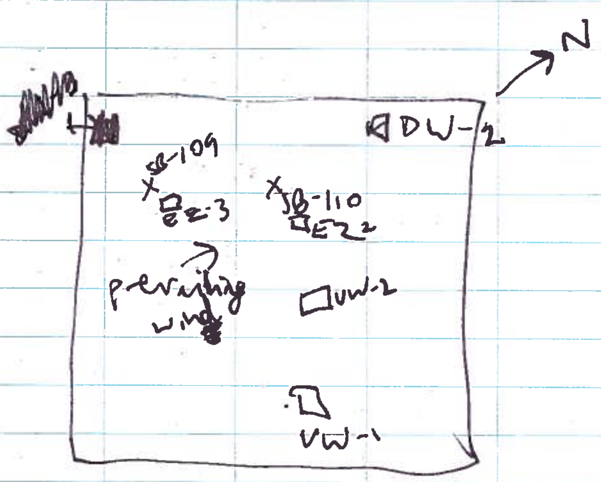
Location

Date 2/27/12

Project / Client

weather: sunny, clear, 45°-55°
wind light from SW





Location

Date 2/27/12

Project / Client

Time	station	part.	VOC	HCN	H_2S
1050	EZ	22	0	0-1	0
	DW	12.3	0		
	UW	14.7	0		
	Clearing 1-2' by hand @ SB-106 #1				
1122	EZ	27	0	0-1	0
	DW	7.2	0		
	UW	13.6	0		
	Clearing SB-106 #2 by hand				
1147	EZ	12.1	0	0-1	0
	DW	8.5	0		
	UW	12.3	0		

air knifing SB-106 #2, @2'-3'

1200 Break for lunch.

1242 DW PID pump failed. I restart it as F&N sets up to continue work.

1245 DW PID pump fails. I replace it with PID #0883

1300 Refusal @ SB-106 #2

1310 move EZ station.

1312 F&N start clearing SB-109.

Location ______ Date 2/27/11

Project / Client ______

PID SB-109

0' - concrete + brick rubble

0 0' FILL - red brown sand, silty gravel, bricks, cobbles.

see Book #1

Time	station	part	VOC	HCN	H_2S
1325	EZ	13 ~~0.01~~	0	0	0
1326	VW	21.8	0		
1326	DW	13.5	0		

clearing SB-109 1-2'

1305 Position Rig at SB-109.

1400 Drill down 1', then remove auger + clear hole

1410	EZ	16	0	0	0
	DW	13.1	0		
	VW	24.1	0		

Using augers, + drill to 5'

1420 Move EZ after drill SB109 to 6'

Move to SB-108.

1435	EZ	48	0	0	0
	DW	20.7	0		
	VW	23.9	0	—	—

Drilling 4-5' @ SB-108

Location ______ Date 2/27/11

Project / Client ______

1438 stop drilling SB-108 at 5', bricks, viable location.

1450 Move EZ CAMP

FAN start drilling @ SB-110.

1500 FAN drill SB-110 #2 to 5'

1510 I turn off CAMP station datalogging + monitoring.

1535 URS + FAN off-site.

Megan [illegible]

Location Tres Date 2/28/12

Project / Client

weather: sunny, few clouds, 37°-45°
wind from South, prevailing,
moderate breezes

5^{30} calibrate: Fresh air ✓

MultiRae 2000 w/ Isob lot# 0422FA11 part# 4P1012 exp 6/15

\# 02545 span gas = 100.0

\# 03582 span = 102.0

\# 08803 span = 107.0

multiRae # 18824

VOC = 99.8

724 start DW datalogging
DustTrak # 08769
PID # 02545

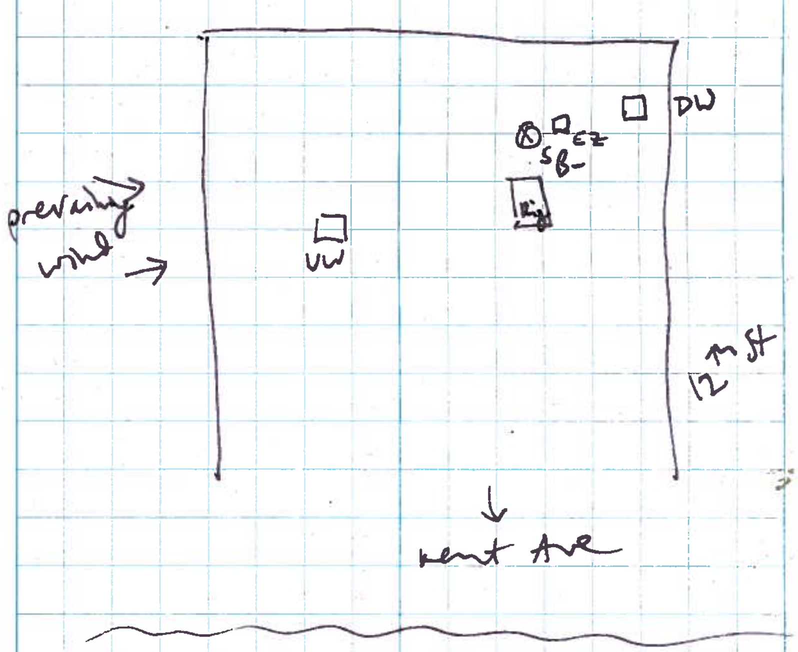
727 start UW datalogging
DustTrak # 08883
PID # 03582

732 start EZ monitoring
DustTrak # 10319
multiRae # 18824

733 Initial EZ
part = 0.057 mg/m³ HCN = 0
VOC = 0 H_2S = 0
smell diesel exhaust from rig

Location Date 2/28/12

Project / Client



8^{00} UW initial
part = 0.22 VOC = 0.0

8^{01} ~~#~~ DW initial
part = 0.21 VOC = 0.0

8^{36} EZ part = 0.576
VOC = 0 HCN = 0 H_2S = 0
particulates high from diesel

Location ______ Date 2/28/12

Project / Client ______

SB-110

838 EZ part = 0.035
after rig stops revving.
840 DW - PID has pump error;
part = 0.023 restart pump
VOC = 0.0
841 UW PID = 0.0 DT = 0.017
part VOC HCN H_2S
931 EZ 0.218 0 0 0
smell diesel fumes
932 ~~EZ~~ EZ 0.097 0 0 0
932 DW 0.040 0
950-1050 Break for fresh air
then I was on phone.
1052 EZ 0.035 VOC=0 HCN=0 H_2S=0
DW 0.015 VOC=0
PID battery is low
UW 0.015 VOC=0
DustTrak was off when I arrived,
low battery. Turned it
on for reading + turned it off,
not logging.

Location ______ Date 2/28/12

Project / Client ______

SB-110

1111 EZ DT = 0.251 VOC=0 HCN=0
Driving split spoon 19'-21'.
1111 DW DT = 0.017 VOC=0
Same
1137 check DW station - DustTrak
has turned off.
1147 Replace batteries @ DW meters.
1147 F&N takes split spoon.
DW DT=0.020 VOC=0.0
1150 EZ DT = 0.052 VOC=0 HCN=0
~~happ~~ removing splitspoon.
spike to DT = 0.206
1205 Turn CAMPs off.
UW CAMP already turned off.
1300 start DW + EZ CAMP monitoring.
No UW monitoring
1304 EZ DT = 0.257 VOC=0
HCN = 0 H_2S=0
spike to 0.572, drop
down to 0.085
smell diesel fumes
1305 DW - DT = 0.013 VOC = 0.0

Location

Date 2/28/12

Project / Client

SB-110

1335
DW = DT: 0.036 VOC: 0.0
EZ DT: 0.073 VOC: 0.0
HCN: 0.0 H_2S: 0.0
Drilling to 30'.

1403 EZ DT: 0.44 VOC: 0.0 HCN: 0
H_2S: 0.0

Idling rig

1406 EZ DT: .118 VOC: 0 HCN: 0
H_2S: 0

Drilling to 33'

1407 DW DT: 0.012 VOC: 0.0
Start DT data logging (inadvertantly not turned on)
Drilling to 33'

1448 DW DT: 0.054 VOC: 0
EZ DT: 0.145 VOC: 0 HCN: 0 H_2S: 0
Drilling to 35'!

Location 50 Kent Ave

Date 2/28/12

Project / Client

Weather: AM – mostly cloudy to overcast, 35°, wind light to mod from NE

5:30 Calibrate PID's
for span gas info, see p. 12
#02545 span = 99.9
#03582 span: 100.0
#08803 span = 100.0

Download Dust Trak + MultiRae data.

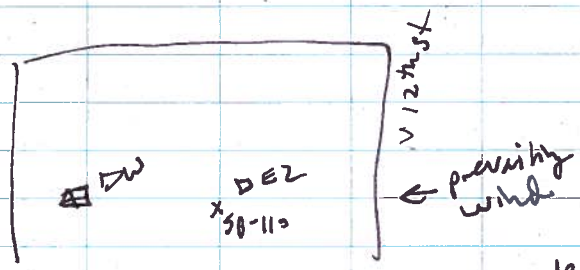
6:15 Leave house
7:00 Arrive at site.
7:46 Start DW monitoring as F&W drills to 39' while we wait for the mechanic.
DW DT: # 08769
PID # 02545 → # 08803 @ 8:25

8:55 Start NW PID. Dust Trak is giving "Service 6" message. I'll call Pine @ 8. DT # 08863, PID # 08803

7:50 Start EZ monitoring
DT: # 10319
MultiRae # 18824

Location ________ Date 2/29/12

Project / Client ________



□ VW - offline - meter trouble

800-802 DW DT = 0.028 PID = 0.0 PID = pump flashing

EZ DT = 0.017, spike to 0.294 VOC:0 w/ diesel exhaust HCN:0 H_2S:0

VW DT: N/A PID = 0.0 Lamp flashing

Drilling to 39'.

802 ~~EZ~~ Restart DW PID.

Restart VW PID to clear "lamp"

815 Turn off DW +VW+EZ CAmp - no work, mechanic onsite. PID had "pump" flashing again calling Pine

will get PID replacement delivered service 6 for DT means clogged line.

I check in... but can't find doc

Location ________ Date 2/29/12

Project / Client ________

830 Move PID #08803 from VW to DW. Take #02545 out of service from DW.

Now No VW monitoring

913 Restart DW + EZ monitoring

915 F&N collect 39'-41' splitspoon, mechanic fixed exhaust leak.

932 EZ DT = 0.023 VOC = 0, HCN = 0 H_2S = 0

retrieving 41'-43' sample

DW - DT stuck, not reading numbers PID = 0.0

947 Restart DW DT Datalogging.

DW DT: 0.020 VOC: 0.0

Drilling to 43'.

957 EZ DT = 0.020 HCN = 0 H_2S = 0 VOC = 0

Retrieving sample 43'-45'.

DW DT = 0.082 VOC = 0.0

Same, smell diesel fumes

1020 EZ DT = 0.024 HCN = 0 VOC = 0

H_2S = 0

DW DT = 0.035 VOC = 0.0

F&N drilling to 47'.

Location ______ Date 2/29/12

Project / Client ______

weather overcast, Raining, 37° ~ 43°
@1130 am

1112 EZ DT = 0.021 VOC = 0 HCN = 0
H_2S = 0
DW DT = 0.063 VOC: 0.0
prepping to drill, smell diesel fumes from rig
1113 DW DT = 0.021 VOC: 0
EZ DT = VOC: HCN: H_2S:
Drilling to 57'.
1137 DW DT = 0.035 PID = 0.0
EZ DT = 0.021 VOC = 0.0
HCN = 0.0 H_2S = 0.0
Removing split spoon 51-53
1221 DW
DT 0.033 PID = 0.5
retrieving spoon 55-57
Raining steadily.
EZ ~~PID 0.0~~ DT = 0.025
VOC = 0.0 HCN = 0.0 H_2S = 0.0
1241 DW = 0.033 PID = 0.8
EZ = 0.027 PID = 0.0
HCN = 0.0 H_2S = 0.0
Drilling to 57'.
1256 stop DW + EZ
camp for lunch.

Location ______ Date 2/29/12

Project / Client ______

1300 Raining heavily
1345 Lunch ends. PEN tries to fix frayed split spoon hammer cable.
1415 They can't fix it - drive split spoon.
Camp is suspended for the day because of heavy rains. Rain keeps any particulates down. PIDs are being adversely affected by high humidity + water.
1500 PEN done for the day

Megan Daniel.

Location 50 Kent Ave Date 3/1/12

Project / Client

weather: light rain until 8am
then overcast, light wind from NE/N
~40°

530 Calibrate MiniRae 2000
w/ span gas, see p.12
Fresh air cal'ed ✓
pre #04768 span = 99.4 (delivered 2/29)
#03582 Span = 100
#08803 Span =

MultiRae # 18824
Fresh air cal'ed
Isobutylene = 100.0
Download DW CAMP
Programmed new meters.
630 Leave for site
730 Arrive at site, setup CAMP
835 Start UW datalogging
DustTrak pre #
MiniRae 2000 pre #

Location Date 3/1/12

Project / Client

837 Start DW datalogging
DustTrak pre #
MiniRae 2000 pre #
839 start EZ monitoring.
DustTrak # 10319
MultiRae ~~MiniRae 2000 #~~ 18824
DustTrak has service 6 error.
No EZ monitoring w/ DT until
hose is cleaned.
850 F&N Drilling to 62' after fixing
splitspoon hammer cable.

		DT	VOC	HCN	H_2S
902	UW	0.008	0.5	/	/
	DW	0.019	0.0	/	/
	EZ	N/A	0	0	0

Drilling to 62'.

1030 Check CAMP - no intrusive work

	UW	0.009	0.9	–	–
	DW	0.047	0.0	–	–
	EZ	N/A	0	0	0
1100	UW	0.010	0.9	–	–
	DW	0.035	0.0		
	EZ	–	0	0	0

Remaining auger ~~60'~~ 62'

Location ______ Date 3/1/12

Project / Client

SB-110

1123

	DT	VOC	HCN	H_2S
DW	0.012	0	—	—
VW	0.010	0.9	—	—
EZ	/	0	0	0

mostly grout.

VW PID is most likely being affected by humidity.

1143

DW	0.026	0.0		
VW	0.014	0.8	—	—
EZ	/	0	0	0

tremie grouting 25'-35' @ SB-110

1228 Turn CAMP's off until next intrusive work.

SB-110 grouted, augers removed.

1530 work was not intrusive for the remainder of the day.

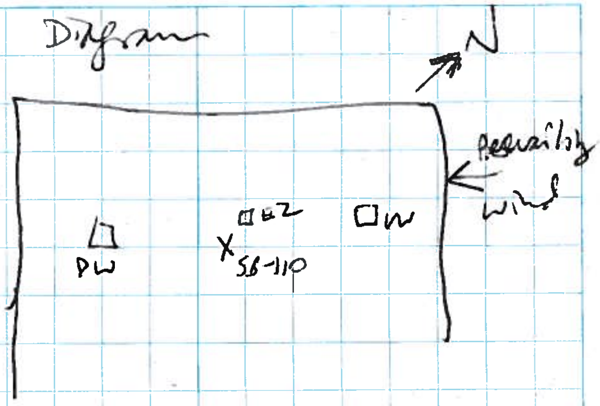
CAMP Not restarted

Location ______ Date 3/1/12

Project / Client

SB-110

Diagram



Location 50 Kent Ave   Date 3/2/12

Project / Client

Weather: overcast, cold, 35°
light to mod wind from SW

5^{55} Calibrate PIDs.
\# 03582 = 100 ppm
\# 08803 = 100 ppm
\# 04768 = 100 ppm
Fresh air cal performed.
Span - Isobutylene gas lot # 0422FA11
part # GP11612 exp: 6/15

6^{15} Pack up car.
7^{00} Arrive at site.
7^{20} Set up + start UW CAMP datalogging
PID # 04768
DT # 08769
7^{23} set up + start DW CAMP datalogging
PID # 08803
DT # 12729
7^{25} set up + start EZ CAMP monitoring
multi~~RAE PID~~ # 18824
DT # - service 6 -
will not be in use today.
7^{26} UW DustTrak alarm - high
particulate DT: 0.414 PID=0
Smell diesel fumes from rig.

Location   Date 3/2/12

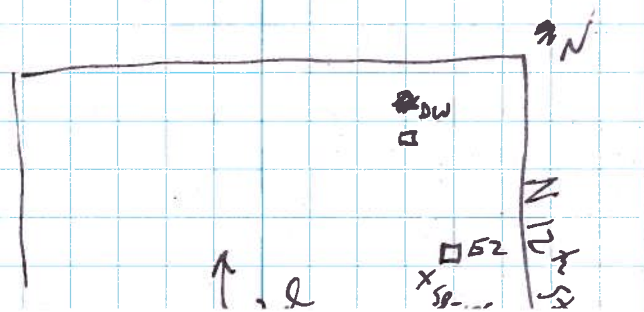
Project / Client

SB-106

7^{29} DW DT = 0.019 VOC = 0.0
UW DT = 0.013 VOC = 0.0
EZ VOC = 0.0 HCN = 0.0 H_2S = 0
Background, no intrusive work yet.
7^{45} Start drilling 0-5.
8^{02} Retrieve 5-7 sample.
8^{15} UW DT = 0.018 PID = 0.0
DW DT = 0.023 PID = 0.0
EZ VOC = 0.0 HCN = 0.0 H_2S = 0
Driving split spoon 9'-11'
8^{35} No exceedances
8^{35} Driving split spoon 13'-15'

		DT	VOC		
8^{50}	DW	0.024	0		
	UW	0.032	0		
	EZ	N/A	0	HCN=0	H_2S=0

Drilling to 17' @SB-106



Location 36,52,1... Date 3/2/12

Project / Client

SB-106

9³³

		DT	VOC	HCN	H2S
	DW	0.022	0	/	/
	UW	0.021	0	/	/
	EZ	/	0	0	0

Drilling to 21'

1002					
	DW	0.024	0	—	—
	UW	0.018	0	/	—
	EZ	—	0	0	0

1042 Drilling to 25'

	UW	0.019	0	/	/
	DW	0.065	0	/	/
	EZ	—	0	0	0

Driving 29-31 split spoon

1108					
	UW	0.021	0.1		
	DW	0.038	0	/	/
	EZ	/	0	0	0

Drilling 30'- 33'.

1135	UW	0.016	0.1		
	DW	0.029	0		
	EZ	—	0	0	0

[illegible] 3 5-25 sample

Location Date 3/2/12

Project / Client

time	station	DT	VOC	HCN	H2S
1215	Break for lunch				
1250	Lunch over				
1257	start drilling to 39'.				
1320	UW	0.019	0.3	/	/
	DW	0.019	0	/	/
	EZ	—	0	0	0
	Driving 39 split spoon to clean augers.				
1400	UW	0.021	0.2		
	DW	0.042	0	/	/
	EZ	/	0	0	0
	Pulling up 41'-43' sample				
1425					
	UW	0.015	0.2		
	DW	0.075	0.0		
	EZ		0	0	0
	Driving 43'-45' sample. Smell Diesel fumes DW.				
1500-1503	Turn off cAmPs.				
	Work done for the day.				

[illegible signature]

Location 50 Kent Ave Monday Date 3/5/12

Project / Client

weather: 33°-39°, sunny, mod-strong breeze from west.

3/4/12

19^00 Calibrate PIDs.
Fresh air cal'd.
pine # 03582 = 100 ppm
08803 : 100 ppm
04768 : 101 ppm
w/ span gas Isobutylene
Lot # 0422FA11 part # GP11012
exp date 6/15
Also Multirae # 18824
Isob. span = 99.9 ppm

3/5/12

7^21 start UW CAmp datalog
DT # 08769
PID # 04768
7^22 start DW CAmp datalog
DT # 12729
PID # 08803
7^30 start EZ CAmp monitoring
DT # Service C
Multirae ~~PID~~ # 18824

Location Date 3/5/12

Project / Client

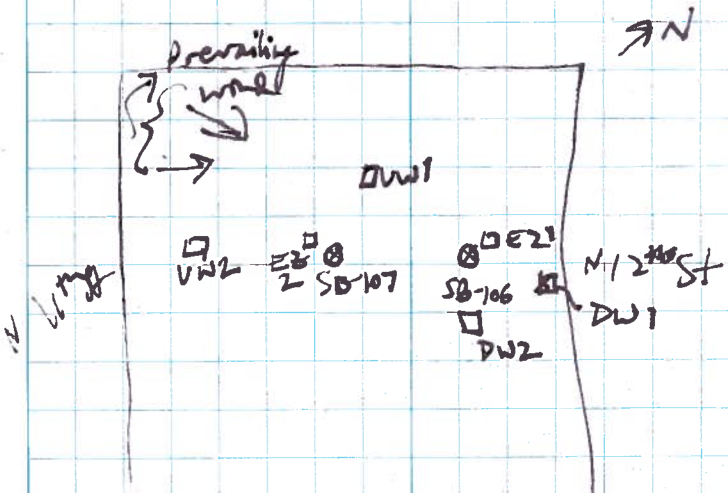
SB-106

803		DT	VOC	HCN	H_2S
	UW	0.006	0.0		
	DW	0.009	0.0		
	EZ	—	0	0	0

Retrieving splitspoon 47'-49'.

836					
	UW	0.006	0.0		
	DW	0.008	0.0		
	EZ	—	0	0	0

Retrieving spoon 53-55.



Location

Date 3/5/12

Project / Client

SB-106 + SB-107

9:00 ~~SB-DT~~

	VOC	HCN	H_2S
UW	0.006	0	
DW	0.015	0	
EZ	0	0	0

Driving 57'-59' spoon.

1025

UW	0.007	0	
DW	0.015	0	
EZ	0	0	0

Grouting + removing augers at 20'-25'.

1045 Pause CAMP datalogging. SB-106 grouted, augers out.

1320 Resume datalogging for SB-107

1351

UW	0.005	0	
DW	0.006	0	
EZ	0.002	0	0	0

Drilling to 9' @ SB-107

1431

UW	0.005	0		
DW	0.007	0		
EZ	0.002	0	0	0

Location

Date 3/5/12

Project / Client

SB-107

1520 F&N done for the day.
Turn off CAMP Stations.

21-21^{30} Download data.

Location 50 Kent Ave Tues. Date 3/6/12

Project / Client

weather: Sunny, cold 25°-37°.
wind predominantly from W/SW
at moderate strength

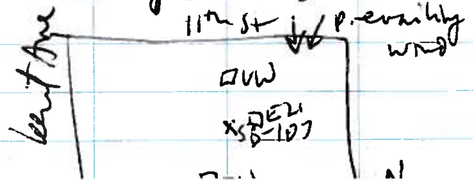
5^{30}-6 Calibrate PID's + MR.

7^{10} I arrive on-site

7^{25} Start DW datalogging.
DT pine # 12729
PID pine # 08803
(calibrated Isb. span=100
Fresh air=0.0)

7^{30} start UW datalogging
DT pine # 08769
PID pine # 04768
(calibrated Isb span=101
Fresh air=0.0)

7^{32} start EZ monitoring
DT pine #:
Multirae pine #
Calibrated Isb span=100
Fresh air=0.0
Multigas: H_2S=~~0~~ 2.4 LEL=~~0~~ 49 O_2=20.9



Location Date 3/6/12

Project / Client

SB-107

7^{35} F&W resumes drilling SB-107 @25'-27'.

8^{15}

	DT	VOC	HCN	H_2S
UW	0.014	0		
DW	0.016	0		
EZ	0.008	0	0	0

Warm up break.

8^{35}

	DT	VOC	HCN	H_2S
UW	0.014	0		
DW	0.017	0		
EZ	0.009	0	0	0

Drilling to ~~29'~~ 33'.

9^{35}

	DT	VOC	HCN	H_2S
UW	0.027	0		
DW	0.021	0		
EZ	0.010	0	0	0

Drilling to 39'.

10^{05}

	DT	VOC	HCN	H_2S
UW	0.015	0		
DW	0.018	0		
EZ	0.009	0	0	0

Drilling to 43'.

Location Date 3/6/12

Project / Client

SB-107

		DT	VOC	HCN	H2S
1053					
	UW	0.016	0		
	DW	0.017	0		
	EZ	0.009	0	0	0

Drilling to 45'!

1137	UW	0.012	0		
	DW	0.017	0		
	EZ	0.006	0	0	0

collecting extra split spoon.

1215-1250 Break for lunch

1340	UW	0.012	PID was off		
	DW	0.013	PID was off		
	EZ	0.005	0.2	0	0

1340 restart PID @ DW VOC=0.0

UW+DW Low battery - replace PID batteries

1403 Replace PID batteries in DW.

UW PID remains off, no replacement batteries.

1425					
	UW	0.018	/		
	DW	0.015	0.0		
	EZ	0.005	0.1	0	0

collecting 57'-59' split spoon.

1515 [illegible]

Location 50 Kent Ave Wed. Date 3/7/12

Project / Client

Weather: Sunny, 39° - 55°, wind light from SE w/mod. gusts

725 Bumptests performed on PIDs + MR.

747 Start DW CAMP datalogging.

PID # 08803

DT # 12729

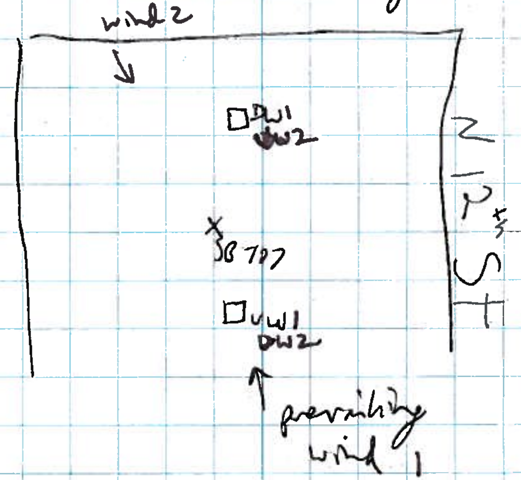
757 Start UW CAMP datalogging

PID # 04768

DT # 08769

FRN mixing grout.

No EZ ~~CAMP~~ monitoring at this time



Location ______ Date 3/7/12

Project / Client

SB-107 grouting

7:55	DT	VOC	1
UW	0.019	0	
DW	~~0.019~~ 0.022	0	

Begin tremie grouting SB-107

815		
UW	0.021	0
DW	0.021	0

Grouting + removing augers @ 50'.

820 DW DustTrak alarm b/c F&N is pouring grout to be mixed, not soil dust.

845		
UW	0.019	0
DW	0.023	0

grouting + removing augers @ 10'.

Note: wind is shifting to SW. Now UW location is downwind + DW is upwind.

847		
UW	0.022	0
DW	0.071	0

Rig's diesel fumes smelled at DW location

Location ______ Date 3/7/12

Project / Client

SB-107 + SB-108

850 Augers removed from SB-107.

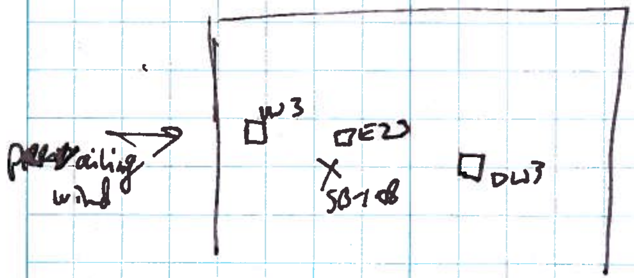
851 Turn CAMP stations off, intensive work @ SB-107 is over.

1323 Start UW CAMP datalogging

1329 Start DW CAMP data logging.

1331 E2 CAMP monitoring started. DustTrak seems to have a loose wire. No DT at present.

1334 E2 DT resumes



		DT	VOC	HzW	H_2S
1333	DW	0.032	0.2		
	UW	0.017	0.3		
	E2	0.014	0	0	0

Diesel ~~odor~~ fumes odor DW.

1334 start drilling SB-108A

Location
Date 3/7/12

Project / Client
SB-108 A

1408		DT	VOC	HCN	H_2S
	E2	0.025	0	0	0
	UW	0.023	0.3		
	DW	0.024	0.1		

Drilling to 7' @ SB 108

1435	E2	0.017	0	0	0
	UW	0.028	0.4		
	DW	0.027	0.1		

Drilling to 10'.

1507 Turn off CAMP stations

Location 50 Kent Ave Thurs Date 3/8/12

Project / Client

weather: partly sunny, 48°-68°, mild, mod wind from W/SW

calibrate PIDs w/ fresh air = 0.0

530 Calibrate w/ Isobutylene

multi Rae VOC = 100.0
PID #03582 = 100.0
PID #08803 = 100.0
PID #04768 = 101~~00.0~~

w/ Isob. span gas lot # 0422FA11
part # 6P11012
exp date 6/15

550 Now load car.

710 Arrive @ site.

720 start DW CAMP
DT pine # 12729
PID gate # 08803

724 Start UW CAMP ~~download~~ datalogging
DT # 08757
PID # 04768

726 start E2 CAMP monitoring
DT # 10319
~~RAE #~~ MultiRae # 18824

		DT	VOC	HCN	H_2S
732	UW	0.017	0		
	DW	0.026	0		
	E2	0.038	0	0	0

Location Date 3/8/12

Project / Client SB-108A

8:03	DT	VOC	HCN	H_2S
UW	0.019	0		
DW	0.056	0		
EZ	0.008	0	0	0

Activity: Drilling to 27'

937				
UW	0.017	0		
DW	0.026	0		
EZ	0.011	0		

Activity: Drilling to 33'.

925				
UW	0.019	0		
DW	0.022	0		
EZ	0.029	0	0	0

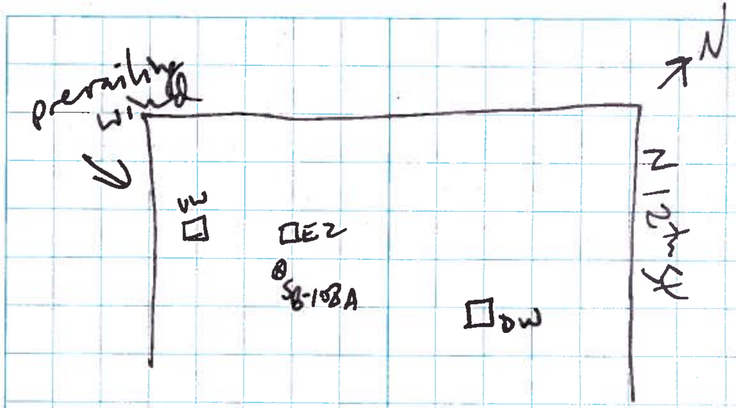
Activity: Drilling to 37'

1055				
UW	0.022	0.2		
DW	0.036	0.0		
EZ	0.013	0	0	0

prepping to grout SB-108A

Location Date 3/8/12

Project / Client SB-108A



1149	DT	VOC	H_2S	HCN	
UW	0.026	0			
DW	0.022	0			
EZ	0.014	0	0	0	0

Grouting SB-108A.

1144 Removed last auger from the ground. No wellhead. I turn off CAMP stations. CAMP done for today.

Location ______ Friday Date 3/9/12

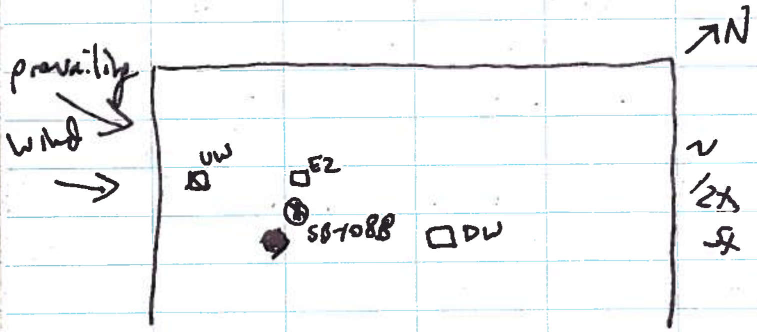
Project / Client ______

weather: cloudy, 40°, wind mod from SW/W

5:15 Calibrate PIDs
all Fresh air = 0.0
PID # = 100
= 100
= 100
MultiRae VOC = 100
Isob. span info, see p. 41
Download CAMP data.

7:00 Arrive at site

7:15 CAMP stations set up while F&N sets up.



7:54 Start DW datalogging
PID# 08803
DT# 12729

Location ______ Date 3/9/12

Project / Client ______

SB-108B

7:52 start UW datalogging
PID # 04768
DT # 08769

755 start EZ monitoring
MR # 18824
DT # 10319

805 F&N starts drilling @ SB-108B. Will drill to 37' bgs w/out sampling.

830	DT	VOC	HCN	H_2S
UW	0.006	0		
DW	0.011	0		
EZ	0.001	0	0	0

Drilling @ 7'-10'.

905		
UW	0.008	0
DW	0.006	0
EZ	0.001	0

Drilling @ 25'-30'.

Location

Date 3/9/12

Project / Client

SB-108 C

1020	DT	VOC	H_2S	HCN
UW	0.005	0		
DW	0.007	0		
EZ	0.002	0	0	0

jackhammering SB-108 C

1055				
UW	0.009	0		
DW	0.008	0		
EZ	0.001	0	0	0

Drilling SB-108C - 5'-10'.

1126				
UW	0.006	0		
DW	0.006	0		
EZ	0.001	0	0	0

Drilling SB-108c 10'-15'

1200				
UW	0.006	0		
DW	0.008	0		
EZ	0.001	0	0	0

Drilling 25'-27'

1230				
UW	0.008	0		
DW	0.005	0		
EZ	0.002	0	0	0

Location

Date 3/9/12

Project / Client

SB-108 C.

1235 Turn off CAMP for lunch.

1320 Restart CAMP data logging

1340	DT	VOC	H_2S	HCN
UW	0.006	0		
DW	0.010	0		
EZ	0.002	0	0	0

retrieved 37'-39'

1420				
UW	0.009	0		
DW	0.013	0		

Break in drilling @ 39'.

1443 UW turned off.

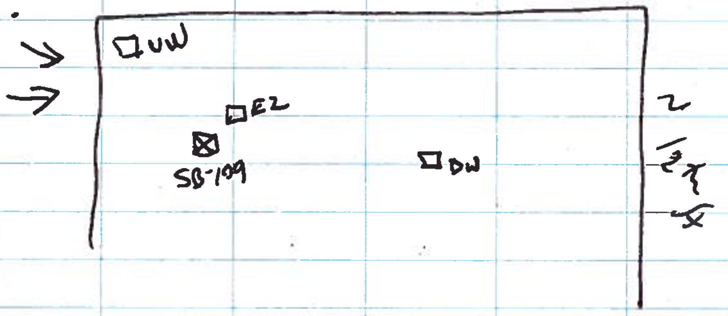
1445 DW turned off

1445 EZ turned off

Location 50 Kent Ave   Monday Date 3/12/12

Project / Client N. Grid

weather: sunny, 50°-70°, wind light from SW.



Change time on meters b/c of daylight savings time.

1043 Start DW Datalogging
DT pme# 12729
PID pme# 08803

1048 Start UW datalogging.
DT pme# ~~[illegible]~~ 04768
PID pme# 08769

1050 ~~Reset~~ start E2 monitoring
DT pme# 10319
MultiRae pme# 18824

1105 Drilled to 5' @ SB-109, now getting augers.

Location   Date 3/12/12

Project / Client

SB-109

1112	Station	DT	VOC	H_2S	HCN
	UW	0.037	0.2		
	DW	0.038	0.0		
	E2	0.043	0.0	0	0

Note: when I put filter on UW PID, voc read 0.5 ppm.

Prepping SB-109.

1136 Retrieve 1st split spoon.

1200 Break for lunch, turn camp's off.

1303 ~~Rest~~ Restart DW camp

1304 " E2

1304 " UW

1300 Drilling started/resumed.

1315

UW	0.025	0.3		
DW	0.028	0.1		
E2	0.014	0.0	0	0

Drilling to 15'.

1400

UW	0.021	0.0		
DW	0.029	0.0		
E2	0.014	0	0	0

Location ______ Date 3/12/12

Project / Client ______

1413	station	DT	VOC	HCN	H_2S
	DW	0.027	0.1		
	UW	0.030	0.3		
	EZ	0.016	0	0	0
		Drilling to 25'!			
1457					
	UW	0.018	0.3		
	EZ	0.011	0	0	0
	DW	0.033	0.1		
		Split spooning 33'-35'			

1510-1515 Turn off CAMP stations

Location 50 Kent Ave. Date 3/13/12

Project / Client ______

weather: 55° - 68°, overcast, occ. showers in AM, mostly cloudy, wind light from SE

5:30 Calibrate

Fresh air ✓ Isobutylene span gas:

PIDs # ~~08803~~ = 101

\# 04768 = 101

\# 03582 = 100

MultiRae = #18824 = 100

Isobutylene span gas

lot # 0422FA11

part # GPN012 exp: 6/15

MultiRae H_2S = 25 O_2 = 20.9

LEL = 49

multigas lot # BAM-412P-1

mnf date 4/12, exp 4/13

7:00 Arrive on site.

7:26 Start UW datalogging

DT ~~Rig~~ # 08769

PID ~~DT~~ # 04768

7:28 start EZ monitoring

DT # 10319

~~PID~~ # MR # 18824

7:29 Start DW monitoring

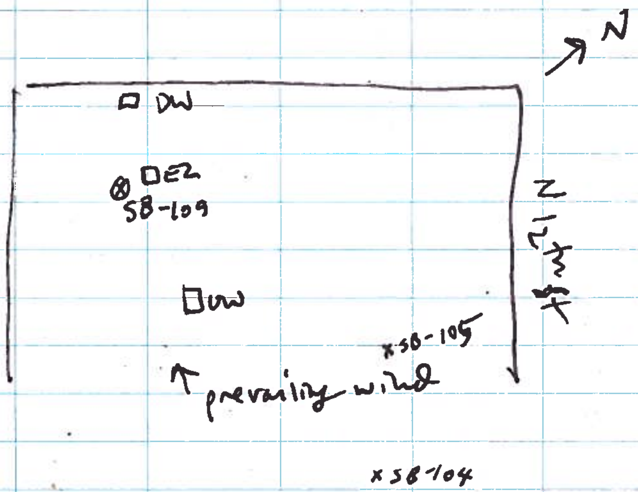
DT # [illegible] PID # [illegible]

52

Location Date 3/13/12

Project / Client

SB-109



745	DT	VOC	HCN	H_2S
UW	.0.023	0.0		
DW	0.044	0.0		
EZ	0.018	0.0	0	0

Retrieving split spoon 35-37.

8:10				
UW	0.023	0.0		
EZ	0.~~0~~96-0.076	0.0	0	0
DW	0.083	0.0		

Drilling to 39'. High Dust readings were taken while the rig was powered up + was most likely ...

53

Location Date 3/13/12

Project / Client

SB-109

8:21 DW Dust alarm - 0.121, returns to 0.043 after 1 minute. mostlikely diesel fumes - soil is wet + ground is wet from morning rain

859	DT	VOC	HCN	H_2S
DW	0.039	0.0		
EZ	0.028	0.0	0	0

Retrieve 43-45. Clearing SB-105

UW	0.036	0.0		
950				
UW	0.032	0.2		
DW	0.041	0.0		
EZ	0.039	0.0	0	0

Drilling to 47'

1035				
UW	0.026	0.2		
DW	0.077	0.0		
EZ	0.082	0.0	0	0

Removing 51'-53' sample

Location
Date 3/13/12

Project / Client
SB-109

10:57	DT	VOC	H_2S	HCN
UW	0.077	0.0		
DW	0.077	0.0		
EZ	0.028	0	0	0

Driving 53'-55' split spoon.

1127				
UW	0.040	0.0		
DW	0.044	0.0		
EZ	0.035	0	0	0

Flush out augers @ 53'.
Start jackhammering @ SB-104
(upwind of UW station).

1155 Boring ended, break for lunch
Stop CAMP.

1306 Start UW, EZ CAMP datalogging
1307 Start DW CAMP "

1320				
UW	0.044	0.0		
DW	0.048	0.0		
EZ	0.036	0	0	0

Removing rods, breaking them down

Location
Date 3/13/12

Project / Client

1350	DT	VOC	H_2S	HCN
UW	0.032	0.0		
EZ	0.036	0.0	0	0
DW	0.046	0.0		

Grouting SB-109.
1356 DW DT alarm. FKN mixing grout, grout dust causing alarm.
1358 Alarm over @ DW DT.
1427 Turn off CAMP stations.

Location ______ Wed Date 3/14/12

Project / Client ______

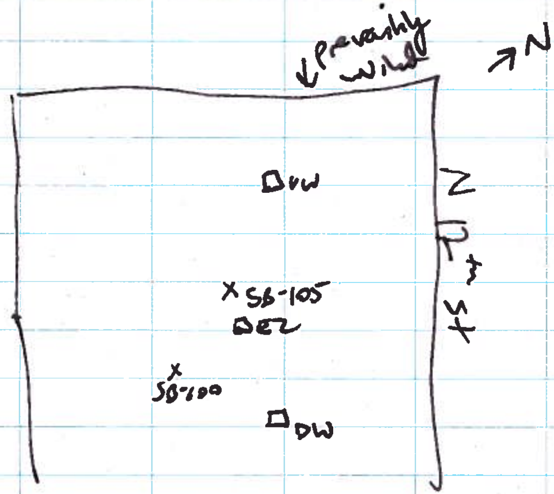
weather: sunny, 58°-70°, wind light from NW

530 Calibrate PIDs + MR. see p51 for details.

843 start EZ monitoring
MR# 18824
DT #10319

846 start DW monitoring
PID# 08833
DT # 12729

850 start ~~DW~~ UW monitoring
PID# 04768
DT # 08789



Location ______ Date 3/14/12

Project / Client ______

SB-105

8:47	Initial:	DT	VOC		
	DW	0.021	0.2		
8:48	EZ	0.019	0	0	0
8:50	UW	0.010	0		
9:21					
	UW	0.019	0		
	DW	0.060	0		
	EZ	0.041	0	0	0
	Drilling to 60':				
10:05	UW	0.011	0		
	DW	0.036	0		
	EZ	0.037	0	0	0
	Fixing teeth on cutter head.				
10:47	UW	0.005	0		
	EZ	0.096	0	0	0
	DW	0.038	0.2		
	Drilling to 23', hard drilling diesel exhaust				
11:20	UW	0.009	0.0		
	DW	0.011	0.2		
	EZ	0.002	0	0	0
	Break until 12:30.				

Location
Date 3/14/12

Project / Client
SB-105

1235	DT	Voc	Hcn	H2S
UW	0.009	0.0	[illegible]	
DW	0.012	0.2		
EZ	0.002	0	0	0

Getting ready

1300-1257				
DW	0.014	0.2		
UW	0.007	0		
EZ	0.002	0.	0	0

retrieve 25-27

1335				
DW	0.012	0.2		
UW	0.009	0		
EZ	0.003	0	0	0

retrieve 29'-31'

1355				
DW	0.012	0.2		
UW	0.009	0.0		
EZ	0.002	0.0	0	0

Drilling to 33'.

Location
Date 3/14/12

Project / Client
SB-105

1430	DT	VOC	H2S	HCN
UW	0.009	0		
DW	0.012	0.3		
EZ	0.016	0	0	0

Drilling to 35'

1505-1510 Turn off CAMP stations.

Location Thurs. Date 3/15/12

Project / Client

weather: overcast, 48°, wind steady, but light-mod from E

5^30 Calibrate PIDs: Fresh span

		Fresh	span
	# 03582	✓	100
	# 08803	✓	101
	# 04768	✓	101
MR	# 18824	✓	100

H_2S: 25 LEL: 49 O_2: 20.9

Downloaded data

For span info see p. 51

902 F&N starts sawcutting TP-104.

907 start UW datalogging
PID # 04768
DT # 08769

909 start DW data logging
PID # 08803
DT # 12729

Location Date 3/15/12

Project / Client

TP-104

910

	DT	VOC
DW	0.049	0.0
UW	0.041	0.0

Saw cutting TP-104

915 Dust readings @ DW camp exceed .150 mg/m3. I stop saw cutting. We agree to saw cut for 5 minutes, then take a break, then continue. Note: No ppl or residences DW at this time.

920

	DT	VOC
DW	0.057	0.0
UW	0.043	0.0

Sawcutting TP-104

935

	DT	VOC
UW	0.039	0.0
DW	0.056	0.0

Same, adding water.

955

	DT	VOC
UW	0.041	0.0
DW	0.047	0.0

replacing bucket on backhoe.

Location ______ Date 3/15/12

Project / Client @1240 - wind has shifted to SE

TP-104 + TP-108

1041		DT	VOC	H_2S	HCN
	UW	0.026			
	DW	0.055	0		
	EZ		0	0	0

TP-104 @ 5'

1120			
	UW	0.027	0
	DW	0.064	0

Refilling TP-104

1142 start to sawcut TP-105.

1150 ~~cut re~~ Asphalt @ TP-105 overlays concrete.

1200-1240 Lunch

1250 sawcut TP-108.

1330

UW 2	0.031	0
DW 2	0.028	0

Digging @ TP-108.

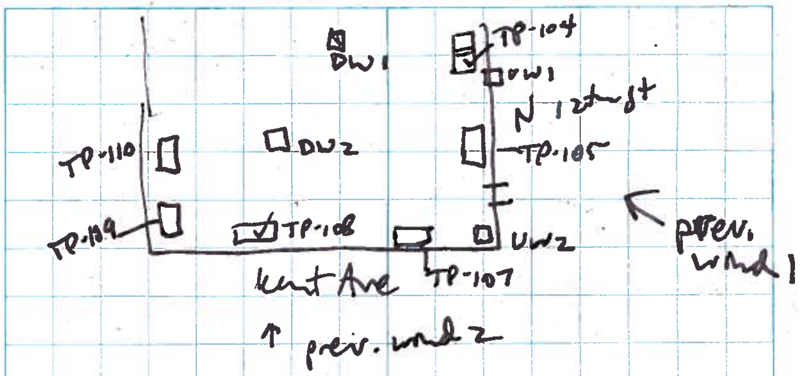
1405

UW 2	0.018	0.0
DW 2	0.034	0.0

~~Extra~~ Excavating TP-108 @ 5'.

Location ______ Date 3/15/12

Project / Client ______



1428	DT	VOC
DW2	0.034	0.0
UW2	0.016	0.0

At 6.5' at TP-108.

1520	DT	VOC
DW2	0.056	0.0
UW2	0.039	0.0

Sawcutting TP-109. Filling + grading TP-108

1530 TP-108 graded.

1534 Turn off DW Camp

1536 Turn off UW Camp

Location Fri Date 3/16/12

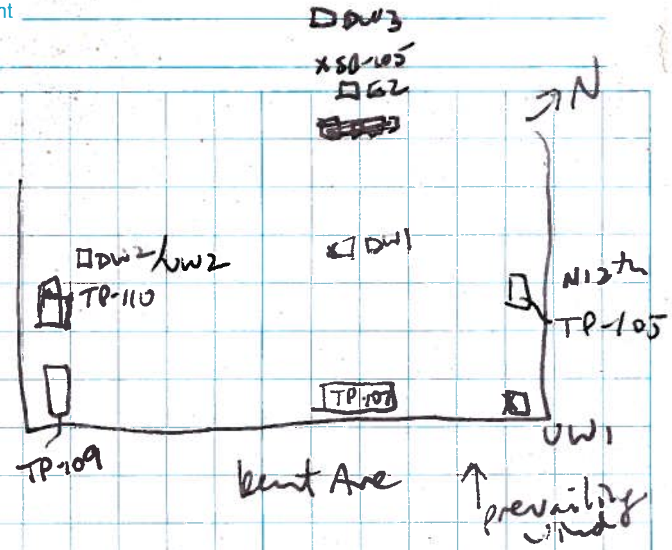
Project / Client

742 Start DW CAMP
DT # 12729
PID# 08803
746 start UW CAMP
DT # 08769
PID # 04763

820 DT PID
UW1 0.023 0.0
DW1 0.031 0.0
Backhoe moves to TP-109.
830 Move DW location to be DW
of TP-109
848 DT PID
UW 0.024 0.0
DW 0.030 0.1
Removing asphalt @ TP-110.
920 DW DT alarm b/c of
jackhammering downwind
temporary.
921
DWZ 0.034 0.1
937 Coffee Break

Location Date 3/16/12

Project / Client



956
DW2 0.036 0.2
UW1 0.030 0.2
Setting rig up, digging TP-109.
Move UW1 to be DW3, DW of rig.
1057
DW3 0.032 0.2
DW2 0.030 0.1
TP-110 + SB-105
1115 DW2 DT Alarm = 0.074
+ dropping VOC: 0.2
1116 DW2 DT = 0.045 VOC: 0.2

Location ______ Date 3/16/12

Project / Client ______

TP-111 + SB-105

1145 DT VOC HCN H_2S

DW 2 0.028 0.1

DW3 0.023 0.3

Drilling E2 0.017 0 0 0

1200 Break for lunch,

~~turn off CAMPs.~~

1300

DW3 0.049 0.2

DW2 0.039 .02

SB-105 drilling to 51'

TP-111 backfilled.

1345 DW2 0.203 0.0

DW3 0.037 0.4

Grouting SB-105

Using ram bit @

~~FB~~ TP-105 to get

through asphalt.

1346 DW2 DT = 0.053

temp. exceedance. Also,

DW2 is new UW 2.

Concrete work occurring

UW of station ~~[illegible]~~

across [illegible] street

Location ______ Date 3/16/12

Project / Client ______

TP-100 + SB-105

1409

UW2 0.044 0.0

DW3 0.037 0.4

Hammering TP-100

Grouting SB-105.

Drilling E2 0.052 0.0 0 0

1500 Finished grouting SB-105.

1505 Turn off UW2 CAMP

Location 50 Kent Ave   Monday Date 3/19/12

Project / Client N. Grd

weather: mostly sunny, 55°-70°,
wind none to light S/E

5 30 Calibrate

MR   VOC=99.9

H_2S=25   LEL=49 O_2=20.9

~~Voc~~ PID #03582   VOC=100

PID #08803   VOC=100

PID #04768   VOC=100

for span info, see p.51

7 00 Arrive @ site.

753 Start DW monitoring/data logging

PID # 08803

DT# 12729

1 Initial

DW	DT=0.092	PID:0.1
UW	DT=0.057	PID:0.0

755 start UW monitoring/datalogging

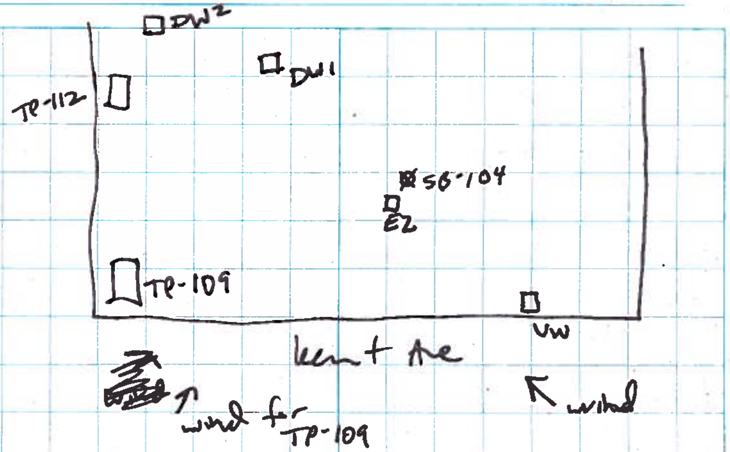
PID #04768

DT ~~#08769~~

Task - excavating @5' @ TP-109

Location   Date 3/19/12

Project / Client



		DT	PID		
815	DW1	0.079	0.0		
	UW	0.061	0.0		
905	DW2	0.078	0.0		
	UW	0.078	0.2		

Digging TP-112. Setting SB-104 up.

		DT	VOC	H_2S	HCN
1005	UW	0.051	0.2		
	DW2	0.060	0.0		
	Drill-E2	0.057	0	0	0

Drilling SB-104, Digging TP-112

1043	E2	0.050	0	0	0
	UW	0.044	0.1		
	DW2	0.063	0.1		

[illegible]

Location

Date 3/19/12

Project / Client

		DT	VOC	H_2S	HCN
1130	E2	0.052	0	0	0
	DW1	0.062	0		
	UW	0.059	0.2		
1215- 1200	Lunch				
13^{00}	E2	0.046	0	0	0
	DW1	0.045	0.1		
	UW	0.058	0.2		

Backfilling TP-102.
Drilling SB-104.
UW location near Road

1400	E2	0.042	0	0	0
	UW	0.015	0.3		
	DW1	0.042	0.2		

Collecting SB-104 27-29 sample. Digging TP-103.
wind from E/NE

1430	E2	0.026	0	0	0
	UW	0.010	0.2		
	DW1	0.038	0.1		

Drilling to 33'. Backfilling TP-103.

Location

Date 3/19/12

Project / Client

1455 Turn off E2 monitoring
1458 Turn off UW + DW1 monitoring.

Location Date 3/20/12

Project / Client

weather: cloudy, 58°F, little to no wind from SE.

5^30 calibrate PIDs. Fresh air ✓

PID #08803 : 100

PID #04768 : 100

PID #03582 : 101

Isobutylene spangas lot#0422FA11 exp 6/15

MultiRae #18824 = 101 | part#6P11012

H_2S = 25 LEL = 49 O_2 = 20.9

Multigas span gas lot# BAM-412P-1

manf date: 1/12, exp date 4/13

700 Arrive @ site.

721 set up DW CAMP datalogging

DT pine# 12729

PID pine# 08803

739 set up UW CAMP datalogging

DT pine# 08769

PID pine# 04768

setup EZ CAMP monitoring

DT pine# 10319

MR pine# 18824

Location Date 3/20/12

Project / Client

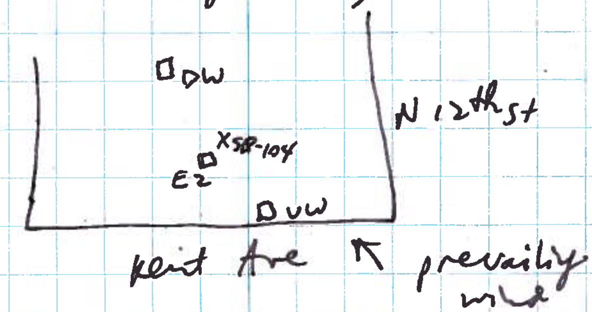
EZ	DT.	MR	
0750	0.077 mg/m³	VOC 0	HCN 0
		H_2S 0	

UW		
0752	0.067	VOC 0.1

DW		
0754	0.098	VOC 0.1

Activity: Initial, rig running, not drilling yet.

755 start drilling SB-104 N



0825	DT	VOC	H_2S	HCN
EZ	0.068	0.0	0	0
DW	0.121	0.2		
UPW	0.060	0.1		
0833				
EZ	0.063	0.0	0	0
DW	0.086	0.2		
UW	0.039	0.1		

Location ______ Date 3/20/12

Project / Client ______

Sunny, 68°F, Calm winds from NW

0843 -	DT	VOC	H_2S	HCN
EZ	0.058	0.0	0	0
UW	0.063	0.2		
DW	0.063	0.2		
0854				
EZ	0.056	0.0	0	0
UW	0.047	0.2		
DW	0.080	0.2		
0911				
EZ	0.063	0.0	0	0
UW	0.048	0.3		
DW	0.080	0.2		
0926				
EZ	0.074	0.0	0	0
UW	0.070	0.4		
DW	0.068	0.2		
0945				
EZ	0.054	0.0	0	0
UW	0.046	0.3		
DW	0.052	0.1		
1000	Sun comes out temp. 65°F, wind is same.			
EZ	0.039	0.0	0	0
UW	0.035	0.2		
DW	0.046	0.1		

Location ______ Date 3/20/12

Project / Client ______

Sunny, 68°F, Calm winds from NW

1013 -	DT	VOC	H_2S	HCN
EZ	0.049	0.0	0	0
UW	0.040	0.2		
DW	0.051	0.1		
1032				
EZ	0.081	0.0	0	0
UW	0.046	0.2		
DW	0.046	0.1		
1049				
EZ	0.081	0.0	0	0
UW	0.038	0.2		
DW	0.052	0.1		
1102	No drilling, Fixing Rig Cable.			
EZ	0.095	0.0	0	0
UW	0.044	0.2		
DW	0.060	0.1		
1118	Fixing Rig Cable Continues			
EZ	0.062	0.0	0	0
UW	0.095	0.2		
DW	0.070	0.1		
1131	Fixing Rig Cable Continues			
EZ	0.067	0.0	0	0
UW	0.056	0.3		
DW	0.077	0.1		

Location

Date 3-20-12

Project / Client

Continuing to Fix Rig Cable.

1158 -	DT	VOC	H2S	HCN
EZ	0.022	0.0	0	0
UW	0.031	0.2		
DW	0.036	0.1		
1234	Drilling w/ split spoon (sampling)			
EZ	0.019	0.0	0	0
UW	0.020	0.2		
DW	0.030	0.1		
1240	lunch Break.			
1326	Back from lunch, Drilling & SS Sampling @ SB-104			
EZ	0.05	0.0	0	0
UW	0.010	0.2		
DW	0.016	0.1		
1405				
EZ	0.07	0.0	0	0
UW	0.010	0.2		
DW	0.016	0.1		
1428	Continuing to Sample SB-104			
EZ	0.06	0.0	0	0
UW	0.012	0.2		
DW	0.016	0.1		

1447 - Starting to pull augers out from SB-104.

1453 - Continuing to Break down equipment from SB-104

Location

Date 3-20-12

Project / Client

1501 - Finished clearing up, will Finish pulling augers Tomorrow Breaking down Camp.

1548 - MA & MD off-site.

[illegible]

Location ______ Date 3/21/12

Project / Client ______

~~Sunny~~ Cloudy, 70°F, Calm w/winds from N.W.
~~Humidity~~ High, showers.

0621 - MA on-site to set-up stations For air monitoring (Camp).

0631 set up UW station to do Background

0638 Set up DW Station to do Background.
NO work Being Done at this time only obtaining Background data. Calibrated PID's at earlier time (0521 am)

PID #08803 → 100ppm.
PID # 04768 → 100ppm.
PID # 03582 → 100ppm.

Isobutylene lot # 04228 FALL EXP 6/15. MultiRae #78824.
@ 100 H_2S - 25 LEL = 49
O_2 - 20.8, Multigas Lot # BAH 4/2P-1 Exp date 4/13

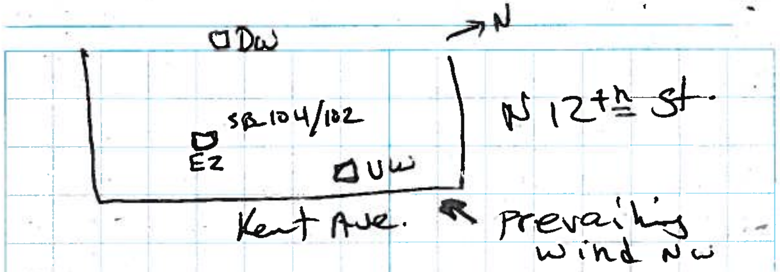
Set-up DW CAMP
DT pine# 12729
PID pine# 08803

Set-up UW Camp.
DT Pine# 08769
PID pine # 04768

Will Set EZ Camp Datalogging when work Begins.

Location ______ Date 3/21/12

Project / Client ______



0718 - Set up EZ datalogging station

0725 -	DT	VOC	H_2S	HCN
EZ	0.095	0.0	0	0
UW	0.080	0.2		
DW	0.107	0.9 Due to Cars from Parks Dept on-side near datalogger & High Humidity.		

0735 -				
EZ	0.072	0.0	0	0
UW	0.057	0.1		
DW	0.064	1.0		

0751				
EZ	0.038	0.0	0	0
UW	0.031	0.3		
DW	0.042	3.7, PID reading due to Cars & trucks Being moved by the Parks Dept.		

0805 Driller just starting to pull out Casing out of SB-104.

Location Kent Ave, Brooklyn, N.Y Date 3/21/12

Project / Client

Cloudy, Humidity med. wind from NW
Calm.

0811	DT	VOC	H2S	HCN
EZ	0.039	0.0	0	0
UW	0.029	0.5		
DW	0.037			

Lle due to Drizzle of Rain & High Humidity.

0830 Driller Continues to take augers out of SB-104.

EZ	0.052	0.8	0	0
UW	0.049	0.6		
DW	0.052	0.3		

0910

EZ	0.069	0.0	0	0
UW	0.055	0.5		
DW	0.067	0.0		

0934

EZ	0.064	0.0	0	0
UW	0.049	0.6		
DW	0.[illegible]79	0.0		

0955 - Shut off Datalogging due to NO intrussive work Being done, only Deconning.

1105 - Moved EZ Datalogger by SB-103 location, Did not turn on any dataloggers till work actually starts

Location Date 3/21/12

Project / Client

Cloudy, med. Humidity, wind calm out of NW.

1135 Turned on all 3 dataloggers, Drilling @ SB-103 will begin in a few minutes.

1156	DT	VOC	H2S	HCN
EZ	0.052	0.0	0	0
UW	0.043	0.5		
DW	0.055	0.0		

1230 lunch.

1313 Back from lunch.

EZ	0.050	0.0	0	0
UW	0.046	0.3		
DW	0.053	0.0.		

1351 - Backhoe off-site w/trailer

EZ	0.054	0.0	0	0
UW	0.038	0.3		
DW	0.056	0.0		

1410

EZ	0.051	0.0	0	0
UW	0.056	0.3		
DW	0.061	0.0		

1440 Breaking down datalogging stations Hit refusal @ 24 feet, will continue Tomorrow.

Location 50 Kent Ave, Brooklyn, NY Date 3/22/12

Project / Client

Cloudy later sunny, 70°F, Calm winds from NW.

0615 – MA on-site.

0623 – Set-up Datalogger downwind For background air data.

0632 – Set-up Datalogger upwind For background air data.

Calibrated PIDs & MultiRae.

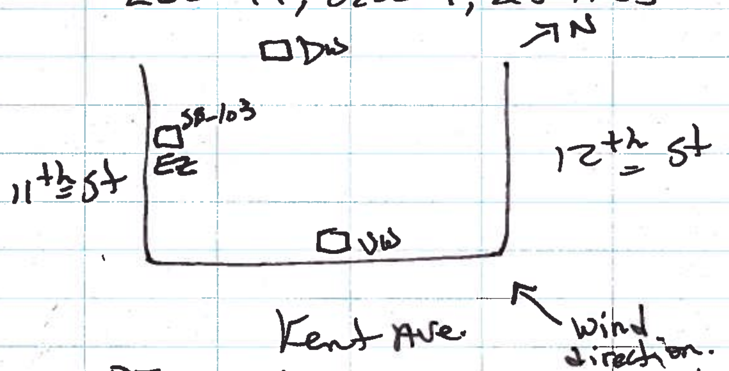
PID # 08803 = 100

03582 = 101

04768 = 100

MultiRae # 78824 = 100 VOC

LEL = 49, O_2 = 20.9, 25 = H_2S



	DT	VOC	H_2S	HCN
0817				
EZ	0.063	0.0	0	0
UW	0.034	3.2 (Humidity High)		
DW	0.043	0.0		

Location Date 3/22/12

Project / Client

NR Driller Pulling out Augers from SB-103

9:00AM	DT	VOC	H_2S	HCN
EZ	0.078	0.0	0	0
UW	0.056	4.7 (HM)		
DW	0.078	1.5		

0931 Driller Jack hammering new SB-103.

EZ	0.060	0.0	0	0
UW	0.047	0.0		
DW	0.068	0.0		

1003 - Clearing SB-103 to 5'

EZ	0.056	0.0	0	0
UW	0.044	0.0		
DW	0.059	0.0		

Drilling new SB-103, 3rd location.

10:48	DT	VOC	H_2S	HCN
EZ	0.076	0.0	0	0
UW	0.078	0.0		
DW	0.086	0.0		

12:00	DT	VOC	H_2S	HCN
EZ	0.069	0	0	0
UW	0.070	0		
DW	0.076	0		

Location ______ Date 3/22/12

Project / Client ______

13:49 DT VOC H2S HCN

	DT	VOC	H2S	HCN
EZ	0.041	0.		
UW	0.047	0.		
DW	0.051	0		

1437 Drilling Continues

	DT	VOC	H2S	HCN
EZ	0.060	0.0	0	0
UW	0.044	0.0		
DW	0.052	0.0		

14:55 Drilling stopped - Broke down all three data loggers

15:00 Driller offsite

15:15 URS inspector offsite MA, AP

03-23-12

8:10 AM DT VOC H2S HCN

	DT	VOC	H2S	HCN
EZ	0.036	0.0		
UW	0.032	0.0		
DW	0.043	0.0		

8.39 AM. DT VOC H2S HCN

	DT	VOC	H2S	HCN
EZ	0.32	0.0.		
UW	0.31	PID off ? Low Battery.		
DW	0.38	0.0.		

9:42.

	DT	VOC	H2S	HCN
EZ	0.029	0.0		
UW	0.022	0.10 off ? Low battery.		

Location ______ Date ______

Project / Client ______

10:21 AM DT VOC H2S HCN

	DT	VOC	H2S	HCN
EZ	0.037	0.0 - Low Battery (PID)		
UW	0.031.	PID No Battery. (PID		
DW	0.035	0.0		

11:38

	DT	VOC	
EZ	0.038	0.0	- Low battery (PID)
UW	0.033	PID	- No Battery (PID)
DW	0.037	0.0.	- Low Battery (PID)

1308

	DT	VOC	
EZ	0.020	PID is out.	(NO BATTERY)
UW	0.029	PID is out	(NO BATTERY)
DW	0.028	PID is out	(NO BATTERY)

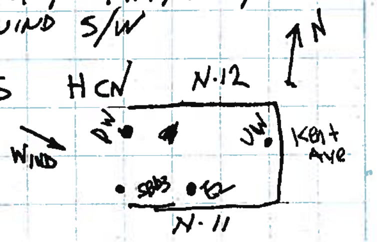
1411

	DT	VOC
EZ	0.040.	PID is out.
UW	0.024	PID is out.
DW	0.028	PID is out.

03-26-12 (MONDAY) Temp 49F PARTLY CLOUDY WIND S/W

7:57 AM DT VOC H2S HCN

	DT	VOC	H2S	HCN
EZ	0.010	0.0.		
UW	0.015	0		
DW	0.018	0.		



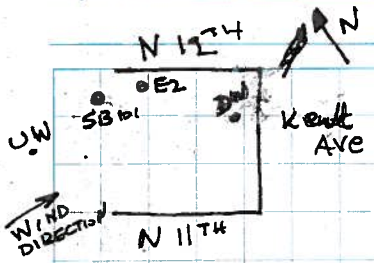
Location ______ Date ______

Project / Client ______

TIME		DT	VOC	H2S	HCN
9:10AM					
	E2	0.02	0.0	0	0
	UW	0.09	0.0		
	DW	0.010	0.0		
10:10					
	E2	0.005	0.0		
	UW	0.015	0.0.		
	DW	0.010			
11:07					
	E2	0.015	0.0		
	UW	0.022	0.		
	DW	0.016.	0		
12:52					
	E2	0.001	0.		
	UW	0.026	0.		
	DW	0.014	0.		
1500					
	E2	0.000	0.		
	UW	0.022	0		
	DW	0.010	0		

Location 50 Kent Ave - Brooklyn NY Date 03-27-12

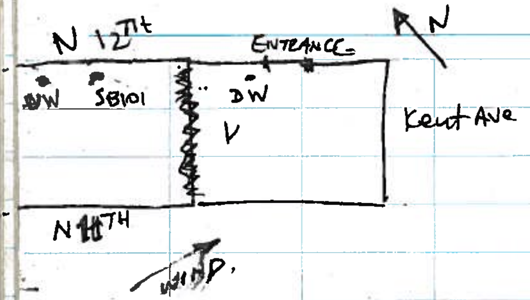
Project / Client National Grid.



TIME		DT	VOC	H2S	HCN
7:53	E2	0.008			
	UW	0.006	0.0.		
	DW	0.021	0.0.		
9:02	E2	0.018.	00		
	UW	0.005	0.0		
	DW	0.009	.00		
10:50.	E2	0.013	0.0		
	UW	0.005	0.0		
	DW	0.019	0.0.		
11:57.	E2	0.001	0.0.		
	UW	0.006.	0.0		
	DW	0.009	0.0.		
1315					
	UW	0.019	0.0		
	DW	0.023	0.0		
	E2	-0.004	.0.0		
1435	UW	0.009	0.0		
	DW	0.008	0		
	E2	0.005	0		

Location 50 KENT AVE BROOKLYN.Y Date 03-28-12

Project / Client National Grid.



Time		DT	VOC	H_2S	HCN
8:05	E2	0.019	0.0	0	0
	UW	0.017	0.0.		
	DW	0.021	0.0		
9:20	E2	0.049	0.0	0	0
	UW	0.026	0.0.		
	DW	0.018	0.0		
10:30	E2	0.055	0.0	0	1
	UW	0.011	0.0.		
	DW	0.029	0.0.		
11:30	E2	0.062	0.0	0	0
	UW	0.043	0.0		
	DW	0.060	0.0		
1300	E2	0.020	0.0	0	0
	UW	0.020	0.0.		
	DW	0.030	0.0		
1400	E2	0.015	0.0	0	0
	UW	0.014	0.0		
	DW	0.019	0.0		

~~03/28/12~~

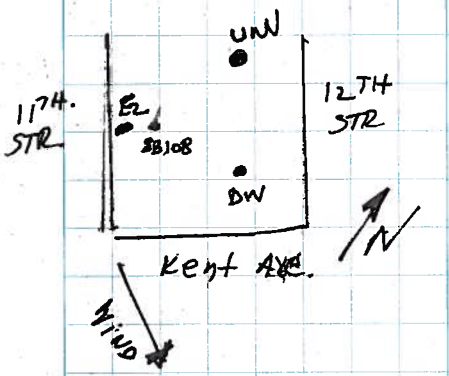
Location

Date 03-29-12

Project / Client

Time		DT	VOC	H_2S	HCN
1452	E2	0.014	0.0	0	0
	UW	0.014	0.0.		
	DW	0.022	0.0		

03-29-12 (Thursday)



Time		DT	VOC	H_2S	HCN
8:30AM	E2	0.004	0.0	0	0
	UW	0.026	0.0		
	DW	0.013	0.0		
9:30AM	E2	0.032	0.0	0	0
	UW	0.022	0.0		
	DW	0.035	0.0		
10:30	E2	0.025	0.0	0	0
	UW	0.037	0.0		
	DW	0.010	0.0		

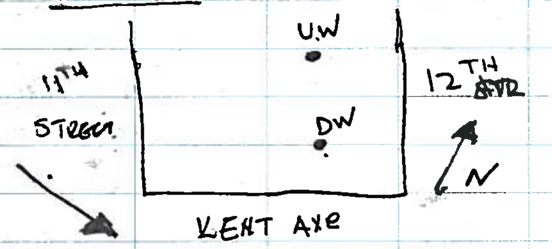
SB-108

Location ______ Date 03-29-12

Project / Client ______

Time		DT	VOC	H_2S	HCN
11:30	E2	0.067	0.0	0	0
	UW	0.004	0.0.		
	DW	0.005	0.0		
12:30	E2	0.039	0.0	0	0
	UW	0.004			
	DW	0.009	0.0.	0	0.
1330	E2	0.023	0.0	0	0
	UW	0.003	0.0.		
	DW	0.006	0.0.		
1430	E2	0.040	0.0	0	0
	UW	0.005	0.0.		
	DW	0.010	0.0		

03-30-12 FRIDAY



Time		DT	VOC	H_2S	HCN	
8:00	E2	No drilling.	—	—	—	E2 off
	UW	0.006.	0.0.			
	DW	0.008	0.0.			

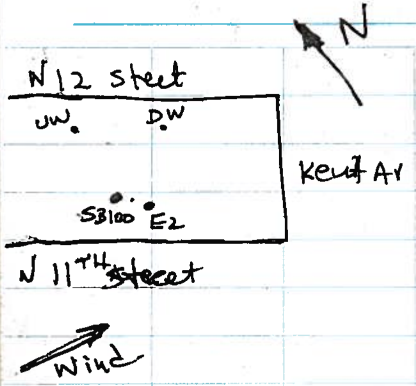
Location 03-29-12 Date ______

Project / Client ______

TIME		DT	VOC	H_2S	HCN
9:00	E2	—	0.0	0	0
	UW	0.018	0.0		
	DW	0.009	0.0.		
10:00	E2			0	0
	UW	0.010	0.0		
	DW	0.016	0.0		
11:00	E2		0.0	0	0
	UW	0.012	0.0		
	DW	0.016	0.0		
13:00	E2	0.018	0.0	0	0
	UW	0.021	0.0		
	DW	0.019	0.0		
14:00	E2	0.050	0.0	0	0
	UW	0.029	0.0		
	DW	0.021	0.0		
1500.	E2	0.025	0.0.	0	0
	UW	0.012	0.0		
	DW	0.020.	0.0		

Location 50 Kent Ave, Brooklyn NY Date 04-02-12

Project / Client National Grid.

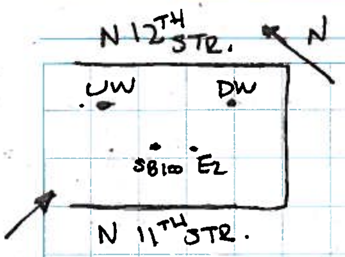


Time		DT	VOC	H2S	HCN
841	E2	0.043	0.0	0	0
	UW	0.007	0.0		
	DW	0.005	0.0.		
952	E2	0.040.	0.0	0	0.
	UW	0.008	0.0		
	DW	0.005	0.0.		
1102	E2	0.030	0.0	0	0
	UW	0.005	0.0		
	DW	0.006	0.0		
1355	E2	0.048	0.0	0	0
	UW	0.006	0.0		
	DW	0.006.	0.0		
1500	E2	0.003	0.0	0	0
	UW	0.000	0.0		
	DW	0.009	0.0		

Location 50 Kent Ave, Brooklyn Date 04-03-12

Project / Client National Grid

BREEZY, 40°F, SUNNY.



Time		DT	VOC	H2S	HCN
8:00.	E2	0.012	0.0	0	0
	UW	0.010	0.0		
	DW	0.011.	0.0		
9:00.	E2	0.044	0.0	0	0
	UW	0.016	0.0.		
	DW	0.007	0.0		
10.00.	E2	0.061	0.0	0.	0.
	UW	0.010.	0.0		
	DW	0.015	0.0		
11:00	E2	0.090	0.0	0	0
	UW	0.021	0.0.		
	DW	0.003	0.0.		
12:00	E2	0.076	0.0	0	0
	UW	0.052	0.0.		
	DW	0.008	0.0		
13 30	E2	0.018	0.0	0	0
	UW	0.008	0.0		
	DW	0.007	0.0		

Location

Date

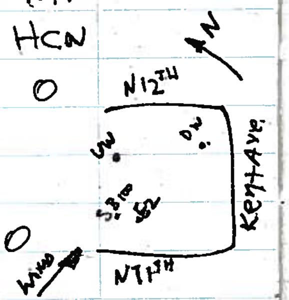
Project / Client

04-03-12

Time		DT	VOC	H2S	HCN
14:30.	E2	0.086.	0.0	0.	0.
	DW	0.012	0.0		
	UW	0.012	0.0		

04-04-12 Breezy 55°F N/W

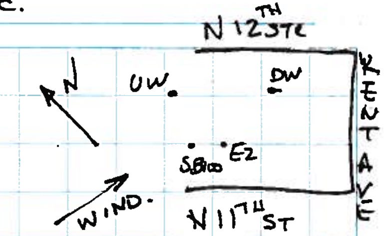
Time		DT	VOC	H2S	HCN
8:15AM	E2	0.006	0.0	0	0
	UW	0.020	0.0		
	DW	0.015	0.0		
9:06AM	E2	0.030	0.0	0	0
	UW	0.010	0.0		
	DW	0.030	0.0		
10:20	E2	0.036.	0.0	0	0.
	UW	0.020.	0.0.		
	DW	0.023	0.0.		
11:20	E2	0.089	0.0	0	0
	UW	0.023	0.0		
	DW	0.049	0.0		
13:07	E2	0.005	0.0	0	0
	UW	0.023	0.0		
	DW	0.045	0.0		
14:36	E2	0.025	0.0	0	0
	UW	0.010			
	DW	0.018	0.0		



Location 50 Kent Ave, Williamsburg. Date 04-05-12

Project / Client Brooklyn, NY.

National Grid.

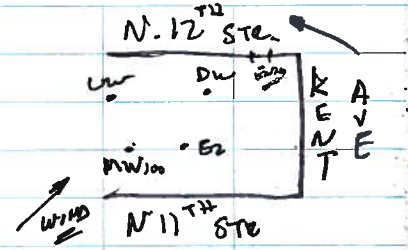


Time		DT	VOC	H2S	HCN	
8:30	E2	0.010	0.0	0	0	
	UW	0.052	0.0.			
	DW	0.015	0.0.			
9:22	E2	0.060	0.0	0	1	
	UW	0.024	0.0			
	DW	0.004	0.0.			
10:20	E2	0.002	0.0	0	0	
	UW	0.032	0.0			
	DW	0.009	0.0			
11:45	E2	0.013	0.0	~~0~~	~~0~~	MRAE is off ?? Battery problem.
	UW	0.024	0.0			
	DW	0.008	0.0.			
1315	E2	0.002	0.0.			
	UW	0.014	0.0			
	DW	0.007	0.0.			
1410	E2	0.004	0.0			
	UW	0.003	0.0			
	DW	0.007	0.0			

Location 50 Kent Ave, Brooklyn NY Date 04-06-12

Project / Client National Grid.

WIND N/W. T. 38°F, BREEZY, PARTLY Sunny.

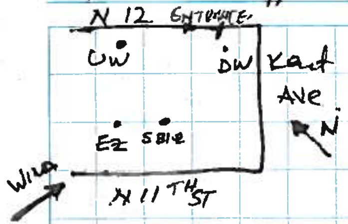


Time		DT	VOC	H_2S	HCN
800	E2	0.031	0.0	0	0
	UW	0.010	0.0		
	DW	0.010	0.0		
9:18	E2	-.012	0.0	0	0
	UW	0.007	0.0		
	DW	0.007	0.0		
1054	E2	-.011	0.0	0	0
	UW	0.030	0.0		
	DW	0.012	0.0		
1300	E2	0.003	0.0	0	0
	UW	0.012	0.0		
1400	DW	0.020	0.0		
	E2	+0.008	0.0	0	0
	UW	0.009	0.0		
	DW	0.010	0.0		
1445	E2	-0.008	0.0	0	0
	UW	0.004	0.0		
	DW	0.007	0.0		

Location 50 Kent Ave. Brooklyn NY Date 04-09-12 Monday

Project / Client National Grid

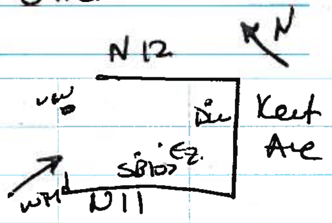
T 52°F Sunny, windy N/W.



Time		DT	VOC	H_2S	HCN
8:15AM	E2	-0.009	0.0	0	0
	UW	0.002	0.0		
	DW	0.012	0.0		
9:11	E2	-0.004	0.0	0	0
	UW	0.012	0.0		
	DW	0.013	0.0		
10:37	E2	0.016	0.0	0	0
	UW	0.019	0.0		
	DW	0.014	0.0		
1350	E2	0.026	0.0	0	0
	UW	0.010	0.0		
	DW	0.019	0.0		
1518	E2	-0.009	0.0	0	0
	UW	0.007	0.0		
	DW	0.014	0.0		
	~~E2~~				
	UW				
	DW				

Location 50 Kent Ave, Brooklyn NY Date 04-10-12

Project / Client National Grid



	DT	VOC	H2S	HCN	Time	
E2	0.00	0	0	0		collecting 33-35',
UW	0.015	0				
DW	0.019	0			8:02	Alarm @ 8:24 I jostled it
E2	0.0	0	0	0		Drilling to 37'.
UW	0.015	0				
DW	0.24	0			8:26	
E2	0.002	0.0	0	0	9:30.	
UW	off.	0.1				
DW	0.026	0				
E2	0	0			9:58	
UW	N/A	0.1				
DW	0.025	0				
E2	0	0	0	0	1045	sampling ~~Drilling to 51'~~ 51-53'
UW	0.019	0.2				Diesel fume odor
DW	0.046	0.				
E2	-0.005	0	0	0	11:30	
UW	0.017	0.3				
DW	0.028	0				

Location Date 4/10/12

Project / Client

8:30 Note: Memory was full on DW PID. I erase datalog so that we can continue logging the rest of today.

9:58 UW DT not reading, turn it off by unplugging. doesn't turn back on. DT off for now

10:12 Spoke to Pine Environmental- ~~Sam~~ Sam said that there is a chip inside DustTrak that can become unlodged. They will replace instrument. It began working again as we talked, it will still be replaced.

1135 Stop DT - E2 + zero / re-calibrate

1145 resume readings

Location ______ Date 4/10/12

Project / Client ______

CAMP - SB-102

	Time	DT	VOC	HCN	H2S
EZ	11:49 ~~0.008~~	~~00~~ 0.008	0	0	0
DW	11:49	0.019	0.0		
UW	~~0~~ 11:49	0.003	0.3		
1150	Break for lunch, Rig off.				
EZ	1300	0.007	0.0	0	0
DW		0.020	0.0		
UW.		0.026	0.3		

Pine Environmental ~~Equipment~~ arrives on site @ 1530 and replaces DT (UW) equipment.

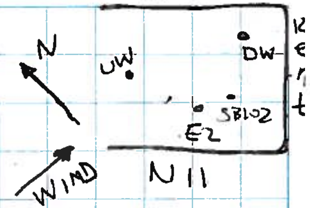
E.O.D.

Z

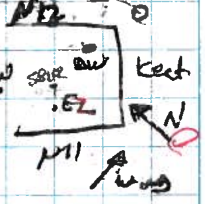
Location 50 Kent Ave Brooklyn, NY Date 04-11-12

Project / Client National Grid.

T- 41°F WIND N/W. CLOUDY.



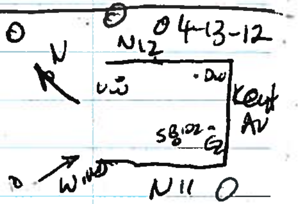
	Time	DT	VOC	HCN	H2S
EZ	825	0.000	0.0	0	0
UW		0.028	0.0		
DW		0.022	0.0		
EZ	930.	0.001	0.0	0	0
UW		0.020	0.0		
DW		0.018	0.0		
EZ	1043	0.003	0.0	0.	0.
UW		0.015	0.0		
DW		0.014	0.0		
EZ	1300.	0.001	0.0	0	0
UW		0.010	0.0		
DW		0.010	0.0		
					04-12-12
EZ	8:30	0.023	0.0	0	0
UW		0.016	0.0		
DW		0.015	0.0		
EZ	930.	0.007	0.0	0	
UW		0.012	0.0		
DW		0.014	0.0		



Location 50 Kent Ave. Brooklyn, NY Date 04-12-12

Project / Client NG

	Time	DT	VOC	HCN	H2S
E2	1102	0.001	0.0	0	0
UW		0.054	0.2		
DW		0.010	0.0		
E2	1403	0.000	0.0	0	0
UW		0.015	0.2		
DW		0.020	0.0		
E2	905	0.000	0.0	0	0 04-13-12
UW		0.010	0.1		
DW		0.020	0.0		
E2	1005	0.002	0.0		
UW		0.009	0.2		
DW		0.014	0.0		
E2	1100	0.007	0.0	0	0
UW		0.008	0.4		
DW		0.020	0.0		
E2	1400	0.004	0.0	0	0
UW		0.012	0.4		
DW		0.010	0.0		
E2					
UW					
DW					
E2					
UW					
DW					



Location 50 Kent Ave Date 4-16-12

Project / Client National Grid

80°F, Sunny, winds calm from ~~SE~~ NE Direction

0615 - MA on-site.

0650 - Drillers on-site, Discussed A&S & work for today.

0801 - Andreas on-site & setting up Camp. starting to clear Holes from augers. Calibrated PIDs & MultiRae

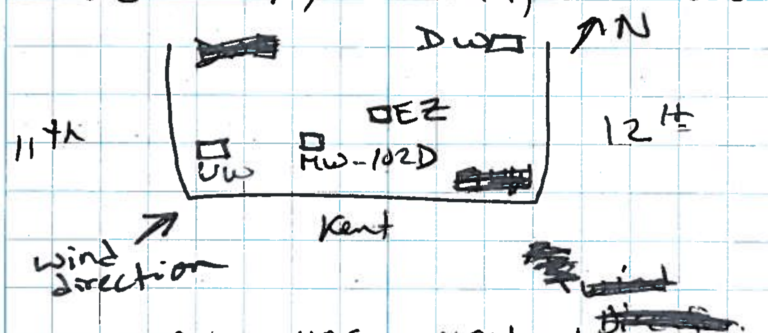
PID#04768 = 100

#08803 = 100

#03582 = 101

MultiRae #1 78824 - 100 VOC

O2 = 20.9, LEL = 49, H2S = 25



		DT	VOC	HCN	H2S
0902	E2	0.000	0.0	0	0
	UW	0.051	0.2		
	DW	0.064	0.0		
0938	E2	0.000	0.0	0	0
	DW	0.057	0.0		
	UW	0.050	0.2		

Location 50 Kent Ave. Brooklyn, NY Date 4-16-12

Project / Client National Grid.

Driller Continues to install Casing.

1018	DT	VOC	HCN	H2S
EZ	0.00	0.00	0-0	0.0
DW	0.062	0.0	[illegible]	.
UW	0.057	0.2		

Setting Casing
1100

EZ	0.000	0.0	0	0
DW	0.059	0.0.		
UW	0.061	0.2		

1155 Continuing to set Casing.

EZ	0.000	0-0	0	0
DW	0.058	0.0		
UW	0.059	0.2		

1238 Continuing to ~~set~~ Casing.

EZ	0.000	0.0	0	0
DW	0.059	0.0		
UW	0.061	0.2		

1245 lunch.
1330 Broke down Camp, no more intrusive work, Driller to Decon all augers.
1345 Back from lunch, starting to Set-up for deconning.
1545 MA & Andrea off-site, Drillers off-site.

Location 50 Kent Ave. Date 4-17-12

Project / Client National Grid.

75°F, little wind From SE, sunny, Gusts of wind from SE.

0623 MA on site, Calibrating PIDs & MultiRae
PID 04768 = 100
03582 = 100
08803 = 101
MultiRae 78824 = O_2 - 20.9
LEL - 49, VOC - 100, H_2S = 25

0640 - Set-up DW Dusttrack.
0645 - Set-up UW Dusttrack.
0743 - Set-up EZ Dust track, Drillers clearing MW-102I location, which is ~5' Feet NW of MW-102D.

0802 -	DT	VOC	HCN	H2S
EZ	0.000	0.00	0	0
DW	0.018	0.00		
UW	0.023	0.00		
0835 - EZ	0.005	0.00	0	0
DW	0.015	0.00		

Location 30 Kent Ave. Date 4-17-12

Project / Client National Grid

		DT	VOC	HCN	H2S
0903	EZ	0.005	0.0	0	0
	DW	0.011	0.0		
	UW	0.009	0.0		
1036	EZ	0.005	0.0	0	0
	DW	0.023	0.0		
	UW	0.013	0.0		
1145	EZ	0.06	0.0	0	0
	DW	0.021	0.0		
	UW	0.012	0.0		

- Broke down dustTracks, NO intrusive work to be done till end of today.

1515 - MA & Drillers off-site.

Location 50 Kent Ave. Date 4-18-12

Project / Client National Grid.

55°F, little windy, wind From SE.

0615 - MA on-site, Calibrating PIDs

08803 = 100

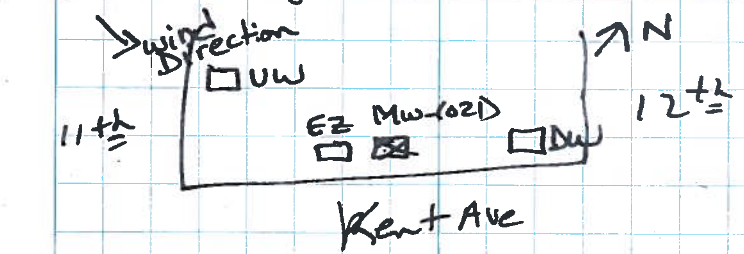
03582 = 101

04768 = 100

MultiRae 78824 = O_2 = 20.9

VOC = 100 LEL = 49 H2S = 25

0635 - setting up UW & DW Dusttrack



	DT	VOC	HCN	H2S	Time
EZ	0.000	0.0	0	0	900
UW	0.018	0.0			
DW	0.015	0.0			
EZ	0.000	0.0	0	0	10.00
UW	0.010	0.0			
DW	0.008	0.0			
EZ	0.0[illegible]	0.0	0	0	1053
UW	0.009	0.0			
DW	0.016	0.0			

Location 50 Kent Ave. Brooklyn Date 04-18-12

Project / Client NG.

Time.		DT	VOC	HCN	H2S.
1149	E2	0.022	0.0	0	0
	UW	0.016	0.0		
	DW	0.039	0.0		
1349	E2	0.002	0.0	0	0
	UW	0.036	0.0		
	DW	0.021	0.0		
1449	E2	0.001	0.0	0	0
	UW	0.019	0.0		
	DW	0.024	0.0		
1549	E2	0.000	0 0	0	0
	UW	0.024	0.0		
	DW	0.027	0.0		

1615 _ Broke Camp down _ Drillers & MA, Andreas off-site.

Location 50 Kent Ave. Date 4-19-12

Project / Client National Grid.

55°F, still winds from SE.

0623 – MA on-site, Andreas on site. Calibrated PIDs & MultiRae

03582 = 100

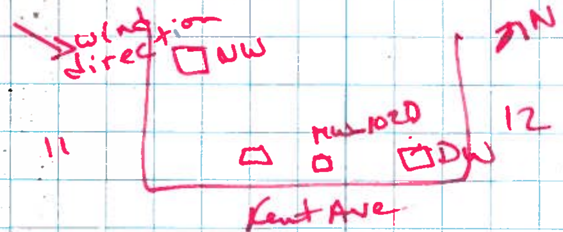
08803 = 101

04768 = 100

MultiRae 78824 = O_2 = 20.9, VOC = 100

LEL = 49 H_2S = 25

0633 = Setting up the UW & DW Dusttrack



	Time	DT	VOC	HCN	H_2S
E2	0740	0.000	0.0	0	0
UW		0.055	0.0		
DW		0.055	0.1		
E2	0840	0.000	0.0	0	0
UW		0.063	0.0		
DW		0.059	0.2		
E2	0939	0.000	0.0	0	0
UW		0.045	0.0		
DW		0.051	0.2		
E2	1031	0.000	0.0	0	0
UW		0.073	0.0		

Location 50 Kent Ave Date 04-19-12

Project / Client National Grid

→

	Time	DT	VOC	HCN	H2S
E2	1135	0.000	0.0	0	0
UW		0.054	0.0		
DW		0.058	0.2		
E2	1310	0.000	0.0	0	0
UW		0.053	0.0		
DW		0.054	0.0		
E2	1338	0.000	0.0	0	0
UW		0.048	0.0		
DW		0.051	0.0		
E2	1423	0.000	0.0	0	0
UW		0.043	0.0		
DW		0.048	0.0		
EZ	1515	0.000	0.0	0	0
UW		0.053	0.0		
DW		0.054	0.0		

1520 shut down dusttrack machines
End of day.

1530 MA, Andrews & Drillers
off-site.

[signature]

Location Date

Project / Client

APPENDIX F

IDW CHARACTERIZATION LAB RESULTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-17392-1
Client Project/Site: Williamsburg

For:
URS Corporation
77 Goodell Street
Buffalo, New York 14203

Attn: Mr. Colin Wasteneys

Melissa Deyo

Authorized for release by:
3/29/2012 9:03:08 AM

Melissa Deyo
Project Manager I
melissa.deyo@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Table of Contents

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
X	Surrogate is outside control limits

GC Semi VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 480-17392-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-17392-1

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
Method 8260B: The following sample was diluted due to the abundance of non-target analytes: NGW1DW 031512S (480-17392-1). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

GC/MS Semi VOA
Method 8270C: The following sample was diluted due to the nature of the sample matrix: NGW1DW 031512S (480-17392-1). Elevated reporting limits (RLs) are provided.

Method 8270C: The following sample was diluted due to the abundance of target analytes: NGW1DW 031512S (480-17392-1 DL). As such, the surrogates were reduced to a level in which the recovery calculation no longer provides useful information. Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

GC VOA
Method 8015B: The following sample was diluted due to the abundance of target analytes: NGW1DW 031512S (480-17392-1). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

GC Semi VOA
Method 8015B: The following sample was diluted due to the abundance of target analytes: NGW1DW 031512S (480-17392-1). As such, surrogate recoveries are not representative and elevated reporting limits (RLs) are provided.

Method 8082: One surrogate recovery for the following sample was outside control limits: NGW1DW 031512W (480-17392-2). Evidence of matrix interference was present; therefore, re-extraction and re-analysis was not performed.

No other analytical or quality issues were noted.

Metals
Method 6010B: The method blank for preparation batch 56277 contained Zinc above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of the associated sample was not performed.

No other analytical or quality issues were noted.

General Chemistry
Method SM 2540C: Due to the matrix, the initial volume used for the following sample deviated from the standard procedure: NGW1DW 031512W (480-17392-2). The reporting limits (RLs) have been adjusted proportionately.

Method 9020: Breakthrough exceeded 10% for the following sample:NGW1DW 031512W (480-17392-2). Re-analysis was performed with concurring results. The data has been reported.

No other analytical or quality issues were noted.

Organic Prep
Method 3510C: During pH adjustment, the following sample required 5 mL of Sulfuric acid and 7 mL of Sodium hydroxide (base) to reach

Job ID: 480-17392-1 (Continued)

Laboratory: TestAmerica Buffalo (Continued)

the desired pH ranges: NGW1DW 031512W (480-17392-2).

No other analytical or quality issues were noted.

Detection Summary

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Client Sample ID: NGW1DW 031512S — Lab Sample ID: 480-17392-1

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Free Liquid	passed				mL/100g	1		9095A	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	5500		590	28	ug/Kg	5	☼	8260B	Total/NA
Ethylbenzene	6900		590	170	ug/Kg	5	☼	8260B	Total/NA
Isopropylbenzene	710		590	88	ug/Kg	5	☼	8260B	Total/NA
Styrene	11000		590	140	ug/Kg	5	☼	8260B	Total/NA
Toluene	12000		590	160	ug/Kg	5	☼	8260B	Total/NA
Xylenes, Total	19000		1200	99	ug/Kg	5	☼	8260B	Total/NA
2-Methylnaphthalene	29000		1000	12	ug/Kg	5	☼	8270C	Total/NA
Acenaphthene	4200		1000	12	ug/Kg	5	☼	8270C	Total/NA
Acenaphthylene	10000		1000	8.3	ug/Kg	5	☼	8270C	Total/NA
Anthracene	5800		1000	26	ug/Kg	5	☼	8270C	Total/NA
Benzo(a)anthracene	3800		1000	18	ug/Kg	5	☼	8270C	Total/NA
Benzo(a)pyrene	2400		1000	24	ug/Kg	5	☼	8270C	Total/NA
Benzo(b)fluoranthene	1900		1000	20	ug/Kg	5	☼	8270C	Total/NA
Benzo(g,h,i)perylene	900	J	1000	12	ug/Kg	5	☼	8270C	Total/NA
Benzo(k)fluoranthene	800	J	1000	11	ug/Kg	5	☼	8270C	Total/NA
Biphenyl	2800		1000	63	ug/Kg	5	☼	8270C	Total/NA
Carbazole	340	J	1000	12	ug/Kg	5	☼	8270C	Total/NA
Chrysene	3600		1000	10	ug/Kg	5	☼	8270C	Total/NA
Dibenz(a,h)anthracene	300	J	1000	12	ug/Kg	5	☼	8270C	Total/NA
Dibenzofuran	1100		1000	11	ug/Kg	5	☼	8270C	Total/NA
Fluoranthene	6800		1000	15	ug/Kg	5	☼	8270C	Total/NA
Fluorene	6800		1000	23	ug/Kg	5	☼	8270C	Total/NA
Indeno(1,2,3-cd)pyrene	730	J	1000	28	ug/Kg	5	☼	8270C	Total/NA
Phenanthrene	22000		1000	21	ug/Kg	5	☼	8270C	Total/NA
Pyrene	8900		1000	6.6	ug/Kg	5	☼	8270C	Total/NA
Naphthalene - DL	52000		10000	170	ug/Kg	50	☼	8270C	Total/NA
GRO (C6-C10)	290		14	1.7	mg/Kg	10	☼	8015B	Total/NA
Diesel Range Organics [C10-C28]	640		200	60	mg/Kg	10	☼	8015B	Total/NA
Arsenic	3.7		2.6	0.52	mg/Kg	1	☼	6010B	Total/NA
Barium	51.9		0.66	0.14	mg/Kg	1	☼	6010B	Total/NA
Beryllium	0.55		0.26	0.037	mg/Kg	1	☼	6010B	Total/NA
Cadmium	0.093	J	0.26	0.039	mg/Kg	1	☼	6010B	Total/NA
Chromium	23.2		0.66	0.26	mg/Kg	1	☼	6010B	Total/NA
Copper	22.0		1.3	0.28	mg/Kg	1	☼	6010B	Total/NA
Lead	20.2		1.3	0.31	mg/Kg	1	☼	6010B	Total/NA
Nickel	15.7		6.6	0.30	mg/Kg	1	☼	6010B	Total/NA
Vanadium	44.7		0.66	0.14	mg/Kg	1	☼	6010B	Total/NA
Zinc	38.8	B	2.6	0.20	mg/Kg	1	☼	6010B	Total/NA
Mercury	0.035		0.024	0.0098	mg/Kg	1	☼	7471A	Total/NA

Client Sample ID: NGW1DW 031512W — Lab Sample ID: 480-17392-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0083	J	0.010	0.0056	mg/L	1		6010B	Total/NA
Chromium	0.031		0.0040	0.0010	mg/L	1		6010B	Total/NA
Lead	0.0095		0.0050	0.0030	mg/L	1		6010B	Total/NA
Total Organic Halides (TOX)	96.7		20.0	6.5	ug/L	1		9020	Total/NA
Total Dissolved Solids	590		100	40.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Flashpoint	>176.0		50.0	50.0	Degrees F	1		1010	Total/NA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Client Sample ID: NGW1DW 031512S

Lab Sample ID: 480-17392-1

Date Collected: 03/15/12 16:20
Date Received: 03/17/12 09:00

Matrix: Solid
Percent Solids: 82.2

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		590	160	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,1,2,2-Tetrachloroethane	ND		590	95	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		590	290	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,1,2-Trichloroethane	ND		590	120	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,1-Dichloroethane	ND		590	180	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,1-Dichloroethene	ND		590	200	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,2,4-Trichlorobenzene	ND		590	220	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,2-Dibromo-3-Chloropropane	ND		590	290	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,2-Dibromoethane	ND		590	22	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,2-Dichlorobenzene	ND		590	150	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,2-Dichloroethane	ND		590	240	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,2-Dichloropropane	ND		590	95	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,3-Dichlorobenzene	ND		590	160	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
1,4-Dichlorobenzene	ND		590	82	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
2-Butanone (MEK)	ND		2900	1700	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
2-Hexanone	ND		2900	1200	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
4-Methyl-2-pentanone (MIBK)	ND		2900	190	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Acetone	ND		2900	2400	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Acrylonitrile	ND		2900	1500	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Benzene	**5500**		590	28	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Bromodichloromethane	ND		590	120	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Bromoform	ND		590	290	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Bromomethane	ND		590	130	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Carbon disulfide	ND		590	270	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Carbon tetrachloride	ND		590	150	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Chlorobenzene	ND		590	78	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Chloroethane	ND		590	120	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Chloroform	ND		590	400	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Chloromethane	ND		590	140	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
cis-1,2-Dichloroethene	ND		590	160	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
cis-1,3-Dichloropropene	ND		590	140	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Cyclohexane	ND		590	130	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Dibromochloromethane	ND		590	280	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Dichlorodifluoromethane	ND		590	260	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Ethylbenzene	**6900**		590	170	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Isopropylbenzene	**710**		590	88	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Methyl acetate	ND		590	280	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Methyl tert-butyl ether	ND		590	220	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Methylcyclohexane	ND		590	270	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Methylene Chloride	ND		590	120	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Styrene	**11000**		590	140	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Tetrachloroethene	ND		590	79	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Toluene	**12000**		590	160	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
trans-1,2-Dichloroethene	ND		590	140	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
trans-1,3-Dichloropropene	ND		590	28	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Trichloroethene	ND		590	160	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Trichlorofluoromethane	ND		590	280	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Vinyl chloride	ND		590	200	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5
Xylenes, Total	**19000**		1200	99	ug/Kg	☼	03/22/12 13:09	03/22/12 15:22	5

Client Sample Results

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Client Sample ID: NGW1DW 031512S

Lab Sample ID: 480-17392-1

Date Collected: 03/15/12 16:20
Matrix: Solid
Date Received: 03/17/12 09:00
Percent Solids: 82.2

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*105*		*53 - 146*	*03/22/12 13:09*	*03/22/12 15:22*	*5*
4-Bromofluorobenzene (Surr)	*98*		*49 - 148*	*03/22/12 13:09*	*03/22/12 15:22*	*5*
Toluene-d8 (Surr)	*110*		*50 - 149*	*03/22/12 13:09*	*03/22/12 15:22*	*5*

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4,5-Trichlorophenol	ND		1000	220	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2,4,6-Trichlorophenol	ND		1000	67	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2,4-Dichlorophenol	ND		1000	53	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2,4-Dimethylphenol	ND		1000	270	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2,4-Dinitrophenol	ND		2000	360	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2,4-Dinitrotoluene	ND		1000	160	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2,6-Dinitrotoluene	ND		1000	250	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2-Chloronaphthalene	ND		1000	68	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2-Chlorophenol	ND		1000	52	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2-Methylnaphthalene	**29000**		1000	12	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2-Methylphenol	ND		1000	31	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2-Nitroaniline	ND		2000	330	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
2-Nitrophenol	ND		1000	46	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
3,3'-Dichlorobenzidine	ND		1000	890	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
3-Nitroaniline	ND		2000	230	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4,6-Dinitro-2-methylphenol	ND		2000	350	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Bromophenyl phenyl ether	ND		1000	320	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Chloro-3-methylphenol	ND		1000	42	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Chloroaniline	ND		1000	300	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Chlorophenyl phenyl ether	ND		1000	22	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Methylphenol	ND		2000	57	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Nitroaniline	ND		2000	110	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
4-Nitrophenol	ND		2000	250	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Acenaphthene	**4200**		1000	12	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Acenaphthylene	**10000**		1000	8.3	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Acetophenone	ND		1000	52	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Anthracene	**5800**		1000	26	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Atrazine	ND		1000	45	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Benzaldehyde	ND		1000	110	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Benzo(a)anthracene	**3800**		1000	18	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Benzo(a)pyrene	**2400**		1000	24	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Benzo(b)fluoranthene	**1900**		1000	20	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Benzo(g,h,i)perylene	**900**	**J**	1000	12	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Benzo(k)fluoranthene	**800**	**J**	1000	11	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Biphenyl	**2800**		1000	63	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
bis (2-chloroisopropyl) ether	ND		1000	110	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Bis(2-chloroethoxy)methane	ND		1000	55	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Bis(2-chloroethyl)ether	ND		1000	88	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Bis(2-ethylhexyl) phthalate	ND		1000	330	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Butyl benzyl phthalate	ND		1000	270	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Caprolactam	ND		1000	440	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Carbazole	**340**	**J**	1000	12	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Chrysene	**3600**		1000	10	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Dibenz(a,h)anthracene	**300**	**J**	1000	12	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Dibenzofuran	**1100**		1000	11	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Diethyl phthalate	ND		1000	31	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5

Client Sample ID: NGW1DW 031512S
Date Collected: 03/15/12 16:20
Date Received: 03/17/12 09:00

Lab Sample ID: 480-17392-1
Matrix: Solid
Percent Solids: 82.2

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dimethyl phthalate	ND		1000	26	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Di-n-butyl phthalate	ND		1000	350	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Di-n-octyl phthalate	ND		1000	24	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Fluoranthene	**6800**		1000	15	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Fluorene	**6800**		1000	23	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Hexachlorobenzene	ND		1000	50	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Hexachlorobutadiene	ND		1000	52	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Hexachlorocyclopentadiene	ND		1000	310	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Hexachloroethane	ND		1000	79	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Indeno(1,2,3-cd)pyrene	**730**	**J**	1000	28	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Isophorone	ND		1000	51	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Nitrobenzene	ND		1000	45	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
N-Nitrosodi-n-propylamine	ND		1000	80	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
N-Nitrosodiphenylamine	ND		1000	55	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Pentachlorophenol	ND		2000	350	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Phenanthrene	**22000**		1000	21	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Phenol	ND		1000	110	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Pyrene	**8900**		1000	6.6	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5
Pyridine	ND		2000	570	ug/Kg	☼	03/19/12 08:58	03/19/12 18:56	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*92*		*39 - 146*	*03/19/12 08:58*	*03/19/12 18:56*	*5*
2-Fluorobiphenyl	*90*		*37 - 120*	*03/19/12 08:58*	*03/19/12 18:56*	*5*
2-Fluorophenol	*68*		*18 - 120*	*03/19/12 08:58*	*03/19/12 18:56*	*5*
Nitrobenzene-d5	*86*		*34 - 132*	*03/19/12 08:58*	*03/19/12 18:56*	*5*
Phenol-d5	*78*		*11 - 120*	*03/19/12 08:58*	*03/19/12 18:56*	*5*
p-Terphenyl-d14	*94*		*65 - 153*	*03/19/12 08:58*	*03/19/12 18:56*	*5*

Method: 8270C - Semivolatile Organic Compounds (GC/MS) - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	**52000**		10000	170	ug/Kg	☼	03/19/12 08:58	03/21/12 17:52	50

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*0*	*X*	*39 - 146*	*03/19/12 08:58*	*03/21/12 17:52*	*50*
2-Fluorobiphenyl	*76*		*37 - 120*	*03/19/12 08:58*	*03/21/12 17:52*	*50*
2-Fluorophenol	*38*		*18 - 120*	*03/19/12 08:58*	*03/21/12 17:52*	*50*
Nitrobenzene-d5	*44*		*34 - 132*	*03/19/12 08:58*	*03/21/12 17:52*	*50*
Phenol-d5	*58*		*11 - 120*	*03/19/12 08:58*	*03/21/12 17:52*	*50*
p-Terphenyl-d14	*85*		*65 - 153*	*03/19/12 08:58*	*03/21/12 17:52*	*50*

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C6-C10)	**290**		14	1.7	mg/Kg	☼	03/19/12 09:35	03/19/12 14:14	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*97*		*46 - 156*	*03/19/12 09:35*	*03/19/12 14:14*	*10*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	**640**		200	60	mg/Kg	☼	03/19/12 18:13	03/20/12 14:09	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*235*	*X*	*48 - 119*	*03/19/12 18:13*	*03/20/12 14:09*	*10*

Client Sample ID: NGW1DW 031512S — Lab Sample ID: 480-17392-1

Date Collected: 03/15/12 16:20 — **Matrix: Solid**
Date Received: 03/17/12 09:00 — **Percent Solids: 82.2**

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		250	49	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1221	ND		250	49	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1232	ND		250	49	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1242	ND		250	55	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1248	ND		250	49	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1254	ND		250	53	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1260	ND		250	120	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1262	ND		250	53	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1
PCB-1268	ND		250	53	ug/Kg	☼	03/19/12 12:03	03/20/12 19:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*117*		*36 - 182*	*03/19/12 12:03*	*03/20/12 19:15*	*1*
Tetrachloro-m-xylene	*95*		*24 - 172*	*03/19/12 12:03*	*03/20/12 19:15*	*1*

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		19.7	0.71	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Arsenic	**3.7**		2.6	0.52	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Barium	**51.9**		0.66	0.14	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Beryllium	**0.55**		0.26	0.037	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Cadmium	**0.093**	**J**	0.26	0.039	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Chromium	**23.2**		0.66	0.26	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Copper	**22.0**		1.3	0.28	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Lead	**20.2**		1.3	0.31	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Nickel	**15.7**		6.6	0.30	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Selenium	ND		5.2	0.75	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Silver	ND		0.66	0.26	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Thallium	ND		7.9	0.39	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Vanadium	**44.7**		0.66	0.14	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1
Zinc	**38.8**	**B**	2.6	0.20	mg/Kg	☼	03/22/12 10:50	03/22/12 18:04	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.035**		0.024	0.0098	mg/Kg	☼	03/19/12 08:45	03/19/12 13:04	1

General Chemistry

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Free Liquid	**passed**				mL/100g			03/27/12 12:51	1

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Total Sulfur	ND		0.111		%			03/27/12 14:20	1

Client Sample ID: NGW1DW 031512W — Lab Sample ID: 480-17392-2

Date Collected: 03/15/12 16:40 — **Matrix: Water**
Date Received: 03/17/12 09:00

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		0.53	0.19	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1221	ND		0.53	0.19	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1232	ND		0.53	0.19	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1242	ND		0.53	0.19	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1248	ND		0.53	0.19	ug/L		03/20/12 08:02	03/20/12 18:54	1

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Client Sample ID: NGW1DW 031512W
Date Collected: 03/15/12 16:40
Date Received: 03/17/12 09:00

Lab Sample ID: 480-17392-2
Matrix: Water

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1254	ND		0.53	0.27	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1260	ND		0.53	0.27	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1262	ND		0.53	0.27	ug/L		03/20/12 08:02	03/20/12 18:54	1
PCB-1268	ND		0.53	0.27	ug/L		03/20/12 08:02	03/20/12 18:54	1
Polychlorinated biphenyls, Total	ND		0.53	0.27	ug/L		03/20/12 08:02	03/20/12 18:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*15*	*X*	*19 - 112*	*03/20/12 08:02*	*03/20/12 18:54*	*1*
Tetrachloro-m-xylene	*70*		*23 - 127*	*03/20/12 08:02*	*03/20/12 18:54*	*1*

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0083**	**J**	0.010	0.0056	mg/L		03/21/12 08:40	03/21/12 22:16	1
Cadmium	ND		0.0010	0.00050	mg/L		03/21/12 08:40	03/21/12 22:16	1
Chromium	**0.031**		0.0040	0.0010	mg/L		03/21/12 08:40	03/21/12 22:16	1
Lead	**0.0095**		0.0050	0.0030	mg/L		03/21/12 08:40	03/21/12 22:16	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Halides (TOX)	**96.7**		20.0	6.5	ug/L			03/21/12 05:14	1
Total Dissolved Solids	**590**		100	40.0	mg/L			03/19/12 22:56	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint	**>176.0**		50.0	50.0	Degrees F			03/20/12 14:12	1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		12DCE	BFB	TOL
Lab Sample ID	Client Sample ID	(53-146)	(49-148)	(50-149)
480-17392-1	NGW1DW 031512S	105	98	110
LCS 480-56351/3-A	Lab Control Sample	106	104	114
MB 480-56351/4-A	Method Blank	108	99	110

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)					
		TBP	FBP	2FP	NBZ	PHL	TPH
Lab Sample ID	Client Sample ID	(39-146)	(37-120)	(18-120)	(34-132)	(11-120)	(65-153)
480-17392-1	NGW1DW 031512S	92	90	68	86	78	94
480-17392-1 - DL	NGW1DW 031512S	0 X	76	38	44	58	85
LCS 480-55759/2-A	Lab Control Sample	114	103	86	97	92	119
LCSD 480-55759/3-A	Lab Control Sample Dup	115	100	87	99	94	119
MB 480-55759/1-A	Method Blank	97	79	60	69	63	116

Surrogate Legend

TBP = 2,4,6-Tribromophenol
FBP = 2-Fluorobiphenyl
2FP = 2-Fluorophenol
NBZ = Nitrobenzene-d5
PHL = Phenol-d5
TPH = p-Terphenyl-d14

Method: 8015B - Gasoline Range Organics - (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
		TFT2
Lab Sample ID	Client Sample ID	(46-156)
480-17392-1	NGW1DW 031512S	97
LCS 480-55768/2-A	Lab Control Sample	111
MB 480-55768/1-A	Method Blank	88

Surrogate Legend

TFT = a,a,a-Trifluorotoluene

Method: 8015B - Diesel Range Organics (DRO) (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
		OTPH1
Lab Sample ID	Client Sample ID	(48-119)
480-17392-1	NGW1DW 031512S	235 X
LCS 480-55867/2-A	Lab Control Sample	103
LCSD 480-55867/3-A	Lab Control Sample Dup	107
MB 480-55867/1-A	Method Blank	89

Client: URS Corporation | TestAmerica Job ID: 480-17392-1
Project/Site: Williamsburg

Surrogate Legend

OTPH = o-Terphenyl

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB2	TCX2
Lab Sample ID	Client Sample ID	(36-182)	(24-172)
480-17392-1	NGW1DW 031512S	117	95

Surrogate Legend

DCB = DCB Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB1	TCX1
Lab Sample ID	Client Sample ID	(19-112)	(23-127)
480-17392-2	NGW1DW 031512W	15 X	70
LCS 480-55904/2-A	Lab Control Sample	67	83
LCSD 480-55904/3-A	Lab Control Sample Dup	71	93
MB 480-55904/1-A	Method Blank	80	73

Surrogate Legend

DCB = DCB Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 480-56351/4-A
Matrix: Solid
Analysis Batch: 56296

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 56351

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		97	27	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,1,2,2-Tetrachloroethane	ND		97	16	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		97	49	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,1,2-Trichloroethane	ND		97	20	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,1-Dichloroethane	ND		97	30	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,1-Dichloroethene	ND		97	34	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,2,4-Trichlorobenzene	ND		97	37	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,2-Dibromo-3-Chloropropane	ND		97	49	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,2-Dibromoethane	ND		97	3.7	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,2-Dichlorobenzene	ND		97	25	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,2-Dichloroethane	ND		97	40	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,2-Dichloropropane	ND		97	16	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,3-Dichlorobenzene	ND		97	26	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
1,4-Dichlorobenzene	ND		97	14	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
2-Butanone (MEK)	ND		490	290	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
2-Hexanone	ND		490	200	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
4-Methyl-2-pentanone (MIBK)	ND		490	31	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Acetone	ND		490	400	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Acrylonitrile	ND		490	240	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Benzene	ND		97	4.7	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Bromodichloromethane	ND		97	19	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Bromoform	ND		97	49	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Bromomethane	ND		97	21	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Carbon disulfide	ND		97	44	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Carbon tetrachloride	ND		97	25	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Chlorobenzene	ND		97	13	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Chloroethane	ND		97	20	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Chloroform	ND		97	67	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Chloromethane	ND		97	23	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
cis-1,2-Dichloroethene	ND		97	27	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
cis-1,3-Dichloropropene	ND		97	23	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Cyclohexane	ND		97	22	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Dibromochloromethane	ND		97	47	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Dichlorodifluoromethane	ND		97	42	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Ethylbenzene	ND		97	28	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Isopropylbenzene	ND		97	15	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Methyl acetate	ND		97	46	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Methyl tert-butyl ether	ND		97	37	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Methylcyclohexane	ND		97	46	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Methylene Chloride	ND		97	19	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Styrene	ND		97	23	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Tetrachloroethene	ND		97	13	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Toluene	ND		97	26	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
trans-1,2-Dichloroethene	ND		97	23	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
trans-1,3-Dichloropropene	ND		97	4.7	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Trichloroethene	ND		97	27	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Trichlorofluoromethane	ND		97	46	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Vinyl chloride	ND		97	33	ug/Kg		03/22/12 13:09	03/22/12 14:43	1
Xylenes, Total	ND		190	16	ug/Kg		03/22/12 13:09	03/22/12 14:43	1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 480-56351/4-A
Matrix: Solid
Analysis Batch: 56296

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 56351

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	108		53 - 146	03/22/12 13:09	03/22/12 14:43	1
4-Bromofluorobenzene (Surr)	99		49 - 148	03/22/12 13:09	03/22/12 14:43	1
Toluene-d8 (Surr)	110		50 - 149	03/22/12 13:09	03/22/12 14:43	1

Lab Sample ID: LCS 480-56351/3-A
Matrix: Solid
Analysis Batch: 56296

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 56351

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethane	2490	3060		ug/Kg		123	
1,1-Dichloroethene	2490	2960		ug/Kg		119	54 - 144
1,2-Dichlorobenzene	2490	3020		ug/Kg		121	
1,2-Dichloroethane	2490	2900		ug/Kg		116	
Benzene	2490	3060		ug/Kg		123	75 - 131
Chlorobenzene	2490	3090		ug/Kg		124	80 - 127
cis-1,2-Dichloroethene	2490	2920		ug/Kg		117	
Ethylbenzene	2490	3210		ug/Kg		129	
Methyl tert-butyl ether	2490	2900		ug/Kg		116	
Tetrachloroethene	2490	3060		ug/Kg		123	
Toluene	2490	3100		ug/Kg		124	76 - 133
trans-1,2-Dichloroethene	2490	3120		ug/Kg		125	
Trichloroethene	2490	3040		ug/Kg		122	77 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	106		53 - 146
4-Bromofluorobenzene (Surr)	104		49 - 148
Toluene-d8 (Surr)	114		50 - 149

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 480-55759/1-A
Matrix: Solid
Analysis Batch: 55811

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 55759

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4,5-Trichlorophenol	ND		170	37	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2,4,6-Trichlorophenol	ND		170	11	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2,4-Dichlorophenol	ND		170	8.8	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2,4-Dimethylphenol	ND		170	45	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2,4-Dinitrophenol	ND		330	59	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2,4-Dinitrotoluene	ND		170	26	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2,6-Dinitrotoluene	ND		170	41	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2-Chloronaphthalene	ND		170	11	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2-Chlorophenol	ND		170	8.6	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2-Methylnaphthalene	ND		170	2.0	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2-Methylphenol	ND		170	5.2	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2-Nitroaniline	ND		330	54	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
2-Nitrophenol	ND		170	7.7	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
3,3'-Dichlorobenzidine	ND		170	150	ug/Kg		03/19/12 08:58	03/19/12 15:12	1

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 480-55759/1-A
Matrix: Solid
Analysis Batch: 55811

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 55759

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
3-Nitroaniline	ND		330	39	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4,6-Dinitro-2-methylphenol	ND		330	58	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Bromophenyl phenyl ether	ND		170	53	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Chloro-3-methylphenol	ND		170	6.9	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Chloroaniline	ND		170	49	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Chlorophenyl phenyl ether	ND		170	3.6	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Methylphenol	ND		330	9.4	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Nitroaniline	ND		330	19	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
4-Nitrophenol	ND		330	41	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Acenaphthene	ND		170	2.0	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Acenaphthylene	ND		170	1.4	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Acetophenone	ND		170	8.6	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Anthracene	ND		170	4.3	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Atrazine	ND		170	7.5	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Benzaldehyde	ND		170	18	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Benzo(a)anthracene	ND		170	2.9	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Benzo(a)pyrene	ND		170	4.0	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Benzo(b)fluoranthene	ND		170	3.3	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Benzo(g,h,i)perylene	ND		170	2.0	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Benzo(k)fluoranthene	ND		170	1.8	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Biphenyl	ND		170	10	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
bis (2-chloroisopropyl) ether	ND		170	18	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Bis(2-chloroethoxy)methane	ND		170	9.1	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Bis(2-chloroethyl)ether	ND		170	15	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Bis(2-ethylhexyl) phthalate	ND		170	54	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Butyl benzyl phthalate	ND		170	45	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Caprolactam	ND		170	73	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Carbazole	ND		170	1.9	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Chrysene	ND		170	1.7	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Dibenz(a,h)anthracene	ND		170	2.0	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Dibenzofuran	ND		170	1.7	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Diethyl phthalate	ND		170	5.1	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Dimethyl phthalate	ND		170	4.4	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Di-n-butyl phthalate	ND		170	58	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Di-n-octyl phthalate	ND		170	3.9	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Fluoranthene	ND		170	2.4	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Fluorene	ND		170	3.9	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Hexachlorobenzene	ND		170	8.3	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Hexachlorobutadiene	ND		170	8.6	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Hexachlorocyclopentadiene	ND		170	51	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Hexachloroethane	ND		170	13	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Indeno(1,2,3-cd)pyrene	ND		170	4.6	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Isophorone	ND		170	8.4	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Naphthalene	ND		170	2.8	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Nitrobenzene	ND		170	7.4	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
N-Nitrosodi-n-propylamine	ND		170	13	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
N-Nitrosodiphenylamine	ND		170	9.2	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Pentachlorophenol	ND		330	58	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Phenanthrene	ND		170	3.5	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Phenol	ND		170	18	ug/Kg		03/19/12 08:58	03/19/12 15:12	1

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 480-55759/1-A
Matrix: Solid
Analysis Batch: 55811

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 55759

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pyrene	ND		170	1.1	ug/Kg		03/19/12 08:58	03/19/12 15:12	1
Pyridine	ND		330	95	ug/Kg		03/19/12 08:58	03/19/12 15:12	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol	*97*		*39 - 146*	*03/19/12 08:58*	*03/19/12 15:12*	*1*
2-Fluorobiphenyl	*79*		*37 - 120*	*03/19/12 08:58*	*03/19/12 15:12*	*1*
2-Fluorophenol	*60*		*18 - 120*	*03/19/12 08:58*	*03/19/12 15:12*	*1*
Nitrobenzene-d5	*69*		*34 - 132*	*03/19/12 08:58*	*03/19/12 15:12*	*1*
Phenol-d5	*63*		*11 - 120*	*03/19/12 08:58*	*03/19/12 15:12*	*1*
p-Terphenyl-d14	*116*		*65 - 153*	*03/19/12 08:58*	*03/19/12 15:12*	*1*

Lab Sample ID: LCS 480-55759/2-A
Matrix: Solid
Analysis Batch: 55811

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 55759

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,4-Dinitrotoluene	3300	3750		ug/Kg		114	55 - 125
2-Chlorophenol	3300	2920		ug/Kg		88	38 - 120
4-Chloro-3-methylphenol	3300	3360		ug/Kg		102	49 - 125
4-Nitrophenol	3300	3850		ug/Kg		117	43 - 137
Acenaphthene	3300	3470		ug/Kg		105	53 - 120
Bis(2-ethylhexyl) phthalate	3300	3730		ug/Kg		113	61 - 133
Fluorene	3300	3690		ug/Kg		112	63 - 126
Hexachloroethane	3300	2740		ug/Kg		83	41 - 120
N-Nitrosodi-n-propylamine	3300	3470		ug/Kg		105	46 - 120
Pentachlorophenol	3300	3480		ug/Kg		105	33 - 136
Phenol	3300	3040		ug/Kg		92	36 - 120
Pyrene	3300	3610		ug/Kg		109	51 - 133

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2,4,6-Tribromophenol	*114*		*39 - 146*
2-Fluorobiphenyl	*103*		*37 - 120*
2-Fluorophenol	*86*		*18 - 120*
Nitrobenzene-d5	*97*		*34 - 132*
Phenol-d5	*92*		*11 - 120*
p-Terphenyl-d14	*119*		*65 - 153*

Lab Sample ID: LCSD 480-55759/3-A
Matrix: Solid
Analysis Batch: 55811

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 55759

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2,4-Dinitrotoluene	3280	3670		ug/Kg		112	55 - 125	2	20
2-Chlorophenol	3280	2880		ug/Kg		88	38 - 120	1	25
4-Chloro-3-methylphenol	3280	3450		ug/Kg		105	49 - 125	3	27
4-Nitrophenol	3280	3780		ug/Kg		115	43 - 137	2	25
Acenaphthene	3280	3410		ug/Kg		104	53 - 120	2	35
Bis(2-ethylhexyl) phthalate	3280	3800		ug/Kg		116	61 - 133	2	15
Fluorene	3280	3620		ug/Kg		110	63 - 126	2	15

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 480-55759/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 55811 — **Prep Batch: 55759**

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Hexachloroethane			3280	2800		ug/Kg		85	41 - 120	2	46
N-Nitrosodi-n-propylamine			3280	3400		ug/Kg		103	46 - 120	2	31
Pentachlorophenol			3280	3520		ug/Kg		107	33 - 136	1	35
Phenol			3280	3080		ug/Kg		94	36 - 120	1	35
Pyrene			3280	3640		ug/Kg		111	51 - 133	1	35

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2,4,6-Tribromophenol	*115*		*39 - 146*
2-Fluorobiphenyl	*100*		*37 - 120*
2-Fluorophenol	*87*		*18 - 120*
Nitrobenzene-d5	*99*		*34 - 132*
Phenol-d5	*94*		*11 - 120*
p-Terphenyl-d14	*119*		*65 - 153*

Method: 8015B - Gasoline Range Organics - (GC)

Lab Sample ID: MB 480-55768/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 55769 — **Prep Batch: 55768**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
GRO (C6-C10)	ND		1.3	0.15	mg/Kg		03/19/12 09:35	03/19/12 10:41	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*88*		*46 - 156*	*03/19/12 09:35*	*03/19/12 10:41*	*1*

Lab Sample ID: LCS 480-55768/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 55769 — **Prep Batch: 55768**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
GRO (C6-C10)			9.78	8.48		mg/Kg		87	66 - 143

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
a,a,a-Trifluorotoluene	*111*		*46 - 156*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 480-55867/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 55894 — **Prep Batch: 55867**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		16	4.9	mg/Kg		03/19/12 18:13	03/20/12 08:45	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*89*		*48 - 119*	*03/19/12 18:13*	*03/20/12 08:45*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC) (Continued)

Lab Sample ID: LCS 480-55867/2-A
Matrix: Solid
Analysis Batch: 55894

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 55867

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics [C10-C28]	49.5	51.9		mg/Kg		105	48 - 135

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*103*		*48 - 119*

Lab Sample ID: LCSD 480-55867/3-A
Matrix: Solid
Analysis Batch: 55894

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 55867

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Range Organics [C10-C28]	49.6	53.1		mg/Kg		107	48 - 135	2	35

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*107*		*48 - 119*

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 480-55904/1-A
Matrix: Water
Analysis Batch: 56043

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 55904

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	ND		0.50	0.18	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1221	ND		0.50	0.18	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1232	ND		0.50	0.18	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1242	ND		0.50	0.18	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1248	ND		0.50	0.18	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1254	ND		0.50	0.25	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1260	ND		0.50	0.25	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1262	ND		0.50	0.25	ug/L		03/20/12 08:02	03/20/12 17:51	1
PCB-1268	ND		0.50	0.25	ug/L		03/20/12 08:02	03/20/12 17:51	1
Polychlorinated biphenyls, Total	ND		0.50	0.25	ug/L		03/20/12 08:02	03/20/12 17:51	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*80*		*19 - 112*	*03/20/12 08:02*	*03/20/12 17:51*	*1*
Tetrachloro-m-xylene	*73*		*23 - 127*	*03/20/12 08:02*	*03/20/12 17:51*	*1*

Lab Sample ID: LCS 480-55904/2-A
Matrix: Water
Analysis Batch: 56043

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 55904

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
PCB-1016	5.00	4.66		ug/L		93	61 - 116
PCB-1260	5.00	4.87		ug/L		97	45 - 110

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Lab Sample ID: LCS 480-55904/2-A
Matrix: Water
Analysis Batch: 56043

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 55904

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
DCB Decachlorobiphenyl	*67*		*19 - 112*
Tetrachloro-m-xylene	*83*		*23 - 127*

Lab Sample ID: LCSD 480-55904/3-A
Matrix: Water
Analysis Batch: 56043

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 55904

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
PCB-1016	5.00	4.76		ug/L		95	61 - 116	2	50
PCB-1260	5.00	5.13		ug/L		103	45 - 110	5	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
DCB Decachlorobiphenyl	*71*		*19 - 112*
Tetrachloro-m-xylene	*93*		*23 - 127*

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 480-56033/1-A
Matrix: Water
Analysis Batch: 56287

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 56033

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.010	0.0056	mg/L		03/21/12 08:40	03/21/12 20:54	1
Cadmium	ND		0.0010	0.00050	mg/L		03/21/12 08:40	03/21/12 20:54	1
Chromium	ND		0.0040	0.0010	mg/L		03/21/12 08:40	03/21/12 20:54	1
Lead	ND		0.0050	0.0030	mg/L		03/21/12 08:40	03/21/12 20:54	1

Lab Sample ID: LCS 480-56033/2-A
Matrix: Water
Analysis Batch: 56287

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 56033

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.200	0.207		mg/L		103	80 - 120
Cadmium	0.200	0.199		mg/L		100	80 - 120
Chromium	0.200	0.196		mg/L		98	80 - 120
Lead	0.200	0.195		mg/L		98	80 - 120

Lab Sample ID: MB 480-56277/1-A
Matrix: Solid
Analysis Batch: 56475

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 56277

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		14.0	0.50	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Arsenic	ND		1.9	0.37	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Barium	ND		0.47	0.10	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Beryllium	ND		0.19	0.026	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Cadmium	ND		0.19	0.028	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Chromium	ND		0.47	0.19	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Copper	ND		0.93	0.20	mg/Kg		03/22/12 10:50	03/22/12 14:56	1

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: MB 480-56277/1-A
Matrix: Solid
Analysis Batch: 56475

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 56277

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.93	0.22	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Nickel	ND		4.7	0.21	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Selenium	ND		3.7	0.53	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Silver	ND		0.47	0.19	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Thallium	ND		5.6	0.28	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Vanadium	ND		0.47	0.10	mg/Kg		03/22/12 10:50	03/22/12 14:56	1
Zinc	0.209	J	1.9	0.14	mg/Kg		03/22/12 10:50	03/22/12 14:56	1

Lab Sample ID: LCSSRM 480-56277/2-A
Matrix: Solid
Analysis Batch: 56475

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 56277

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	106	93.33		mg/Kg		88	25 - 275
Arsenic	109	110.3		mg/Kg		101	70 - 134
Barium	206	204.3		mg/Kg		99	73 - 127
Beryllium	88.1	89.48		mg/Kg		102	74 - 126
Cadmium	80.1	79.90		mg/Kg		100	73 - 127
Chromium	117	111.8		mg/Kg		96	70 - 130
Copper	117	120.3		mg/Kg		103	75 - 125
Lead	76.1	77.03		mg/Kg		101	69 - 131
Nickel	71.1	72.86		mg/Kg		102	71 - 129
Selenium	127	129.0		mg/Kg		102	67 - 134
Silver	40.9	41.67		mg/Kg		102	66 - 134
Thallium	266	276.0		mg/Kg		104	70 - 130
Vanadium	86.0	82.25		mg/Kg		96	63 - 137
Zinc	280	260.3		mg/Kg		93	71 - 129

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 480-55733/1-A
Matrix: Solid
Analysis Batch: 55804

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 55733

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.0081	mg/Kg		03/19/12 08:45	03/19/12 12:25	1

Lab Sample ID: LCSSRM 480-55733/2-A
Matrix: Solid
Analysis Batch: 55804

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 55733

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	3.78	3.40		mg/Kg		90	51 - 149

Lab Sample ID: 480-17392-1 MS
Matrix: Solid
Analysis Batch: 55804

Client Sample ID: NGW1DW 031512S
Prep Type: Total/NA
Prep Batch: 55733

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.035		0.400	0.439		mg/Kg	☼	101	75 - 125

Method: 7471A - Mercury (CVAA) (Continued)

Lab Sample ID: 480-17392-1 MSD
Matrix: Solid
Analysis Batch: 55804

Client Sample ID: NGW1DW 031512S
Prep Type: Total/NA
Prep Batch: 55733

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.035		0.399	0.429		mg/Kg	☼	99	75 - 125	2	20

Method: 1010 - Ignitability, Pensky-Martens Closed-Cup Method

Lab Sample ID: LCS 480-56039/1
Matrix: Water
Analysis Batch: 56039

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Flashpoint	81.0	80.00		Degrees F		99	97.5 - 102.5

Lab Sample ID: 480-17392-2 DU
Matrix: Water
Analysis Batch: 56039

Client Sample ID: NGW1DW 031512W
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Flashpoint	>176.0		>176.0		Degrees F		NC	

Method: 9020 - Organic Halides, Total (TOX)

Lab Sample ID: MB 480-55956/1
Matrix: Water
Analysis Batch: 55956

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Halides (TOX)	ND		20.0	6.5	ug/L			03/20/12 10:53	1

Lab Sample ID: LCS 480-55956/2
Matrix: Water
Analysis Batch: 55956

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Halides (TOX)	100	114.8		ug/L		115	75 - 125

Lab Sample ID: 480-17392-2 MS
Matrix: Water
Analysis Batch: 55956

Client Sample ID: NGW1DW 031512W
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Halides (TOX)	96.7		100	174.8		ug/L		78	75 - 125

Method: 9095A - Paint Filter

Lab Sample ID: 480-17392-1 DU
Matrix: Solid
Analysis Batch: 56934

Client Sample ID: NGW1DW 031512S
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Free Liquid	passed		passed		mL/100g		NC	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 480-55883/1
Matrix: Water
Analysis Batch: 55883

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10.0	4.0	mg/L			03/19/12 22:41	1

Lab Sample ID: LCS 480-55883/2
Matrix: Water
Analysis Batch: 55883

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	503	507.0		mg/L		101	85 - 115

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

GC/MS VOA

Analysis Batch: 56296

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	8260B	56351
LCS 480-56351/3-A	Lab Control Sample	Total/NA	Solid	8260B	56351
MB 480-56351/4-A	Method Blank	Total/NA	Solid	8260B	56351

Prep Batch: 56351

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	5030B	
LCS 480-56351/3-A	Lab Control Sample	Total/NA	Solid	5030B	
MB 480-56351/4-A	Method Blank	Total/NA	Solid	5030B	

GC/MS Semi VOA

Prep Batch: 55759

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	3550B	
480-17392-1 - DL	NGW1DW 031512S	Total/NA	Solid	3550B	
LCS 480-55759/2-A	Lab Control Sample	Total/NA	Solid	3550B	
LCSD 480-55759/3-A	Lab Control Sample Dup	Total/NA	Solid	3550B	
MB 480-55759/1-A	Method Blank	Total/NA	Solid	3550B	

Analysis Batch: 55811

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	8270C	55759
LCS 480-55759/2-A	Lab Control Sample	Total/NA	Solid	8270C	55759
LCSD 480-55759/3-A	Lab Control Sample Dup	Total/NA	Solid	8270C	55759
MB 480-55759/1-A	Method Blank	Total/NA	Solid	8270C	55759

Analysis Batch: 56130

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1 - DL	NGW1DW 031512S	Total/NA	Solid	8270C	55759

GC VOA

Prep Batch: 55768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	5030B	
LCS 480-55768/2-A	Lab Control Sample	Total/NA	Solid	5030B	
MB 480-55768/1-A	Method Blank	Total/NA	Solid	5030B	

Analysis Batch: 55769

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	8015B	55768
LCS 480-55768/2-A	Lab Control Sample	Total/NA	Solid	8015B	55768
MB 480-55768/1-A	Method Blank	Total/NA	Solid	8015B	55768

GC Semi VOA

Prep Batch: 55796

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	3550B	

GC Semi VOA (Continued)

Prep Batch: 55867

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	3550B	
LCS 480-55867/2-A	Lab Control Sample	Total/NA	Solid	3550B	
LCSD 480-55867/3-A	Lab Control Sample Dup	Total/NA	Solid	3550B	
MB 480-55867/1-A	Method Blank	Total/NA	Solid	3550B	

Analysis Batch: 55894

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	8015B	55867
LCS 480-55867/2-A	Lab Control Sample	Total/NA	Solid	8015B	55867
LCSD 480-55867/3-A	Lab Control Sample Dup	Total/NA	Solid	8015B	55867
MB 480-55867/1-A	Method Blank	Total/NA	Solid	8015B	55867

Analysis Batch: 55897

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	8082	55796

Prep Batch: 55904

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	3510C	
LCS 480-55904/2-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 480-55904/3-A	Lab Control Sample Dup	Total/NA	Water	3510C	
MB 480-55904/1-A	Method Blank	Total/NA	Water	3510C	

Analysis Batch: 56043

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	8082	55904
LCS 480-55904/2-A	Lab Control Sample	Total/NA	Water	8082	55904
LCSD 480-55904/3-A	Lab Control Sample Dup	Total/NA	Water	8082	55904
MB 480-55904/1-A	Method Blank	Total/NA	Water	8082	55904

Metals

Prep Batch: 55733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	7471A	
480-17392-1 MS	NGW1DW 031512S	Total/NA	Solid	7471A	
480-17392-1 MSD	NGW1DW 031512S	Total/NA	Solid	7471A	
LCSSRM 480-55733/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 480-55733/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 55804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	7471A	55733
480-17392-1 MS	NGW1DW 031512S	Total/NA	Solid	7471A	55733
480-17392-1 MSD	NGW1DW 031512S	Total/NA	Solid	7471A	55733
LCSSRM 480-55733/2-A	Lab Control Sample	Total/NA	Solid	7471A	55733
MB 480-55733/1-A	Method Blank	Total/NA	Solid	7471A	55733

Prep Batch: 56033

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	3005A	
LCS 480-56033/2-A	Lab Control Sample	Total/NA	Water	3005A	

Metals (Continued)

Prep Batch: 56033 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 480-56033/1-A	Method Blank	Total/NA	Water	3005A	

Prep Batch: 56277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	3050B	
LCSSRM 480-56277/2-A	Lab Control Sample	Total/NA	Solid	3050B	
MB 480-56277/1-A	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 56287

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	6010B	56033
LCS 480-56033/2-A	Lab Control Sample	Total/NA	Water	6010B	56033
MB 480-56033/1-A	Method Blank	Total/NA	Water	6010B	56033

Analysis Batch: 56475

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	6010B	56277
LCSSRM 480-56277/2-A	Lab Control Sample	Total/NA	Solid	6010B	56277
MB 480-56277/1-A	Method Blank	Total/NA	Solid	6010B	56277

General Chemistry

Analysis Batch: 55779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	Moisture	

Analysis Batch: 55883

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	SM 2540C	
LCS 480-55883/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-55883/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 55956

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	9020	
480-17392-2 MS	NGW1DW 031512W	Total/NA	Water	9020	
LCS 480-55956/2	Lab Control Sample	Total/NA	Water	9020	
MB 480-55956/1	Method Blank	Total/NA	Water	9020	

Analysis Batch: 56039

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-2	NGW1DW 031512W	Total/NA	Water	1010	
480-17392-2 DU	NGW1DW 031512W	Total/NA	Water	1010	
LCS 480-56039/1	Lab Control Sample	Total/NA	Water	1010	

Analysis Batch: 56934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	9095A	
480-17392-1 DU	NGW1DW 031512S	Total/NA	Solid	9095A	

General Chemistry (Continued)

Analysis Batch: 57217

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-17392-1	NGW1DW 031512S	Total/NA	Solid	D129	

Client Sample ID: NGW1DW 031512S
Date Collected: 03/15/12 16:20
Date Received: 03/17/12 09:00

Lab Sample ID: 480-17392-1
Matrix: Solid
Percent Solids: 82.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			56351	03/22/12 13:09	LH	TAL BUF
Total/NA	Analysis	8260B		5	56296	03/22/12 15:22	DC	TAL BUF
Total/NA	Prep	3550B			55759	03/19/12 08:58	CM	TAL BUF
Total/NA	Analysis	8270C		5	55811	03/19/12 18:56	HTL	TAL BUF
Total/NA	Prep	3550B	DL		55759	03/19/12 08:58	CM	TAL BUF
Total/NA	Analysis	8270C	DL	50	56130	03/21/12 17:52	HTL	TAL BUF
Total/NA	Prep	5030B			55768	03/19/12 09:35	LW	TAL BUF
Total/NA	Analysis	8015B		10	55769	03/19/12 14:14	LW	TAL BUF
Total/NA	Prep	3550B			55867	03/19/12 18:13	DE	TAL BUF
Total/NA	Analysis	8015B		10	55894	03/20/12 14:09	CD	TAL BUF
Total/NA	Prep	3550B			55796	03/19/12 12:03	CM	TAL BUF
Total/NA	Analysis	8082		1	55897	03/20/12 19:15	DB	TAL BUF
Total/NA	Prep	7471A			55733	03/19/12 08:45	JRK	TAL BUF
Total/NA	Analysis	7471A		1	55804	03/19/12 13:04	JM	TAL BUF
Total/NA	Prep	3050B			56277	03/22/12 10:50	SS	TAL BUF
Total/NA	Analysis	6010B		1	56475	03/22/12 18:04	AH	TAL BUF
Total/NA	Analysis	Moisture		1	55779	03/19/12 10:29	ZR	TAL BUF
Total/NA	Analysis	9095A		1	56934	03/27/12 12:51	KS	TAL BUF
Total/NA	Analysis	D129		1	57217	03/27/12 14:20	CTB	TAL NSH

Client Sample ID: NGW1DW 031512W
Date Collected: 03/15/12 16:40
Date Received: 03/17/12 09:00

Lab Sample ID: 480-17392-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			55904	03/20/12 08:02	TR	TAL BUF
Total/NA	Analysis	8082		1	56043	03/20/12 18:54	JM	TAL BUF
Total/NA	Prep	3005A			56033	03/21/12 08:40	SS	TAL BUF
Total/NA	Analysis	6010B		1	56287	03/21/12 22:16	LH	TAL BUF
Total/NA	Analysis	SM 2540C		1	55883	03/19/12 22:56	KS	TAL BUF
Total/NA	Analysis	9020		1	55956	03/21/12 05:14	JM	TAL BUF
Total/NA	Analysis	1010		1	56039	03/20/12 14:12	KS	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Certification Summary

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Buffalo	Arkansas DEQ	State Program	6	88-0686
TestAmerica Buffalo	California	NELAC	9	1169CA
TestAmerica Buffalo	Connecticut	State Program	1	PH-0568
TestAmerica Buffalo	Florida	NELAC	4	E87672
TestAmerica Buffalo	Georgia	State Program	4	956
TestAmerica Buffalo	Georgia	State Program	4	N/A
TestAmerica Buffalo	Illinois	NELAC	5	100325 / 200003
TestAmerica Buffalo	Iowa	State Program	7	374
TestAmerica Buffalo	Kansas	NELAC	7	E-10187
TestAmerica Buffalo	Kentucky	State Program	4	90029
TestAmerica Buffalo	Kentucky (UST)	State Program	4	30
TestAmerica Buffalo	Louisiana	NELAC	6	02031
TestAmerica Buffalo	Maine	State Program	1	NY0044
TestAmerica Buffalo	Maryland	State Program	3	294
TestAmerica Buffalo	Massachusetts	State Program	1	M-NY044
TestAmerica Buffalo	Michigan	State Program	5	9937
TestAmerica Buffalo	Minnesota	NELAC	5	036-999-337
TestAmerica Buffalo	New Hampshire	NELAC	1	2337
TestAmerica Buffalo	New Hampshire	NELAC	1	68-00281
TestAmerica Buffalo	New Jersey	NELAC	2	NY455
TestAmerica Buffalo	New York	NELAC	2	10026
TestAmerica Buffalo	North Dakota	State Program	8	R-176
TestAmerica Buffalo	Oklahoma	State Program	6	9421
TestAmerica Buffalo	Oregon	NELAC	10	NY200003
TestAmerica Buffalo	Pennsylvania	NELAC	3	68-00281
TestAmerica Buffalo	Tennessee	State Program	4	TN02970
TestAmerica Buffalo	Texas	NELAC	6	T104704412-08-TX
TestAmerica Buffalo	USDA	Federal		P330-08-00242
TestAmerica Buffalo	Virginia	NELAC Secondary AB	3	460185
TestAmerica Buffalo	Virginia	State Program	3	278
TestAmerica Buffalo	Washington	State Program	10	C1677
TestAmerica Buffalo	West Virginia DEP	State Program	3	252
TestAmerica Buffalo	Wisconsin	State Program	5	998310390
TestAmerica Nashville		ACIL		393
TestAmerica Nashville	A2LA	ISO/IEC 17025		0453.07
TestAmerica Nashville	Alabama	State Program	4	41150
TestAmerica Nashville	Alaska (UST)	State Program	10	UST-087
TestAmerica Nashville	Arizona	State Program	9	AZ0473
TestAmerica Nashville	Arkansas DEQ	State Program	6	88-0737
TestAmerica Nashville	California	NELAC	9	1168CA
TestAmerica Nashville	Canadian Assoc Lab Accred (CALA)	Canada		3744
TestAmerica Nashville	Colorado	State Program	8	N/A
TestAmerica Nashville	Connecticut	State Program	1	PH-0220
TestAmerica Nashville	Florida	NELAC	4	E87358
TestAmerica Nashville	Illinois	NELAC	5	200010
TestAmerica Nashville	Iowa	State Program	7	131
TestAmerica Nashville	Kansas	NELAC	7	E-10229
TestAmerica Nashville	Kentucky	State Program	4	90038
TestAmerica Nashville	Kentucky (UST)	State Program	4	19
TestAmerica Nashville	Louisiana	NELAC	6	30613
TestAmerica Nashville	Louisiana	NELAC	6	LA110014
TestAmerica Nashville	Maryland	State Program	3	316
TestAmerica Nashville	Massachusetts	State Program	1	M-TN032

Certification Summary

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Nashville	Mississippi	State Program	4	N/A
TestAmerica Nashville	Montana (UST)	State Program	8	NA
TestAmerica Nashville	New Hampshire	NELAC	1	2963
TestAmerica Nashville	New Jersey	NELAC	2	TN965
TestAmerica Nashville	New York	NELAC	2	11342
TestAmerica Nashville	North Carolina DENR	State Program	4	387
TestAmerica Nashville	North Dakota	State Program	8	R-146
TestAmerica Nashville	Ohio VAP	State Program	5	CL0033
TestAmerica Nashville	Oklahoma	State Program	6	9412
TestAmerica Nashville	Oregon	NELAC	10	TN200001
TestAmerica Nashville	Pennsylvania	NELAC	3	68-00585
TestAmerica Nashville	Rhode Island	State Program	1	LAO00268
TestAmerica Nashville	South Carolina	State Program	4	84009
TestAmerica Nashville	South Carolina	State Program	4	84009
TestAmerica Nashville	Tennessee	State Program	4	2008
TestAmerica Nashville	Texas	NELAC	6	T104704077-09-TX
TestAmerica Nashville	USDA	Federal		S-48469
TestAmerica Nashville	Utah	NELAC	8	TAN
TestAmerica Nashville	Virginia	NELAC Secondary AB	3	460152
TestAmerica Nashville	Virginia	State Program	3	00323
TestAmerica Nashville	Washington	State Program	10	C789
TestAmerica Nashville	West Virginia DEP	State Program	3	219
TestAmerica Nashville	Wisconsin	State Program	5	998020430
TestAmerica Nashville	Wyoming (UST)	A2LA	8	453.07

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Method Summary

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL BUF
8270C	Semivolatile Organic Compounds (GC/MS)	SW846	TAL BUF
8015B	Gasoline Range Organics - (GC)	SW846	TAL BUF
8015B	Diesel Range Organics (DRO) (GC)	SW846	TAL BUF
8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL BUF
6010B	Metals (ICP)	SW846	TAL BUF
7471A	Mercury (CVAA)	SW846	TAL BUF
1010	Ignitability, Pensky-Martens Closed-Cup Method	SW846	TAL BUF
9020	Organic Halides, Total (TOX)	SW846	TAL BUF
9095A	Paint Filter	SW846	TAL BUF
D129	Sulfur, Total Percent	ASTM	TAL NSH
Moisture	Percent Moisture	EPA	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Sample Summary

Client: URS Corporation
Project/Site: Williamsburg

TestAmerica Job ID: 480-17392-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-17392-1	NGW1DW 031512S	Solid	03/15/12 16:20	03/17/12 09:00
480-17392-2	NGW1DW 031512W	Water	03/15/12 16:40	03/17/12 09:00

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Road
Nashville, TN 37204
Tel: 800-765-0980

TestAmerica Job ID: NWC2517
Client Project/Site: 480-17392-1
Client Project Description: TA-Buffalo

For:
TestAmerica Buffalo
10 Hazelwood Drive, Suite 106
Amherst, NY 14228

Attn: Melissa Deyo

Wm Ryan Fitzwater

Authorized for release by:
3/28/2012 1:25:47 PM

Ryan Fitzwater
Project Manager
Ryan.Fitzwater@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
NWC2517-01	NGW1DW 031512S (480-17391-1)	Soil	03/15/12 16:20	03/20/12 08:00

Job ID: NWC2517

Laboratory: TestAmerica Nashville

NELAC Certification

NELAC certifications are not held for the following analytes included in this report:

Method	Matrix	Analyte
SW846 5050	Soil	Sulfate

Definitions/Glossary

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

Client Sample ID: NGW1DW 031512S (480-17391-1)
Lab Sample ID: NWC2517-01
Date Collected: 03/15/12 16:20
Matrix: Soil
Date Received: 03/20/12 08:00

Method: SW846 5050 - General Chemistry Parameters

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfur	ND		0.111		%		03/27/12 14:20	03/27/12 14:20	5.00
Sulfate	ND		0.333	0.333	%		03/27/12 14:20	03/27/12 14:20	5.00

TestAmerica Nashville
3/28/2012
3/29/2012

QC Sample Results

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

Method: SW846 5050 - General Chemistry Parameters

Lab Sample ID: 12C5681-BLK1
Matrix: Soil
Analysis Batch: 12C5681

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 12C5681_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		0.0500	0.0500	%		03/27/12 14:20	03/27/12 14:20	1.00

Lab Sample ID: 12C5681-DUP1
Matrix: Soil
Analysis Batch: 12C5681

Client Sample ID: NGW1DW 031512S (480-17391-1)
Prep Type: Total
Prep Batch: 12C5681_P

Analyte	Sample Result	Sample Qualifier		Duplicate Result	Duplicate Qualifier	Unit	D			RPD	RPD Limit
Sulfate	ND			ND		%					25

TestAmerica Nashville
3/28/2012
3/29/2012

QC Association Summary

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

WetChem

Analysis Batch: 12C5681

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
12C5681-BLK1	Method Blank	Total	Soil	SW846 5050	12C5681_P
12C5681-DUP1	NGW1DW 031512S (480-17391-1)	Total	Soil	SW846 5050	12C5681_P
NWC2517-01	NGW1DW 031512S (480-17391-1)	Total	Soil	SW846 5050	12C5681_P

Prep Batch: 12C5681_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
12C5681-BLK1	Method Blank	Total	Soil	5050 Bomb	
12C5681-DUP1	NGW1DW 031512S (480-17391-1)	Total	Soil	5050 Bomb	
NWC2517-01	NGW1DW 031512S (480-17391-1)	Total	Soil	5050 Bomb	

Lab Chronicle

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

Client Sample ID: NGW1DW 031512S (480-17391-1)
Date Collected: 03/15/12 16:20
Date Received: 03/20/12 08:00

Lab Sample ID: NWC2517-01
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Analysis	SW846 5050		5.00	12C5681	03/27/12 14:20	MSJ	TAL NSH
Total	Prep	5050 Bomb		1.33	12C5681_P	03/27/12 14:20	REM	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Road, Nashville, TN 37204, TEL 800-765-0980

Method Summary

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

Method	Method Description	Protocol	Laboratory
SW846 5050	General Chemistry Parameters		TAL NSH

Protocol References:

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Road, Nashville, TN 37204, TEL 800-765-0980

Certification Summary

Client: TestAmerica Buffalo
Project/Site: 480-17392-1

TestAmerica Job ID: NWC2517

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Nashville		ACIL		393
TestAmerica Nashville	A2LA	ISO/IEC 17025		0453.07
TestAmerica Nashville	Alabama	State Program	4	41150
TestAmerica Nashville	Alaska (UST)	State Program	10	UST-087
TestAmerica Nashville	Arizona	State Program	9	AZ0473
TestAmerica Nashville	Arkansas DEQ	State Program	6	88-0737
TestAmerica Nashville	California	NELAC	9	1168CA
TestAmerica Nashville	Canadian Assoc Lab Accred (CALA)	Canada		3744
TestAmerica Nashville	Colorado	State Program	8	N/A
TestAmerica Nashville	Connecticut	State Program	1	PH-0220
TestAmerica Nashville	Florida	NELAC	4	E87358
TestAmerica Nashville	Illinois	NELAC	5	200010
TestAmerica Nashville	Iowa	State Program	7	131
TestAmerica Nashville	Kansas	NELAC	7	E-10229
TestAmerica Nashville	Kentucky	State Program	4	90038
TestAmerica Nashville	Kentucky (UST)	State Program	4	19
TestAmerica Nashville	Louisiana	NELAC	6	30613
TestAmerica Nashville	Louisiana	NELAC	6	LA110014
TestAmerica Nashville	Maryland	State Program	3	316
TestAmerica Nashville	Massachusetts	State Program	1	M-TN032
TestAmerica Nashville	Mississippi	State Program	4	N/A
TestAmerica Nashville	Montana (UST)	State Program	8	NA
TestAmerica Nashville	New Hampshire	NELAC	1	2963
TestAmerica Nashville	New Jersey	NELAC	2	TN965
TestAmerica Nashville	New York	NELAC	2	11342
TestAmerica Nashville	North Carolina DENR	State Program	4	387
TestAmerica Nashville	North Dakota	State Program	8	R-146
TestAmerica Nashville	Ohio VAP	State Program	5	CL0033
TestAmerica Nashville	Oklahoma	State Program	6	9412
TestAmerica Nashville	Oregon	NELAC	10	TN200001
TestAmerica Nashville	Pennsylvania	NELAC	3	68-00585
TestAmerica Nashville	Rhode Island	State Program	1	LAO00268
TestAmerica Nashville	South Carolina	State Program	4	84009
TestAmerica Nashville	South Carolina	State Program	4	84009
TestAmerica Nashville	Tennessee	State Program	4	2008
TestAmerica Nashville	Texas	NELAC	6	T104704077-09-TX
TestAmerica Nashville	USDA	Federal		S-48469
TestAmerica Nashville	Utah	NELAC	8	TAN
TestAmerica Nashville	Virginia	NELAC Secondary AB	3	460152
TestAmerica Nashville	Virginia	State Program	3	00323
TestAmerica Nashville	Washington	State Program	10	C789
TestAmerica Nashville	West Virginia DEP	State Program	3	219
TestAmerica Nashville	Wisconsin	State Program	5	998020430
TestAmerica Nashville	Wyoming (UST)	A2LA	8	453.07

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER REC

NWC2517

Cooler Received/Opened On 3/20/2012 @ 0800

1. Tracking # 6349 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 14740456

2. Temperature of rep. sample or temp blank when opened: 1.2 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO..NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial)

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #

I certify that I unloaded the cooler and answered questions 7-14 (intial)

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial)

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial)

I certify that I attached a label with the unique LIMS number to each container (intial)

21. Were there Non-Conformance issues at login? YES..NO Was a PIPE generated? YES..NO..#

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 6/24/09

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Deyo, Melissa L	Carrier Tracking No(s):	COC No: 480-3281.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: melissa.deyo@testamericainc.com		Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc				Job #: 480-17392-1
Address: 2960 Foster Creighton Drive,	Due Date Requested: 3/28/2012			
City: Nashville	TAT Requested (days):			
State, Zip: TN, 37204				
Phone: 800-765-0980(Tel) 615-726-0954(Fax)	PO #:			
Email:	WO #:			
Project Name: Williamsburg	Project #: 48005665			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

NWC2517
03/28/12 23:59

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D129/ (MOD) Local Method	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
NGW1DW 031512S (480-17392-1)	3/15/12	16:20 Eastern		Solid			X	1	NWC2517-01

Possible Hazard Identification *Unconfirmed*	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)* ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Zachary J Robinson	3/19/12 1500	TAL BUF	[illegible] TAN	3.20.12 @ 0800	TAN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.2

Buckingham, Paul

NWC2517
03/28/12 23:59

From: Schove, John
Sent: Tuesday, March 20, 2012 11:33 AM
To: Buckingham, Paul
Cc: Fitzwater, Ryan; McBride, Mike; Ford, Easton; Deyo, Melissa
Subject: RE: Job 480-17392-1

Paul,

It looks like the client is looking for Percent Total Sulfur in soil. We have it as method D129 in our system but if you use a different method, that is fine..

John

Announcing TotalAccess 4.0 – Online access to your data. New homepage with easier access to your data, multiple search criteria including sampling date and much more! Contact your Account Executive or Project Manager today to arrange for a live demonstration!

JOHN SCHOVE
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

10 Hazelwood Drive
Amherst, NY 14228
Tel 716.504.9838 | Fax 716.691.7991
www.testamericainc.com

From: Buckingham, Paul
Sent: Tuesday, March 20, 2012 10:54 AM
To: Schove, John
Cc: Fitzwater, Ryan; McBride, Mike; Ford, Easton; Buckingham, Paul; Deyo, Melissa
Subject: RE: Job 480-17392-1

John, I got an out of office from Melissa. Thanks.

From: Buckingham, Paul
Sent: Tuesday, March 20, 2012 9:51 AM
To: Deyo, Melissa
Cc: Fitzwater, Ryan; McBride, Mike; Ford, Easton
Subject: Job 480-17392-1

Job 480-17392-1
Analysis is listed as 'D129/(MOD) Local Method'

I do not understand the requested analysis.
Could you provide a work share or more information?

Thanks. (Easton or Mike are likely to be entering the project)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

777 New Durham Road
Edison, New Jersey 08817
Phone: (732) 549-3900 Fax: (732) 549-3679

CHAIN OF CUSTODY / ANALYSIS REQUEST

Name (for report and invoice): National Grid Williamsburg

Company: URS Corp

Address: 77 Goodell St

City: Buffalo State: NY

Phone: 716-923-1207 Fax:

Samplers Name (Printed): Megan Dascoli

P. O. #: 11176638

Site/Project Identification: National Grid Williamsburg

State (Location of site): NJ: ☐ NY: ☒ Other:

Regulatory Program:

Analysis Turnaround Time: Standard ☐

Rush Chrages Authorized For: 2 Week ☐ 1 Week ☐ Other ☐

LAB USE ONLY: Project No: / Job No: / Sample Numbers:

ANALYSIS REQUESTED (ENTER "X" BELOW TO INDICATE REQUEST)

Sample Identification	Date	Time	Matrix	No. of. Cont.	8260B TCL list / 8270C TCL SVOA	8015B-DRO GRO	9095A-Free liq / D129-Local	8082 TCL PCBs	6010B TCL Metals ICP Hg	6010B TCLP Metals ICP	8082 Local	2540C TDS	1010 Flashpt.	9020 Local method		Sample Numbers
NGW IDW 031512S	3/15/12	1620	S	9	X	X	X	X	X							
NGW IDW 031512W	3/15/12	1640	W	7						X	X	X	X	X		
Preservation Used: 1 = ICE, 2 = HCl, 3 = H_2SO_4, 4 = HNO_3, 5 = NaOH				Soil:	X	X	X	X	X	*						
6 = Other ____, 7 = Other ____				Water:						X	X	X	X	X		

Special Instructions: Call Jon Sundquist-716923-1207 w/any questions

Water Metals Filtered (Yes/No)?

Relinquished by	Company	Date / Time	Received by	Company
1) Megan Dascoli	URS	3/16/12 1020	1) [signature]	Test America
2) [signature]	Test Am	3/16/12 1845	2) UPS	
3)		3-17-12 900	3) [signature]	BLO 3-
4)			4)	

Laboratory Certifications: New Jersey (12028), New York (11452), Pennsylvania (68-522), Connecticut (PH-0200), Rhode Island (132). Massachusetts (M-NJ312), North Carolina (No. 578)

TAL - 0016 (0408)

2.3 #1

Login Sample Receipt Checklist

Client: URS Corporation

Job Number: 480-17392-1

Login Number: 17392

List Number: 1

Creator: Kinecki, Kenneth

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	2.3 C
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

APPENDIX G

IDW DISPOSAL DOCUMENTATION

Annex Q

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	NYR000184184	1	631 924-8111	3406

5. Generator's Name and Mailing Address
MetroTech
1 MetroTech Center
Brooklyn, N.Y 11201

Generator's Phone:

Generator's Site Address (if different than mailing address)
1 North 12th St
Brooklyn, N.Y

6. Transporter 1 Company Name: WRS Environmental Services, Inc — U.S. EPA ID Number: NYR000062166

7. Transporter 2 Company Name: — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
National Grid
175 E. Old Country Rd
Hicksville, NY 11801

Facility's Phone:

U.S. EPA ID Number: NYD006866008

9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1. Non DOT/Non RCRA Regulated Liquids	18	DM	6300	lbs
2. Non DOT/Non RCRA Regulated Debris	3	DM	200	lbs
3.				
4.				

13. Special Handling Instructions and Additional Information
1. Decon / Purge Water
2. PPE

In case of Emergency 800 424-9300 CCN 15023

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Kevin McGrath on Behalf of Nat Grid — Signature: K McGrath — Month 4 Day 27 Year 12

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Kevin McGrath — Signature: K McGrath — Month 4 Day 27 Year 12
Transporter 2 Printed/Typed Name: — Signature: — Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Mike Cappello — Signature: M [signature] — Month 4 Day 30 Year 12

169-BLC-O 6 10498 (Rev. 8/06)

TRANSPORTER #1

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number: NYR000184184	2. Page 1 of 1	3. Emergency Response Phone: 631 924 S41	4. Waste Tracking Number: 3406

5. Generator's Name and Mailing Address: Metrotech / 1 Metrotech / [illegible] NY 11201

Generator's Phone:

Generator's Site Address (if different than mailing address): 1 North 12th St / Brooklyn NY

6. Transporter 1 Company Name: [illegible] Environmental Services — U.S. EPA ID Number: NYR000062166

7. Transporter 2 Company Name: — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: National [illegible] / 175 [illegible] Country Rd / [illegible]ville NY 11801 — U.S. EPA ID Number: NYD006866008

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1.	Non DOT, Non RCRA Regulated Liquid	9	DM	2,700	LBS
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information

91 – Decon Purge Water

IN CASE OF EMERGENCY 800 424-9300 CCN 15623

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Peter Dreesen on behalf of — Signature: [signature] — Month 04 Day 30 Year 12

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Peter Dreesen — Signature: [signature] — Month 04 Day 30 Year 12

Transporter 2 Printed/Typed Name: — Signature: — Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number:

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Mike Cappiello — Signature: M Cappiello — Month 4 Day 30 Year 12

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number BSM #2712-[illegible]	2. Page 1 of 1	3. Emergency Response Phone [illegible]	4. Waste Tracking Number

5. Generator's Name and Mailing Address
[illegible]
Generator's Phone: [illegible]

Generator's Site Address (if different than mailing address)
Williamsburg
50 Kent Ave
[illegible] NY 112.11

6. Transporter 1 Company Name ~~[illegible]~~ LLC @ Horwith Trucks — U.S. EPA ID Number NJT000027193

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number NJT225001522
[illegible] Management LLC
[illegible] Mill Road, [illegible] NJ [illegible]32
Facility's Phone: [illegible]

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
	1. [illegible] RCRA [illegible] [illegible]	1	CM DT	20	Cu Yds
	2.				
	3.				
	4.				

13. Special Handling Instructions and Additional Information

Bo: R26?? [illegible]

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name	Signature	Month	Day	Year
[illegible]	[signature]	04	27	12

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

	Printed/Typed Name	Signature	Month	Day	Year
Transporter 1	x RAymond SBeaR	x Raymond S Bean	04	27	12
Transporter 2					

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month Day Year

169-BLC-O 6 10498 (Rev. 8/06)

GENERATOR'S / SHIPPER'S INITIAL COPY

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number BSMH2712-231	2. Page 1 of 1	3. Emergency Response Phone 631 924-8111	4. Waste Tracking Number 04272012

5. Generator's Name and Mailing Address
The Brooklyn Union Gas Co, DBA National Grid
One Metrotech Center
Brooklyn NY 11201
Generator's Phone: (718) 963-5453

Generator's Site Address (if different than mailing address)
50 Kent Ave
Brooklyn NY 11211

6. Transporter 1 Company Name: ~~Horwith Trucking~~ Clean Venture Inc — U.S. EPA ID Number: NJ0000027193

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address
Bayshore Soil Management LLC
75 Crows Mill Rd
Keasbey NJ. 08832
Facility's Phone: (732) 738-6000
U.S. EPA ID Number: NJ1225001522

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non Dot, Non Haz, Non Rcra, Regulated Solids	GW 75	DM	35,000	LBS	
2.						75.00
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: Peter Duecker on behalf of — Signature — Month/Day/Year: 04 27 12

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: GILBERTO VELEZ — Signature — Month/Day/Year: 04 27 12
Transporter 2 Printed/Typed Name — Signature — Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number: 113585

17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name — Signature — Month/Day/Year: 4 27 12

GENERATOR / INT'L / TRANSPORTER / DESIGNATED FACILITY

169-BLC-O 6 10498 (Rev. 8/06)

DESIGNATED FACILITY TO GENERATOR

Bayshore Recycling Corp.
75 Crows Mill Rd
PO Box 290
Keasbey, NJ 08832

Facility ID: 132397

Ticket: 113585
Date: 4/27/2012
Time: 14:22:14 - 17:36:13

Customer: WRS ENVIRONMENTAL SERVICES, INC./BSM0056
17 OLD DOCK ROAD
YAPHANK, NY 11980-

			Scale
Gross:	85900 lb	In	Scale 2
Tare:	31880 lb	Out	Scale 3
Net:	54020 lb		

Truck: AN454M

CUYDs: 35

Truck Type: TRACTOR

Carrier: CLEAN VENTURE INC.

Manifest: 04272012
Remaining: 0.00 TN

Profile: 2712-231/WILLIAMSBURG PROJECT
Generator: WILLIAMSBURG PROJECT
Comment:

Origin	Materials & Services	Quantity	Unit
Brooklyn	ID27 DRUM	75.00	Units

THE ABOVE IS CORRECT AND NON-HAZARDOUS TO THE BEST OF MY KNOWLEDGE

Driver: [signature]

Weighmaster: Andres

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number: BSM #2742-231	2. Page 1 of: 1	3. Emergency Response Phone: 631 924-8111	4. Waste Tracking Number: 002

GENERATOR

5. Generator's Name and Mailing Address
The Brooklyn Union Gas Co D/B/A National Grid
One Metro Center
Brooklyn NY 11201

Generator's Phone: (718) 963-5457

Generator's Site Address (if different than mailing address)
Williamsburg
50 Kent Ave
Brooklyn NY 11211

6. Transporter 1 Company Name: Howarth Truck Inc
U.S. EPA ID Number: PAD 146714878 ~~NJ 0000027143~~ RSB

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
Bayshore Soil Management
75 Crows Mill Rd
Keasbey NJ 08832
Facility's Phone: (732) 738-6000
U.S. EPA ID Number: NJ 1225001522

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non Dot, Non Rcra, Regulated Solids 1027	1	CM	10	Tons 10 Ton	
2.						10.49
3.						
4.						

13. Special Handling Instructions and Additional Information
9.1 - Contaminated Soil

Box R2694
Mler

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Peter Duecker On behalf of
Signature:
Month 04 Day 30 Year 12

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: RAymond S Bear
Signature: Raymond S Bear
Month 04 Day 30 Year 12

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number: 113672

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name:
Signature:
Month 4 Day 30 Year 12

169-BLC-O 6 10498 (Rev. 8/06)

DESIGNATED FACILITY TO GENERATOR

Bayshore Recycling Corp.
75 Crows Mill Rd
PO Box 290
Keasbey, NJ 08832

Facility ID: 132397

Ticket: 113795
Date: 4/30/2012
Time: 09:32:03 - 10:01:03

			Scale
Gross:	55840 lb	In	Scale 2
Tare:	34860 lb	Out	Scale 3
Net:	20980 lb		

14878
RSB

Customer: WRS ENVIRONMENTAL SERVICES, INC./BSM0056
17 OLD DOCK ROAD
YAPHANK, NY 11980-

Truck: 01522

CUYDs: 20 License: AF07824
Truck Type: SINGLE AXLE

Carrier: HORWITH TRUCKS INC

Manifest: 002
Remaining: 0.00 TN

Profile: 2712-231/WILLIAMSBURG PROJECT
Generator: WILLIAMSBURG PROJECT
Comment:

Origin	Materials & Services	Quantity	Unit
Brooklyn	ID27 INDUSTRIAL WASTE	10.49	Tons

THE ABOVE IS CORRECT AND NON-HAZARDOUS TO THE BEST OF MY KNOWLEDGE

Driver: Raymond S Bear

Weighmaster: Andres

Box R2694
Meier

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Peter Dvecker On behalf of
Signature: [signature]
Month 04 Day 30 Year 12

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: RAymond S BeaR
Signature: Raymond S Bear
Month 04 Day 30 Year 12
Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number: 113672
17b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name Signature Month 4 Day 30 Year 12

169-BLC-O 6 10498 (Rev. 8/06)

DESIGNATED FACILITY TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of 1 of 1	3. Emergency Response Phone (718) 963-5453	4. Waste Tracking Number CEI 308000075023

GENERATOR

5. Generator's Name and Mailing Address
The Brooklyn Union Gas Company
One Metro Tech Center
Brooklyn, NY 11201

Generator's Site Address (if different than mailing address)
The Brooklyn Union Gas
175 East Old Country Road
Hicksville, NY 11801

Generator's Phone: (718) 963-5453

6. Transporter 1 Company Name: AUCHTER INDUSTRIAL VAC SERVICE — U.S. EPA ID Number: NJD080773768

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address: Clean Earth of North Jersey, Inc.
105 Jacobus Ave
South Kearny, NJ 07032
U.S. EPA ID Number: NJD991291105
Facility's Phone: (973) 344-4004

	9. Waste Shipping Name and Description	10. Containers No.	Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-Regulated Material ID72	27	DM	1495	G	ID72
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information: CEI 308000075023 App: 123080902
(1) 100% Water

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Maja Cappello — Signature: M ap — Month 5 Day 2 Year 12

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: William Messinger — Signature: William — Month 5 Day 2 Year 12
Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

RECEIVED PENDING MANIFEST
REVIEW AND QUALITY CONTROL

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Robert Fixter JR — Signature: Robert Fixter JR — Month 5 Day 2 Year 12

169-BLC-O 6 10498 (Rev. 9/09) DESIGNATED FACILITY TO GENERATOR

Clean Earth of North Jersey
115 Jacobus Avenue
South Kearny, NJ 07032
Ph: (973) 444-4004 Fax: (973) 344-2652

Ticket: 308000074155

	Date	Time	Scale
In:	5/2/2012	16:51:45	Scale
Out:	5/2/2012	16:51:56	Scale

Manifest: CEI308000075023
Vehicle ID: AUCHTER

	Lbs	Tns
Gross:	00	0.00
Tare:	00	0.00
Net:	00	0.00

Customer: WRS ENVIRONMENTAL SERVICE
Hauler DEP: 16648
Facility Approval#: NA
Generator: The Brooklyn Union Gas Co
Gen Address: One Metro Tech Center
Brooklyn, NY 11201
Job Name: INBOUND PROJECTS W/O APPROVAL
Job Address: , -

Origin	Materials & Services	Quantity Unit
New York	Non Haz Liquid - Drums	27.00 Drms

Contaminate Type: Not Applicable
Treatment Type: Not Applicable
Fac Waste Code: NJ DEP ID 72 (Profile Pricing ONLY)

Comment:

Driver: ______________________

Facility: ______________________
Barone, Joe

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number BSM #2012-231	2. Page 1 of 1	3. Emergency Response Phone 631-924-8111	4. Waste Tracking Number 001

5. Generator's Name and Mailing Address
The Brooklyn Union Gas Co. d/b/a National Grid NY
One MetroTech Center, Brooklyn, NY 11201
Generator's Phone: 718-963-5493

Generator's Site Address (if different than mailing address)
Williamsburg
50 Kent Avenue
Brooklyn NY 11211

6. Transporter 1 Company Name
Clean Venture Inc.
U.S. EPA ID Number NJD000027193

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Keystone ... C Management, LLC
... Mill Road, Keasbey, NJ 08832
Facility's Phone: ...-738-6000
U.S. EPA ID Number NJ1225001522

9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1. Non Haz Non-RCRA Regulated Solids ID27	1	R.SID ~~CM~~	20	CU YARD	
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information

Box RL64?

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: [illegible] as agent for ...
Signature: [signature]
Month 04 Day 27 Year 12

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: X RAymond S Bear
Signature: X Raymond S Bear
Month 04 Day 27 Year 12

Transporter 2 Printed/Typed Name
Signature
Month Day Year

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☒ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number: 113500

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: MB
Signature: MB
Month 4 Day 27 Year

169-BLC-O 6 10498 (Rev. 6/06)

COPY

MONTECALVO DISPOSAL
75 CROWS MILL ROAD
KEASBEY NJ 08832
732-738-6000

TERMINAL I.D.: 3030
MERCHANT #:

AMEX
************1100*
SALE
BATCH: 000033 **INV:000022**
AUTH:100926

APR 30, 12 17:27

TOTAL $1349.37

X________________________________
I AGREE TO PAY ABOVE TOTAL AMOUNT
ACCORDING TO CARD ISSUER AGREEMENT
(MERCHANT AGREEMENT IF CREDIT VOUCHER)

MERCHANT COPY

Montecalvo Disposal Services, Inc
75 Crows Mill Rd
PO Box 290
Keasbey, NJ 08832

Facility ID: 197408
Permit: SW9079
Ticket: 114091
Date: 4/30/2012
Time: 17:37:45 - 17:39:38

Customer: WRS ENVIRONMENTAL SERVICES/MDS0324
17 OLD DOCK ROAD
YAPHANK, NY 11980-

			Scale
Gross:	70020 lb	In	Manual Wt
Tare:	39000 lb	Out	Manual Wt
Net:	31020 lb		

Truck: 02587 Trail/Cont: 305 CUYDs: 30 License: AN840C
Decal: 02587 Decal: 09336 Truck Type: ROLLOFF
Carrier: MONTECALVO DISPOSAL
A-901: 10103
Comment:

Origin	Materials & Services	Quantity Unit	Rate/Unit	Amount
Woodbridge Twp.	C & D	15.51 Tons	$87.00/TN	$1,349.37

Total Amount: $1,349.37
American Express: xxxx-: $1,349.37
Change: $0.00

THE ABOVE IS CORRECT AND NON-HAZARDOUS TO THE BEST OF MY KNOWLEDGE

Driver: ______________________ Weighmaster: Andres

APPENDIX H

RESULTS OF GEOPHYSICAL INVESTIGATION

NAeVA GEOPHYSICS INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys

GPR
MAGNETICS
ELECTROMAGNETICS
SEISMICS
RESISTIVITY
UTILITY LOCATION
UXO DETECTION
BOREHOLE CAMERA
STAFF SUPPORT

Results of a Geophysical Investigation

Former manufactured Gas Plant
50 Kent Avenue
Williamsburg (Brooklyn), New York

Prepared for: **URS Corporation**
Buffalo, New York

Date of Investigation: **February 23 and April 30, 2012**

Prepared by:

Kelly A. Weyer
Geologist - Project Manager
NAEVA Geophysics, Inc.
225 North Route 303, Suite 102
Congers, NY 10920

NEW YORK
225 N Route 303
Suite 102
Congers
New York 10920
(845) 268-1800
(845) 268-1802 Fax

VIRGINIA
P.O. Box 7325
Charlottesville
Virginia 22906
(434) 978-3187
(434) 973-9791 Fax

Contents

Results of a Geophysical Investigation
Former Manufactured Gas Plant
50 Kent Avenue
Williamsburg (Brooklyn), New York

Introduction

On February 23 and April 30, 2012, NAEVA Geophysics, Inc. conducted a geophysical investigation on portions of the former Manufactured Gas Plant located at 50 Kent Avenue in Williamsburg (Brooklyn), New York. The purpose of this investigation was to markout detectable subsurface utilities and features within 25 feet of the interior side of the perimeter fence, and to confirm any one-call marks indicating utilities enter the property.

This investigation began on February 23; however, due to stored materials in the area of concern (AOC), the second day of work was postponed until April 30 while an attempt was made to remove the stored materials. Most of the materials from the first day of the investigation were not moved. NAEVA investigated around the areas with obstructions.

Methods

The equipment selected for this investigation included a Fisher TW-6 Pipe and Cable Locator (a type of hand-held electromagnetic metal-detector), a Malå RAMAC/Ground Penetrating Radar (GPR) system with a 250-Megahertz (MHz) antenna, a Subsite 950 utility locator, and a 3M Dynatel 2250 Cable Locator.

The AOC was visually inspected for evidence of subsurface utilities (such as utility valves and conduits, fire hydrants, manhole covers, parking lot lamps, etc). Whenever a metallic/electrically conductive utility was noted, a radio-frequency signal was conducted or induced onto the line using one of the utility locating instruments' transmitters. This signal was then used to delineate the utility using the locating instrument's receiver.

Many utilities carry electric currents, and produce electromagnetic fields that can be detected at the surface. In addition, buried metallic conduits, acting as antennas, often pick up and re-radiate background commercial radio signals. The AOC was searched for evidence of these signals using the Subsite operating in passive modes.

The TW-6 metal-detector was carried over the AOC in a series of closely spaced bi-directional traverses in an attempt to locate USTs, subsurface utilities, and other buried metallic features. Anomalies detected with the TW-6 were further investigated with the GPR and utility locators in an attempt to identify their sources. The TW-6 is not suitable for use near metallic objects or over reinforced concrete. Where the TW-6 was not suitable for use, the GPR was used as the primary investigative instrument. It should be noted that reinforced concrete can hinder the effectiveness of the GPR by limiting the penetration of the signal into the subsurface and obscuring underlying targets.

The AOC was also investigated using the Dynatel in a split-box fashion. Two operators, one carrying the transmitter and one carrying the receiver, walked bi-directionally across the AOC at a fixed distance to one another while listening for increases in signal strength that would suggest possible subsurface utilities. The Dynatel is particularly suited for locating the surface trace of telephone lines, electric lines, and other narrow-gauge wiring, but can also detect larger metallic conduits and piping.

Results

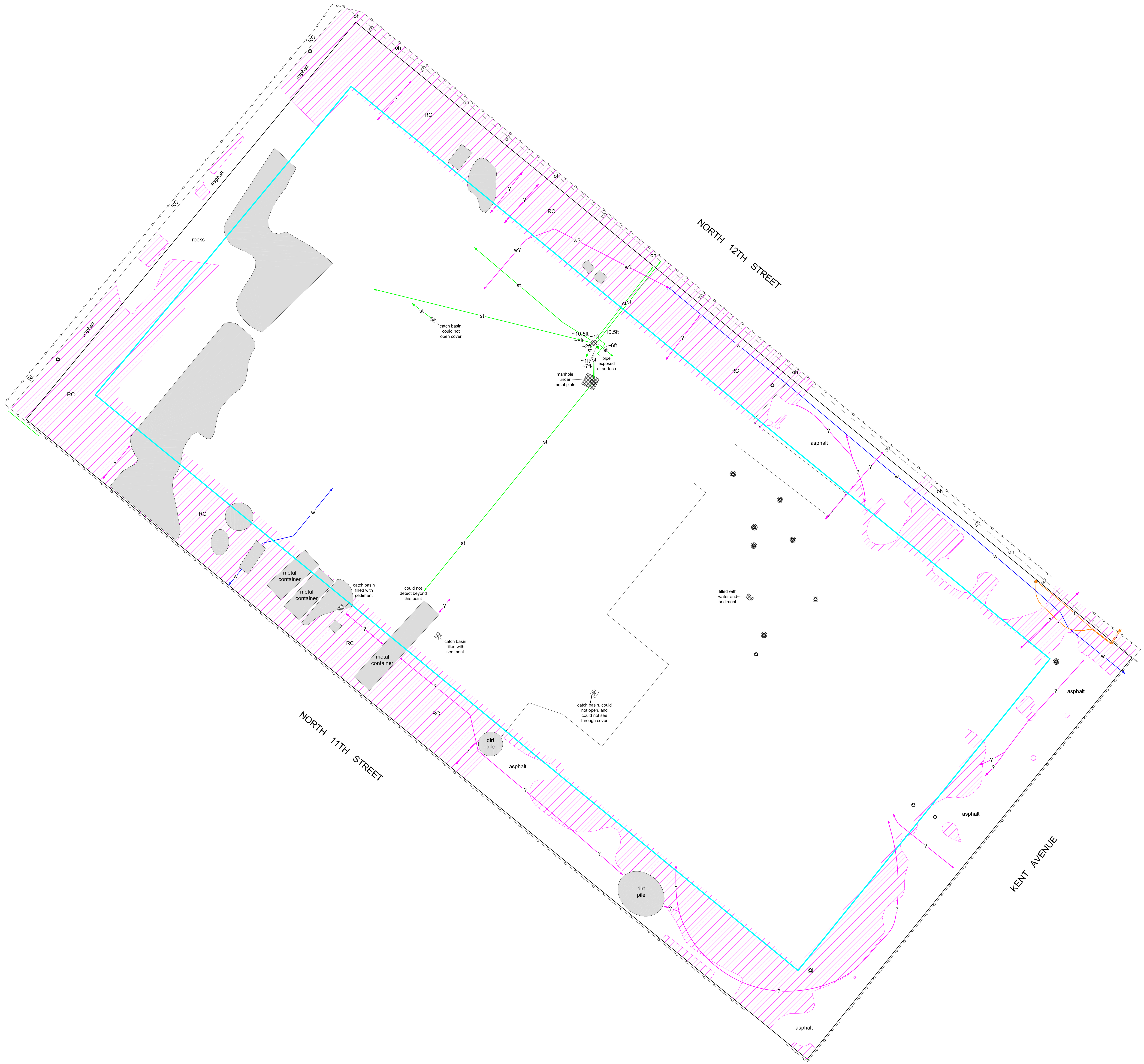
NAEVA identified multiple manhole and valve covers that appeared to be sewer and gas related, however, most were determined to be monitoring wells (see Figure 1). One manhole cover was lifted to reveal nine sewer pipes. The sewer lines were traced to their detectable extents. Two of the lines were traced to a second manhole located under a metal plate. One additional sewer line was traced to its detectable extent from the second manhole. Four catch basins were identified. One cover could not be lifted, although, it was determined to be filled with sediment, as seen through the cover. Two other covers could not be lifted and the inside of the vault was not visible through the cover. The last cover could not be opened, but one pipe was visible on the northwest wall of the vault. Since the cover could not be opened, it could not be determined if additional lines existed. One rectangular cover was lifted, but it was filled with water and sediment and no utilities were visible.

NAEVA identified two water valves in the southwest and southeast sidewalks. The lines were traced on the interior side of the perimeter fence. The water line on the southwest side was traced into the property transecting the AOC. The water line on the southeast side was traced inside the perimeter fence to the northwest along the northeast fence until it either ends or continues then turns to the southwest, west of where the sewer lines were determined to exit the property.

Two telephone lines were traced from conduits exposed on the property to a manhole north of the property and to the northwest to a second exposure of the conduits. One-call marks indicated electric lines ran along the northeast and southeast sidewalks, on the exterior of the perimeter fence. These lines were not detected by NAEVA, and NAEVA is not permitted to access ConEdison manholes.

Several metal-detector anomalies and suspected utilities of undetermined use were identified within the AOC. The large metal-detector anomaly in the north portion of the property is a response to the reinforced concrete. The sources of the metal-detector anomalies in the southern portion of the property and the smaller anomalies in the north could not be determined. GPR data profiles did not aid in characterizing the anomalies. The penetration depth of the GPR signal appeared to be approximately 2-3 feet over most of the site.

The results of this investigation were marked on the ground with spray paint using the American Public Works Association color code (green for sewer, blue for water, orange for telephone). Fluorescent pink was used to mark the locations of metal-detector anomalies and suspected utilities. All detected subsurface utilities and features marked in the field are indicated on the accompanying site map. NAEVA recommends that you exercise caution when excavating near any detected and marked out features.



LEGEND

- water line
- telephone line
- storm sewer
- suspected utility
- suspected water line
- overhead line
- chain-link fence
- metal-detector anomaly
- area of investigation
- debris / obstructions
- monitoring well
- monitoring well under manhole cover
- monitoring well under valve cover
- manhole cover
- wooden support beam

approximately

20 10 0 10 20 ft

Scale: One inch equals approximately twenty feet

NAEVA GEOPHYSICS, INC.
THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys
225 N. Route 303, Suite 102
Congers, NY. 10920
(845)268-1800
(845)268-1802 FAX

Figure 1: Results of a Geophysical Investigation
former Manufacturing Gas Plant
50 Kent Avenue
Brooklyn, New York

Client	URS Corporation	Date of Work	February 23 and April 30, 2012
Project No.	C1204301K	Map By	Alec D. Kurowski

ALL UNDERGROUND FACILITIES MAY NOT BE DEPICTED ON THIS MAP

APPENDIX I

NAPL STABILIZATION BENCH TEST RESULTS

Treatability Study Final Report
Williamsburg Works Former MGP Site

Prepared by Remedius, LLC for URS Corporation

This *Treatability Study Final Report* describes the findings of a study to evaluate stabilization as a treatment technology for reducing the migration of NAPL from the Williamsburg Works Former Manufactured Gas Plant (MGP) Site.

Introduction

Site Description

The Williamsburg Works Former Manufactured Gas Plant (MGP) Site is comprised of four parcels in the Williamsburg neighborhood of Brooklyn, New York. The parcels are bounded by North 12th and North 11th Streets, Kent Avenue, and the East River. This study pertains to NAPL-impacted soil on the 50 Kent Street parcel.

The Williamsburg Works Manufactured Gas Plant operated from 1850 to the 1930s, first by Williamsburg Gas Light Company and later by the Brooklyn Union Gas Company, a predecessor to National Grid. The MGP was dismantled prior to 1941 and subsequently divided into four parcels which were sold to third parties. The site was redeveloped for commercial and industrial uses.

When the MGP was operational, there were three gas holders, purifying houses, salt water condensers, and offices on the 50 Kent Street parcel. When the MGP was closed, most above-ground structures were dismantled, but below-ground structures such as the gas holders remained in place. The New York City Parks Department currently owns the property and uses it for parking and storage. It wishes to redevelop the property as a park.

Waste Stream Description

Numerous investigations have identified NAPL-impacted soil at the site. Data from these investigations suggest that the sources of tar are the former gas holders and tar handling structures. NAPL-impacted soil is generally observed in the coarse-grained sand and gravelly sand layers from depths ranging from 5 to 55 feet below ground surface. There are no visual impacts of tar below a clay layer present from 41 to 72 feet below ground surface.

Treatment Technology Description

Section 1.11(a) of the NYSDEC DER-10 establishes "a priority during investigation and/or remediation is to contain and/or stabilize, to the extent possible, sources of contamination in any media to reduce/eliminate receptor exposure to contaminants or to contain further movement of contaminants through any pathway."

Stabilization is both a physical and chemical process. Seldom is stabilization only one or the other. One might predominate for a particular application, but the combination of chemical processes that transform the hazardous constituents to less soluble forms and physical processes that encapsulate them act together to reduce a matrix's leachability.

For inorganic constituents (e.g., lead), the process is primarily chemical. With proper selection of reagents, more soluble metal-salts are replaced with less soluble metal-salts. For organic constituents, the process is primarily physical. The stronger and less permeable the matrix, the less likely it is that compounds will diffuse through the solid matrix into groundwater.

Prior studies have demonstrated that NAPL can be immobilized by encapsulating it within an impermeable monolith that is an order or two less permeable than surrounding soil.

Treatability Study Protocol

Test Objectives and Rationale

This treatability study's purpose is to determine whether NAPL-contaminated soil from the Williamsburg Works Former MGP Site is amenable to treatment using solidification and stabilization as the treatment technology. The study is designed to (1) evaluate the compatibility of NAPL-contaminated soil with various stabilization reagents; and (2) to develop parameters for effectively implementing the treatment technology.

The goal for this study is to minimize, to the extent possible, the migration of contaminants through the environment, thereby reducing the exposure of receptors to these contaminants. One assessment method to determine whether this goal is attained is to compare the permeability of NAPL-contaminated soil before treatment to the same soil after treatment.

The primary mechanism causing contaminants to migrate through the subsurface environment is advection. Advection is the transport of a substance due to a fluid's bulk motion. An example of advection is the transport of pollutants in a river via current. A technique to limit the migration of contaminants through the subsurface environment is to reduce the NAPL-contaminated soil's permeability. Permeability is a measure of the propensity for one substance to flow through another. When the soil's permeability is decreased sufficiently, groundwater and infiltrating surface water flow around rather than through the soil.

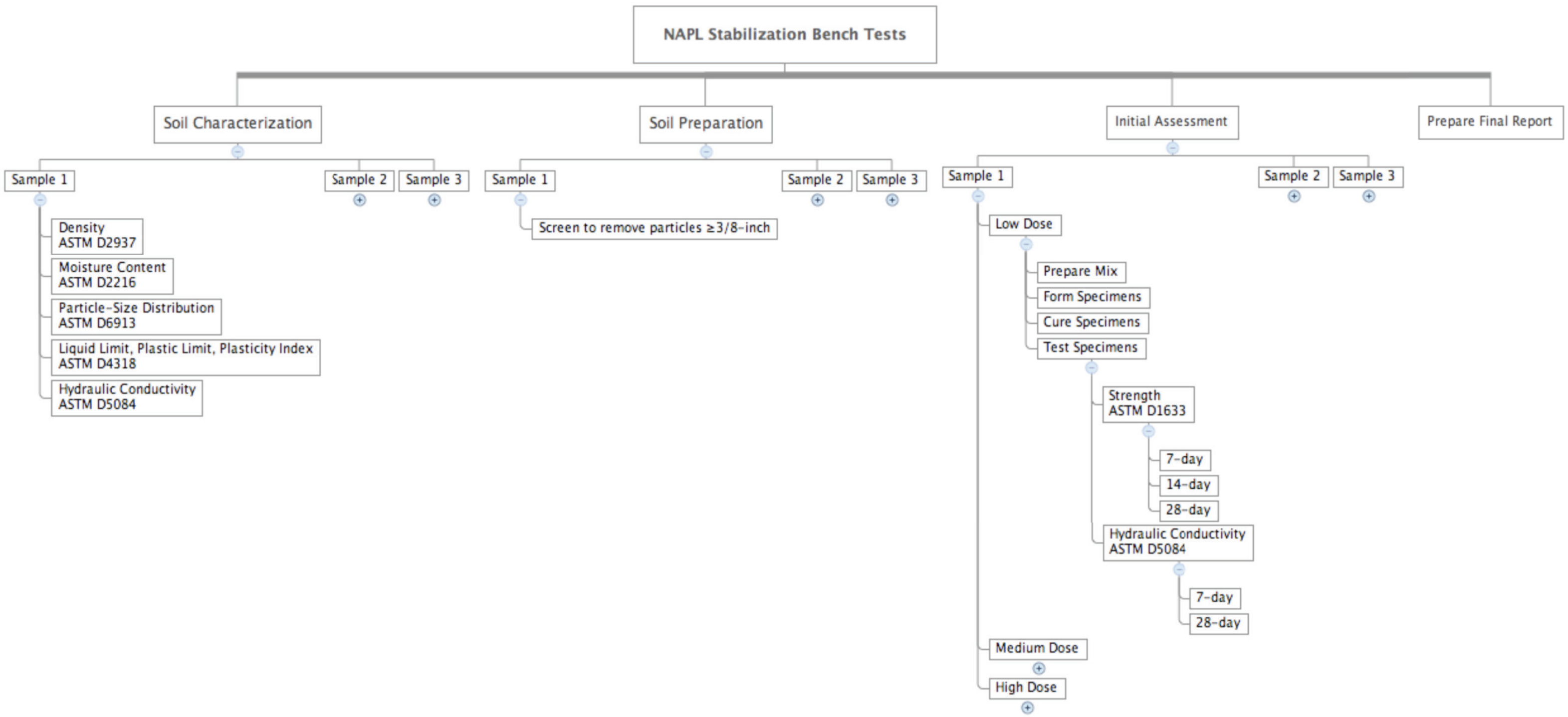
As a general rule-of-thumb, soil that is an order or two less permeable than adjacent soil, and no more permeable than 1 x 10^{-6} cm/s, is relatively unaffected by advection because groundwater and infiltrating surface water will flow around rather than through this material. Some advection will continue to occur along the surface of the solidified monolith, but, the main volume of material will be unaffected. Because NAPL compounds are not water soluble, dissolution is not a factor that affects their migration. So, the primary remaining mechanism by which these compounds can migrate into the larger environment is via diffusion.

There are a number of factors that affect the rate of diffusion, including the concentration gradient, resistance, distance, molecular weight, temperature, and pressure. Stabilization increases resistance. So, reducing the soil's permeability not only decreases advection, it also decreases diffusion.

Experimental Design and Procedures

A treatability study is an iterative process whereby small samples of contaminated material are treated by mixing the material with different combinations and quantities of reagents. Treated specimens are cured for the time necessary for reactions to occur. Most chemical reactions occur fairly rapidly (i.e., within 24 to 72 hours), whereas physical changes such as strength and impermeability develop more slowly, often taking 28 days or more to fully develop. After curing, pertinent characteristics of treated specimens are determined. Post treatment parameters are compared to the corresponding pre treatment parameters and to the project's performance criteria. Combinations of reagents and dosages that produce desirable changes to the contaminated material are refined and retested. This process continues until an optimal treatment regimen is developed. Figure 1 is a pictographic of the experimental design for this study.

Figure 1. Experimental Design and Procedures



Equipment and Materials

Portland cement

Portland cement is the most common type of cement in general use around the world. It is a fine powder produced by grinding Portland cement clinker, a limited amount of calcium sulfate which controls the set time, and other minor constituents (as allowed by various standards).

Type I Portland cement is known as common or general purpose cement. It is commonly used for general construction especially when making precast and precast-prestressed concrete that is not to be in contact with soils or ground water.

Type II Portland cement is intended to have moderate sulfate resistance with or without moderate heat of hydration. This type of cement costs about the same as Type I. Because of similar price to that of Type I, Type II is often used as a general purpose cement, and the majority of Portland cement sold in North America meets this specification. Portland cement meeting both Type I and Type II specifications (i.e., Type I/II) is in common use.

Type I/II Portland cement provided by LaFarge North America was used for this study.

Ground Granulated Blast Furnace Slag

Ground granulated blast furnace slag (GGBFS) is obtained by quenching molten iron slag (a by-product of iron and steel making) from a blast furnace in water or steam, to produce a glassy, granular product that is then dried and ground into a fine powder.

GGBFS is used to make durable concrete structures in combination with ordinary portland cement and/or other pozzolanic materials. ASTM C 989-82 and AASHTO M 302 were developed to cover ground granulated blast furnace slag for use in concrete and mortar.

Experience with solidification/stabilization of soils containing NAPL has shown that the addition of GGBFS achieves a lower permeability than use of Portland cement alone. Additionally, the use of GGBFS reduces the heat of hydration for more controlled strength-gain in a large treated mass, provides better resistance to adverse alkali-silica reactions (ASR) and provides resistance to sulfate and other chemicals which can interfere with cement hydration reactions.

Grade 120 GGBFS provided by LaFarge North America was used for this study.

Sampling and Analysis

Soil samples were collected from soil borings installed during the IRM Design Investigation and archived in 5-gallon buckets for possible use for the bench-scale treatability study. From these buckets, URS prepared three composite samples._ The samples were composited from soil collected from soil borings SB-104, SB-

105, and a combination of SB-106 and SB-107._ These locations and depth intervals were selected based on several factors including:

- The availability of soil material–different intervals from different borings had varying degrees of recovery. Not all soil recovered during drilling was archived for treatability testing for practical purposes of segregated soil storage.
- The presence of DNAPL—the SB-106 interval of 47' to 57'bgs exhibited 100% NAPL saturation, and was combined with soil from SB-107 that was collected from 43' to 57' bgs (also with 100% NAPL saturation) as well as more soil from SB-107 from the entire length of the boring.

Soil Characterization

Sample Descriptions

Remedius received a total of nine five-gallon containers of NAPL-contaminated soil from the Williamsburg Works Former MGP Site—three five-gallon containers of soil from each of three sample locations. When received, soil from each sample location was labeled with a unique numeric laboratory ID.

Figure 2. 13551—Soil 1

Figure 3. 13552—Soil 2

Figure 4. 13553—Soil 3

The individual containers of soil from each sample location were combined and homogenized to form a single composite sample for that location. These are the three samples that were used for this study.

Prior to treating the soil, a portion of soil from each composite sample was used for determination of these physical properties:

- Moisture Content
- Particle-Size Distribution
- Density
- Atterberg Limits
- Hydraulic Conductivity

The purpose for determining these properties is to establish baseline conditions and to gain insight into characteristics that might affect the types and quantities of reagents used to stabilize the soil.

Sample Preparation

Moisture content and particle-size distribution were determined using samples of soil "as received." Density and Atterberg limits were determined using samples of soil after particles greater than ⅜-inch were removed. The reason for removing these particles is to ensure that specimens prepared for strength and permeability tests comply with ASTM requirements for these tests. Both tests stipulate the maximum particle size in relation to the diameter of the cylindrical specimens to be tested. Oversize particles were removed using a sieve.

Sample Testing

Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass—ASTM D2216-10

This test is used to determine the water (moisture) content by mass of soil, rock, and similar materials where the reduction in mass by drying is due to loss of water. A test specimen is dried in an oven at a temperature of 110° ± 5° C to a constant mass. The loss of mass due to drying is considered to be water. The water content is calculated using the mass of water and the mass of the dry specimen.

$$w = \frac{M_w}{M_s} \times 100 \qquad \textbf{(EQ 1)}$$

where:

w = water content (%)

M_w = mass of water $M_w = M_{ms} - M_s$

M_s = mass of oven dry specimen

M_{ms} = mass of moist specimen

The moisture contents of the three soils are similar, ranging from 15.9 percent to 22.6 percent.

Table 1. Moisture Content of Soil Samples

Sample ID	Moisture (%)
13551—Soil 1	18.5
13552—Soil 2	15.9
13553—Soil 3	22.6

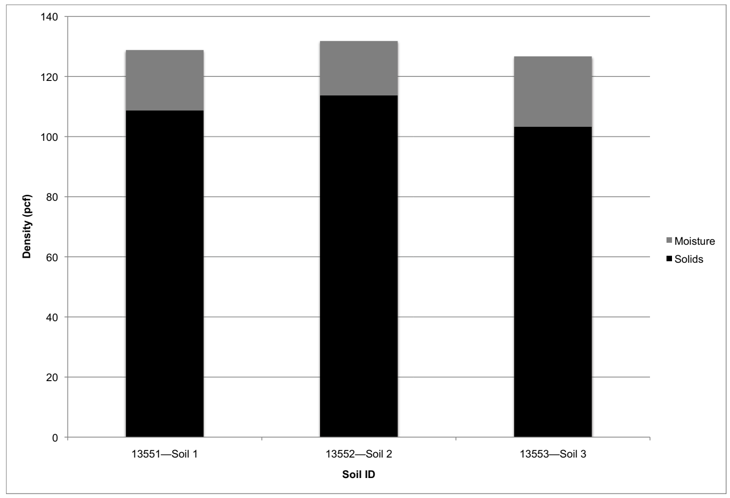
Compaction Characteristics of Soil Using Standard Effort—ASTM D698-12

This test is used to determine the relationship between water content and dry unit weight of soils (compaction curve) compacted in a 4 or 6-in. (101.6 or 152.4-mm) diameter mold with a 5.5-lbf (24.4-N) rammer dropped from a height of 12 in. (305 mm) producing a compactive effort of 12,400 ft-lbf/ft^3 (600 kN-m/m^3). A single point compaction test using a sample of soil "as received" was performed to determine the approximate in-place density of soil. The densities of the three soils are similar, ranging from 126.7 to 131.8 lbs/ft^3 wet weight, and 103.3 to 113.7 lbs/ft^3 dry weight.

Table 2. Soil Densities

Sample ID	Wet Density (lbs/ft^3)	Dry Density (lbs/ft^3)	Moisture (%)
13551—Soil 1	128.8	108.7	18.5
13552—Soil 2	131.8	113.7	15.9
13553—Soil 3	126.7	103.3	22.6

Figure 5. Solid-Liquid Composition of Soils



Particle-Size Analysis of Soils—ASTM D422 - 63(2007)

This test covers the quantitative determination of the distribution of particle sizes in soils. The objective of a particle-size analysis is to group soil particles into separate ranges of sizes and to determine the relative proportion by weight of each size range. The distribution of particle sizes larger than 75 micrometers (retained on the No. 200 sieve) is determined by sieving, while the distribution of particle sizes smaller than 75 micrometers is determined by a sedimentation process using a hydrometer.

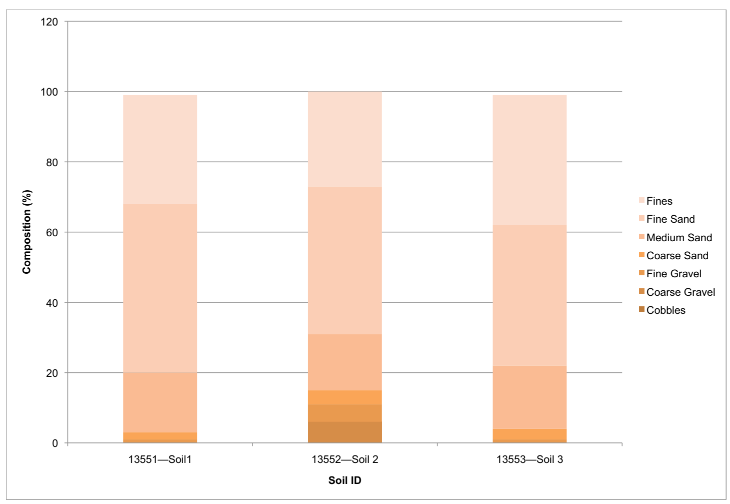
All three soils are similar, consisting primarily of sand and silt, with a minor gravel component. Table 3 is a tabulation of the soils' particles sizes. Figure 6 is a graphic illustrating the soils' compositions using a color gradation from dark, representing the largest particles, to light, representing the smallest. The graphic makes clear that Soil 2 is composed of a greater percentage of large particles than either of the other two soils. The other two soils are relatively equal, with Soil 3 composed of slightly less sand and more fines than Soil 1.

Table 3. Particle-Size Analysis of Soil Samples

	Particle-Size Composition (%)							Clay (%)[a]		Moisture (%)		
Sample ID	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines	<0.005 mm	<0.002 mm	Total Sample	Finer Portion First Subsample[b]	Finer Portion Second Subsample[c]
13551—Soil 1	0	0	1	2	17	48	31	10	8	18.5	6.8	6.7
13552—Soil 2	0	6	5	4	16	42	27	8	6	15.9	8.7	8.8
13553—Soil 3	0	0	1	3	18	40	37	14	10	22.6	11.8	12.1

a. Percentage of particles smaller than No. 200 sieve.
b. First subsample consists of soil smaller than No. 4 sieve and larger than No. 10 sieve.
c. Second subsample consists of soil smaller than No. 10 sieve.

Figure 6. Distribution of Particle Sizes

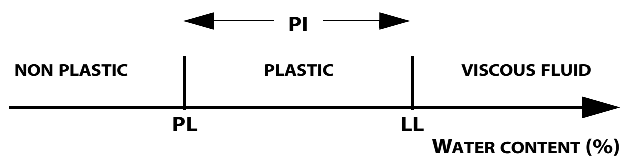


Liquid Limit, Plastic Limit, and Plasticity Index of Soils—ASTM D4318 - 10

These tests are used as an integral part of several engineering classification systems to characterize the fine-grained fractions of soils. The liquid limit, plastic limit, and plasticity index of soils are also used extensively, either individually or together, with other soil properties to correlate with engineering behavior such as compressibility, hydraulic conductivity (permeability), compactibility, shrink-swell, and shear strength.

The liquid (LL) and plastic (PL) limits define the water content boundaries between non-plastic, plastic and viscous fluid states. The plasticity index (PI) defines the complete range of plastic state.

Figure 7. Plasticity Index Relationship



All three soils are similar, exhibiting only a very narrow moisture range where the soil is plastic.

Table 4. Atterberg Limits of Soil Samples

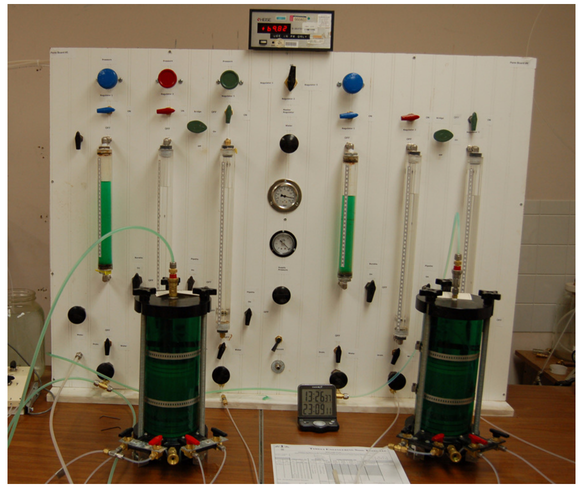
Sample ID	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
13551—Soil 1	22	18	4
13552—Soil 2	20	18	2
13553—Soil 3	23	17	6

Hydraulic Conductivity of Saturated Porous Materials—ASTM D5084

Hydraulic conductivity, often referred to as permeability, is a measurement of the resistance of a material to the passage of water. Permeability tests estimate the quantity and flow rate of water through material under saturated conditions.

ASTM Standard D5084 is a methodology for determining the hydraulic conductivity of water-saturated porous materials using a flexible wall permeameter. A material's permeability is determined by applying a hydraulic head of water to one end of a specimen and measuring the flow through the specimen. A pressure somewhat greater than the pressure under which liquids enter the specimen is imposed to press a flexible membrane firmly against the specimen, thereby preventing flow along the sidewall. A confining pressure of 10 psi was applied to all the specimens of this study.

Figure 8. Hydraulic Conductivity Apparatus



The relevance of permeability tests are best understood by comparing them to natural materials. Sand, a permeable material, has a hydraulic conductivity in the order of 10^{-2} cm/sec. Clay, a relatively impermeable material, has a hydraulic conductivity in the order of 10^{-6} cm/sec or less.

To obtain the permeability of soil prior to treatment, each soil was compacted to 100% of its dry density at its "as received" moisture content—no moisture adjustment. Coupled with the 10 psi confining pressure applied to the specimens when tested, this procedure produced specimens that are likely more compacted than the indigenous soil.

The soils are quite impermeable, ranging from a minimum of 1.1×10^{-7} to a maximum of 4.3×10^{-6} cm/s. As discussed previously, these results likely overstate the impermeability of the indigenous soil.

Table 5. Atterberg Limits of Soil Samples

Sample ID	Hydraulic Conductivity (cm/s)
13551—Soil 1	3.9×10^{-7}
13552—Soil 2	4.3×10^{-6}
13553—Soil 3	1.1×10^{-7}

First Iteration Mixes

For each soil, three mixes were prepared. One mix was created using a low dose of reagents, the second a medium dose, and the third a high dose. All mixes were prepared using the following procedure.

Mix Design Procedure

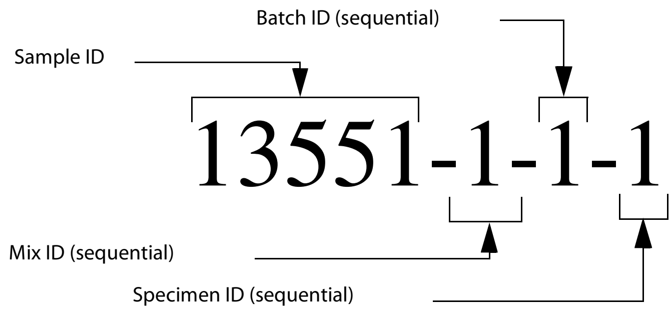
1. Weigh quantity of soil.
2. Compute the soil's dry weight.

   Assume that the soil's wet weight is 7110.0 grams and its moisture content is 18.5% (weight of moisture ÷ weight of solids x 100). The soil's dry weight is computed as follows: 7110.0 grams ÷ (1 + 0.185) = 6000 grams.
3. Compute prescribed quantity of reagent(s).

   Assume a mix design consists of 4.5% ground granulated blast furnace slag and 1.5% cement. The weight of each reagent is computed as follows: 6000 grams (soil's dry weight) x 4.5% (GGBFS dose) = 270 grams and 6000 grams x 1.5% (cement dose) = 90 grams.
4. Weigh prescribed quantity of reagent(s).
5. Place the reagents and enough water to create a flowable grout into an appropriate container. Record the amount of water used to make the grout. Mix using a commercial mixer or by hand using a stainless steel spoon or other non-reactive implement until thoroughly blended.

   N.B. The minimum quantity of water that a contractor might use to create a grout is equal to 60% of the reagents' weights. A grout prepared using less water would be too viscous to pump.
6. Add the grout to the soil and mix until the grout is thoroughly intermixed with the soil. If the mix is too dry to achieve a uniform consistency, add water until a uniform consistency is achieved. Record the amount of water added. The desired consistency is similar to the consistency of controlled low strength material (CLSM). It is a fluid material with typical slumps of 2 to 6 inches.
7. Place grouted soil into appropriate molds. Tamp the molds with a blunt object to remove any air and to allow the grouted soil to naturally compact. If the grouted soil is not self-leveling with a moderate amount of vibration, the mix is too dry. Add more water (record the quantity of water added), remix, and remold.
8. Cure specimens in a cooler at room temperature and 100% relative humidity for a prescribed duration, then remove from molds and test.

Figure 9. Mix Design Nomenclature



The mixes and compositions are tabulated in Table 6.

Table 6. Mix Designs

Soil 1					Soil 2					Soil 3				
Mix ID	**Component**	**Mass (g)**	**Ratio (%)**	**w/r[a]**	**Mix ID**	**Component**	**Mass (g)**	**Ratio (%)**	**w/r**	**Mix ID**	**Component**	**Mass (g)**	**Ratio (%)**	**w/r**
13551-1-1	Soil (Wet Mass)	7110			13552-1-1	Soil (Wet Mass)	6954			13553-1-1	Soil (Wet Mass)	7356		
	Soil (Dry Mass)	6000	100			Soil (Dry Mass)	6000	100			Soil (Dry Mass)	6000	100	
	GGBFS	270	4.5			GGBFS	270	4.5			GGBFS	270	4.5	
	Cement	90	1.5			Cement	90	1.5			Cement	90	1.5	
	Grout Moisture	516		1.43		Grout Moisture	716		1.99		Grout Moisture	416		1.16
	Soil Moisture	1110				Soil Moisture	954				Soil Moisture	1356		
	Total Moisture[b]	1626		4.52		Total Moisture	1670		4.64		Total Moisture	1772		4.92
13551-2-1	Soil (Wet Mass)	7110			13552-2-1	Soil (Wet Mass)	6954			13553-2-1	Soil (Wet Mass)	6954		
	Soil (Dry Mass)	6000	100			Soil (Dry Mass)	6000	100			Soil (Dry Mass)	6000	100	
	GGBFS	405	6.75			GGBFS	405	6.75			GGBFS	405	6.75	
	Cement	135	2.25			Cement	135	2.25			Cement	135	2.25	
	Grout Moisture	574		1.06		Grout Moisture	774		1.43		Grout Moisture	544		1.01
	Soil Moisture	1110				Soil Moisture	954				Soil Moisture	1356		
	Total Moisture	1684		3.12		Total Moisture	1728		3.20		Total Moisture	1900		3.52
13551-3-1	Soil (Wet Mass)	7110			13552-3-1	Soil (Wet Mass)	6954			13553-3-1	Soil (Wet Mass)	6954		
	Soil (Dry Mass)	6000	100			Soil (Dry Mass)	6000	100			Soil (Dry Mass)	6000	100	
	GGBFS	540	9.0			GGBFS	540	9.0			GGBFS	540	9.0	
	Cement	180	3.0			Cement	180	3.0			Cement	180	3.0	
	Grout Moisture	632		0.88		Grout Moisture	832		1.16		Grout Moisture	582		0.81
	Soil Moisture	1110				Soil Moisture	954				Soil Moisture	1356		
	Total Moisture	1742		2.42		Total Moisture	1786		2.48		Total Moisture	1938		2.69

a. Water to reagents ratio
b. Total moisture is the sum of the grout's moisture and the soil's moisture.

For each mix that was prepared, five cylindrical specimens were formed—three specimens for strength and two for permeability. Specimens for strength were molded in 3-inch diameter by 6-inch length molds. Specimens for hydraulic conductivity were molded in 3-inch diameter by 3-inch length molds. Specimens were cured at 100% relative humidity and standard temperature and pressure. After curing for a prescribed duration, specimens were extruded from their molds and tested. Strength was determined after specimens cured 7, 14, and 28 days. Permeability was determined after specimens have cured 7 and 28 days.

Sample Testing

Compressive Strength of Molded Soil-Cement Cylinders—ASTM D1633 - 00(2007)

This test covers the determination of the compressive strength of soil-cement using molded cylinders as test specimens. Unconfined compressive strength is a measurement of a material's shear strength. Shear strength is the maximum stress that a material can withstand before failure in shear. Shear refers to deformation in which parallel surfaces slide past one another.

The method determines the shear strength of cohesive, soil-like material in unsaturated undrained conditions with no lateral confinement of the specimen. The test entails placing a cylindrical specimen between two plates. The specimen is subjected to a vertical strain at a rate between 0.5 to 2 percent per minute until the specimen fails. Loading continues until the load values decrease with increasing strain, or until 15 percent strain is reached. The peak stress (at failure) is defined as the Unconfined Compressive Strength.

Figure 10. Compression Machine

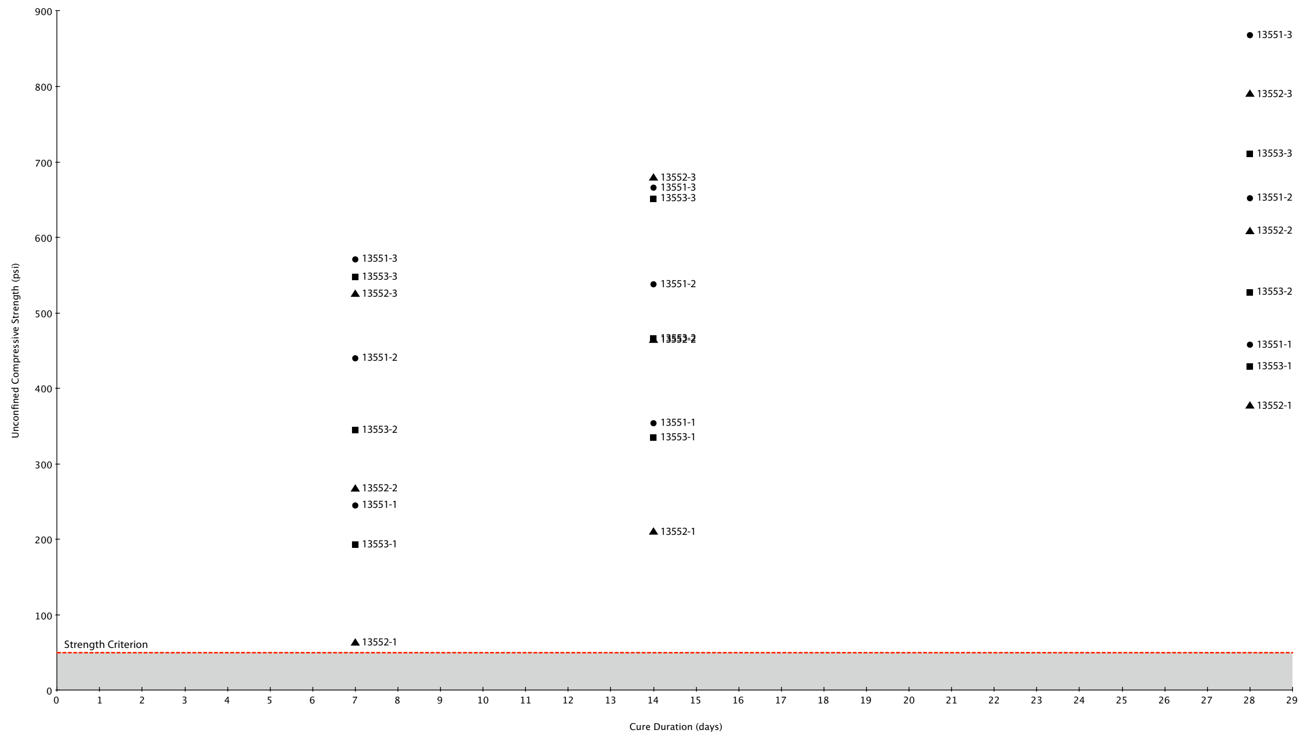
Strengths of mixes increase with dose and time. Mixes prepared using Soil 2 gain slightly less early strength using the 6% dose of GGBFS and cement than mixes prepared using either of the other two soils. However, all mixes exceed the minimum strength criterion after curing seven days, and strength continues to increase.

Table 7. First Iteration Strengths

Soil	Mix ID	Dose[a] (%)	Strength (psi) 7-day	14-day	28-day
Soil 1	13551-1-1	6	245	354	458
	13551-2-1	9	440	538	652
	13551-3-1	12	571	666	868
Soil 2	13552-1-1	6	63	210	377
	13552-2-1	9	267	464	608
	13552-3-1	12	525	679	790
Soil 3	13553-1-1	6	193	335	429
	13553-2-1	9	345	466	527
	13553-3-1	12	548	651	711

a. Total dose of cementitious materials consisting of 3 parts GGBFS and 1 part cement

Figure 11. First Iteration Strengths



Hydraulic Conductivity of Saturated Porous Materials—ASTM D5084

Permeabilities of the mixes decrease with dose and time. All mixes are less permeable than the criterion after curing seven days, and permeability continues to decrease.

Table 8. First Iteration Permeabilities

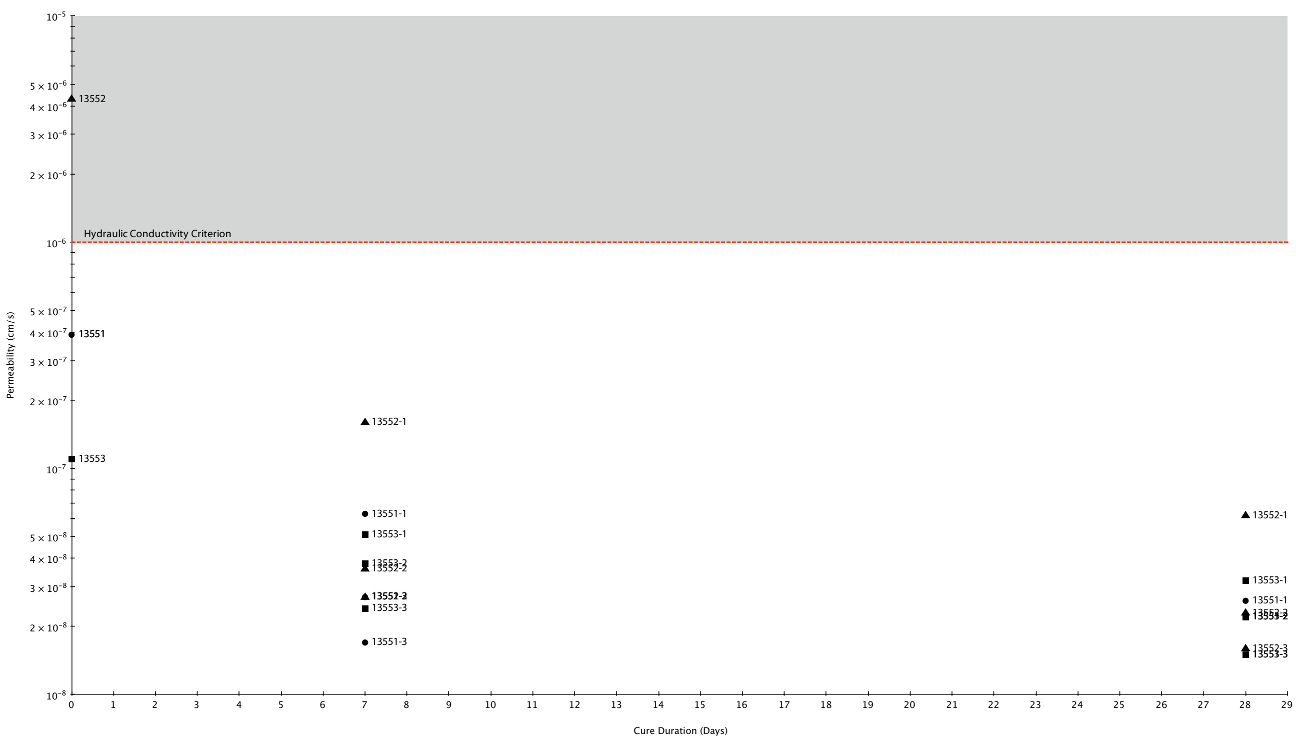
			Permeability (cm/s)	
Soil	Mix ID	Dose[a] (%)	7-day	28-day
Soil 1	13551-1-1	6	6.3×10^{-8}	2.6×10^{-8}
	13551-2-1	9	2.7×10^{-8}	2.2×10^{-8}
	13551-3-1	12	1.9×10^{-8}	1.5×10^{-8}
Soil 2	13552-1-1	6	1.6×10^{-7}	6.2×10^{-8}
	13552-2-1	9	3.6×10^{-8}	2.3×10^{-8}
	13552-3-1	12	2.7×10^{-8}	1.6×10^{-8}

Table 8. First Iteration Permeabilities

Soil	Mix ID	Dose[a] (%)	Permeability (cm/s) 7-day	28-day
Soil 3	13553-1-1	6	5.1×10^{-8}	3.2×10^{-8}
	13553-2-1	9	3.8×10^{-8}	2.2×10^{-8}
	13553-3-1	12	2.4×10^{-8}	1.5×10^{-8}

a. Total dose of cementitious materials consisting of 3 parts GGBFS and 1 part cement

Figure 12. First Iteration Permeabilities



Data Analysis and Interpretation

There were only minor differences in the three soil samples that were received. Soil 2 differs slightly from the other two soil samples in these ways:

- Slightly more dense,
- Composed of slightly more gravel,
- Moisture content is slightly less, and
- Slightly more permeable.

In all other respects the three soils are very similar.

All three soils were treated using the same mix designs—6, 9, and 12 percent doses of GGBFS and cement. The GGBFS and cement are combined in a 3-to-1 ratio of three parts GGBFS and one part cement. Only the water-to-reagents ratio differed from one mix to another.

The strengths of all mixes exceed the likely engineering requirements for future use of the property.

The permeabilities of all mixes are less than the indigenous soils' permeability and an order or two less permeable than this study's criterion of 1 x 10^{-6} cm/s.

The data indicates that NAPL-contaminated soil can be treated to produce a solid, impermeable monolith that will limit further movement of contaminants through any pathway.

Conclusions and Recommendations

Conclusions

A 6% dose of GGBFS and cement (4.5% GGBFS and 1.5% cement) produces a material with strength that will resist physical degradation and greatly exceeds the likely engineering requirements for future use of the property. The treatment also reduces the soil's permeability sufficiently to significantly limit the flow of ground water or surface water through it. The permeability of the treated material asymptotes toward 1 x 10^{-8} cm/s. This is two orders of magnitude less permeable than the criterion for this study.

Some adjustments to the mix design will undoubtedly be expected if the remedy is implemented on a full-scale basis.

First, because strength exceeds the likely engineering requirements for future use of the property, a mix design using less reagent might be feasible. However, most mixing processes require a minimum volume of grout during the mixing process to fluidize the soil and lubricate mixing equipment. If the grout volume is insufficient, friction can prevent the columns from being mixed. If the amount of reagent is decreased and the volume of water for grout makeup remains unchanged so as to produce approximately the same volume of grout, the water-to-reagents ratio increases. This will likely decrease strength, which is desirable. But, it will also likely increase permeability, which is not desirable.

Second, if the remedy is implemented by creating overlapping columns of treated material, the soil's ultimate strength will have to be moderated where columns cure for lengthy durations before overlapping columns can be mixed. Moderating the strength will require some adjustments to the mix design. This might entail reducing the dose of GGBFS and cement, or it might entail adding a retarder to the mix design to slow the hydration and setting of GGBFS and cement, or it might entail adding bentonite, which previous studies have shown decreases strength when added in sufficient doses. If the dose of GGBFS and cement is reduced for these columns, the same precaution mentioned previously also applies.

Alternatively, the mix design could be used "as is," and columns could be created with each column abutting adjacent columns rather than overlapping them. Or, only columns that cure for a lengthy duration before overlapping columns can be mixed might have adjacent columns abut them rather than overlap them. Either option would decrease reagent costs because slightly less soil would be treated. And, it would also decrease installation costs because fewer columns would be mixed. There will be small interstitial areas of untreated soil between columns. But, because these areas of untreated soil would be "sandwiched" between large monolithic columns of treated soil, ground water would still flow around rather than through the mass. There is the possibility that surface water might infiltrate through the monolith following the vertical pathway of untreated soil. However, the untreated soil volume will be a very small percentage compared to the treated soil volume, so the mass of contaminants that might migrate via advection will be minimal. If water infiltration through these vertical channels is a concern, an impermeable layer could be incorporated into the final surface design for the park.

Recommendations

Because stabilization might be one component of a multi-component remedy for the site, and because equipment that might be used to treat the soil in situ will differ from contractor to contractor, contractors should be consulted for input about the operating parameters for their specific equipment. Based on their responses, a small sidebar study is recommended to determine the sensitivity of a mix design to changes of dose, water-to-reagents ratio, or addition of additives to retard the hydration of GGBFS and cement or to increase the fluidity and lubricity of the mix design.

T.E. S.T.

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	ER/AV
Date	05/07/12
Checked By	

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13551/Soil 1	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 422/AASHTO T 88

Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

As-Received Moisture Content (Total Sample)

Mass of Wet Sample & Tare, g	1092.1
Mass of Dry Sample & Tare, g	953.6
Mass of Tare, g	203.9
Moisture Content, %	18.5

Moisture Content of FINER PORTION

	1st Subsample	*2nd Subsample*
Mass of Wet Sample & Tare, g	411.9	392.80
Mass of Dry Sample & Tare, g	391.1	373.40
Mass of Tare, g	87.2	82.70
Moisture Content, %	6.8	6.7

Mass of Total Sample before separation on 3/8" sieve & Tare, g	74800
Mass of Tare, g	0.0
Total Mass of Dry Sample, g	63136

	1st Subsample	*2nd Subsample*
Mass of Wet Finer Portion & Tare, g	1407.0	101.94
Mass of Tare	0.0	0.0
Dry Mass, g	1316.9	95.56
% of Total Sample passing Split Sieve	99.3	98.6

SIEVE ANALYSIS

COARSER PORTION OF SAMPLE (RETAINED ON 3/8" SIEVE)

Mass of Tare, g: 0.00

Sieve Size		Sample & Tare, g	% RETAINED	% PASSING (of Total)
12"	COBBLES		0	100
3"	COARSE GRAVEL		0	100
2.5"			0	100
2"			0	100
1.5"		0.0	0	100
1"		165.1	0	100
.75"	FINE GRAVEL	238.0	0	100
.5"		404.5	1	99
.375"		443.4	1	99
#4	COARSE SAND	9.8	1	99

#4 <First Subsample of Finer Portion<3/8"

2nd Subsample of FINER PORTION OF SAMPLE (PASSING #4 SIEVE:Hydrometer Backsieve)

Sieve Size		Cumulative Mass retained, g	% PASSING (of Total)
#10	MEDIUM SAND	2.41	96
#20		8.45	90
#40	FINE SAND	19.14	79
#60		37.83	60
#100		53.03	44
#200	FINES	65.36	31

Remarks

HYDROMETER ANALYSIS

Length of Dispersion Period	1 Minute
Mechanical Dispersion Device ID #	61
Amount of Dispersing Agent (ml)	125.0
Specific Gravity (assumed)	2.650
Specific Gravity (tested)	
Starting time	11:46

PARTICLE-SIZE ANALYSIS

% COBBLES	0	% MEDIUM SAND	17
% COARSE GRAVEL	0	% FINE SAND	48
% FINE GRAVEL	1	% FINES	31
% COARSE SAND	2	% TOTAL SAMPLE	100
% CLAY(<0.005mm)	10	% CLAY(<0.002mm)	8

Date	Time	Testing time (min)	Reading	Temp (^oC)	K	Composite Correction	Actual Reading	Effective Depth (cm)	a	Particle Diam. (mm)	Percent Passing
	11:48	2	25.0	21.4	0.01348	5.0	20.0	13.1	1.00	0.0344	20.6
01/00/00	11:51	5	22.0	21.4	0.01348	5.0	17.0	13.6	1.00	0.0222	17.5
01/00/00	12:01	15	19.5	21.4	0.01348	5.0	14.5	14.0	1.00	0.0130	15.0
01/00/00	12:16	30	18.0	21.4	0.01348	5.0	13.0	14.2	1.00	0.0093	13.4
01/00/00	12:46	60	16.0	21.4	0.01348	5.0	11.0	14.6	1.00	0.0066	11.3
01/00/00	15:56	250	13.5	21.4	0.01348	5.0	8.5	15.0	1.00	0.0033	8.8
01/01/00	11:46	1440	12.0	21.4	0.01348	5.0	7.0	15.2	1.00	0.0014	7.2

Hydrometer 152H ID #	451190	Oven ID #	12/13/14/15
Sieve Shaker ID #	54/130	Balance ID#	1/6/7

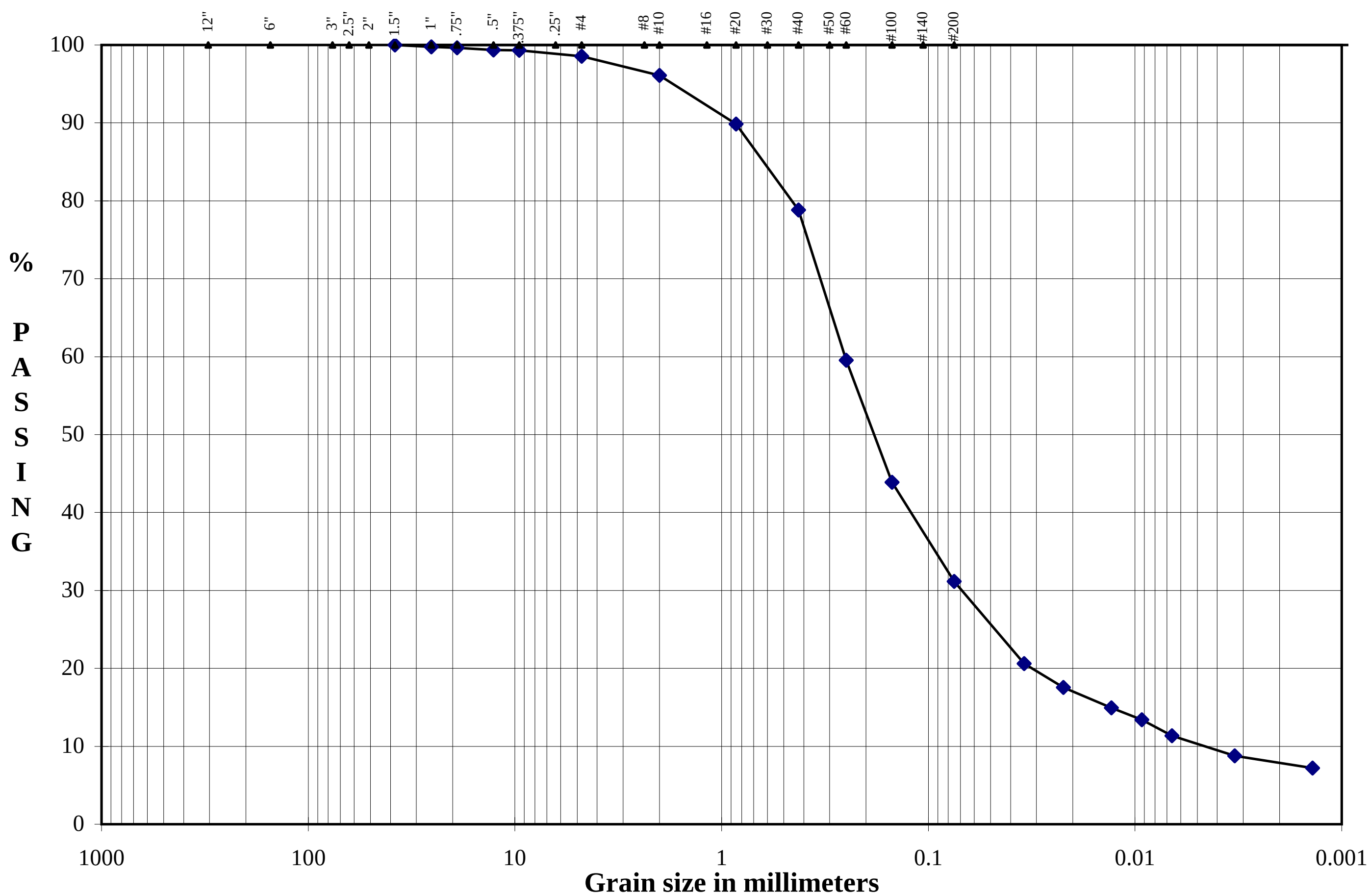
T.E.S.T.	TIMELY ENGINEERING SOIL TESTS, LLC	1874 Forge Street Tucker, GA 30084 Phone: 770-938-8233 Fax: 770-923-8973 Web: www.test-llc.com	Tested By: ER/AV Date: 05/07/12 Checked By: [signature]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13551/Soil 1	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 422/AASHTO T 88

Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

Particle-Size Analysis



Boulders	Cobbles	Gravel		Sand			Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

D_{10}	NA	mm
D_{30}	NA	mm
D_{60}	NA	mm
Cu	NA	
Cc	NA	

DESCRIPTION: NA

USCS (ASTM D2487; D2488): NA

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Tested By	NK
Date	05/14/12
Checked By	

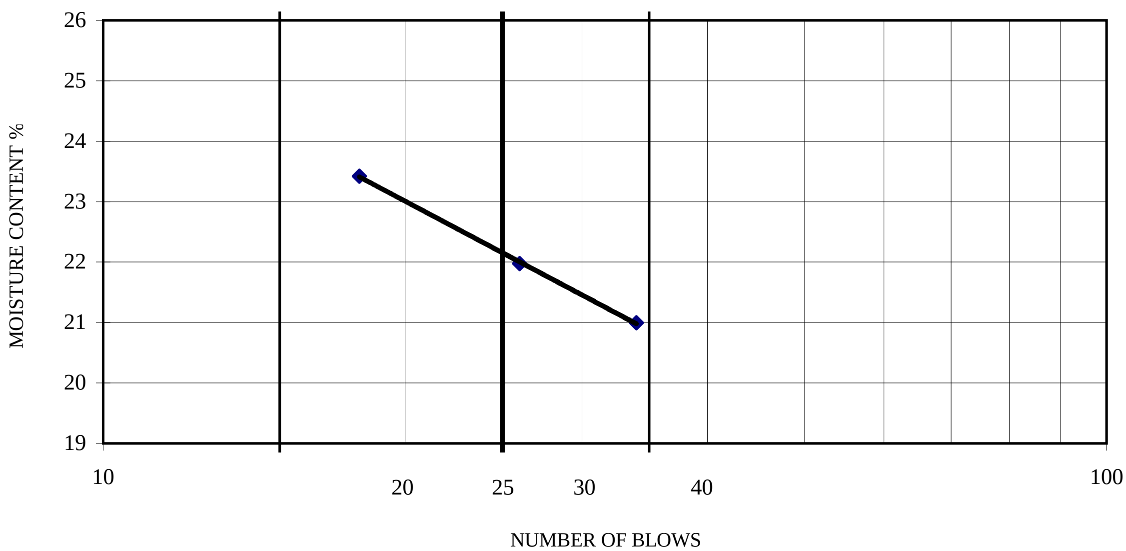
Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13551/Soil 1	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 4318/AASHTO T 88, T 89
Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (Atterberg Limits)

LIQUID LIMIT

Number of Blows	34	26	18
Mass of Wet Sample & Tare, g	42.78	42.60	38.83
Mass of Dry Sample & Tare, g	39.95	39.60	36.01
Mass of Tare, g	26.47	25.95	23.97
Moisture Content, %	20.99	21.98	23.42

Oven ID #	12/13/14/15
Balance ID #	2
Liquid Limit Device ID #	56



PLASTIC LIMIT

Mass of Wet Sample & Tare, g	34.51	33.11
Mass of Dry Sample & Tare, g	32.86	31.76
Mass of Tare, g	23.71	24.35
Moisture Content, %	18.03	18.22

PREPARATION PROCEDURE: DRY

NOTE: MATERIAL PASSING NO. 40 SIEVE WAS USED FOR TEST

NATURAL MOISTURE

Mass of Wet Sample & Tare, g	1092.10
Mass of Dry Sample & Tare, g	953.60
Mass of Tare, g	203.90
Moisture Content, %	18.47

LIQUID LIMIT (LL)	22
PLASTIC LIMIT (PL)	18
PLASTICITY INDEX (PI)	4
LIQUIDITY INDEX (LI)	0.12

DESCRIPTION: NA

USCS (ASTM D2487; D2488): NA

AASHTO (M 145): NA

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Tested By	RI
Date	05/09/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13551/Soil 1	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 698
Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3))

DETERMINATION OF TEST PROCEDURE

	wet	dry
Mass of Soil before sieving, g		
Mass of Mat. Retained on No. 4 sieve, g		
Mass of Mat. Retained on 3/8" sieve, g		
Mass of Mat. Retained on 3/4" sieve, g		

Material Retained on No. 4 Sieve, %	
Material Retained on 3/8" Sieve, %	
Material Retained on 3/4" Sieve, %	
Total, % (oversized)	

MOISTURE CONTENT

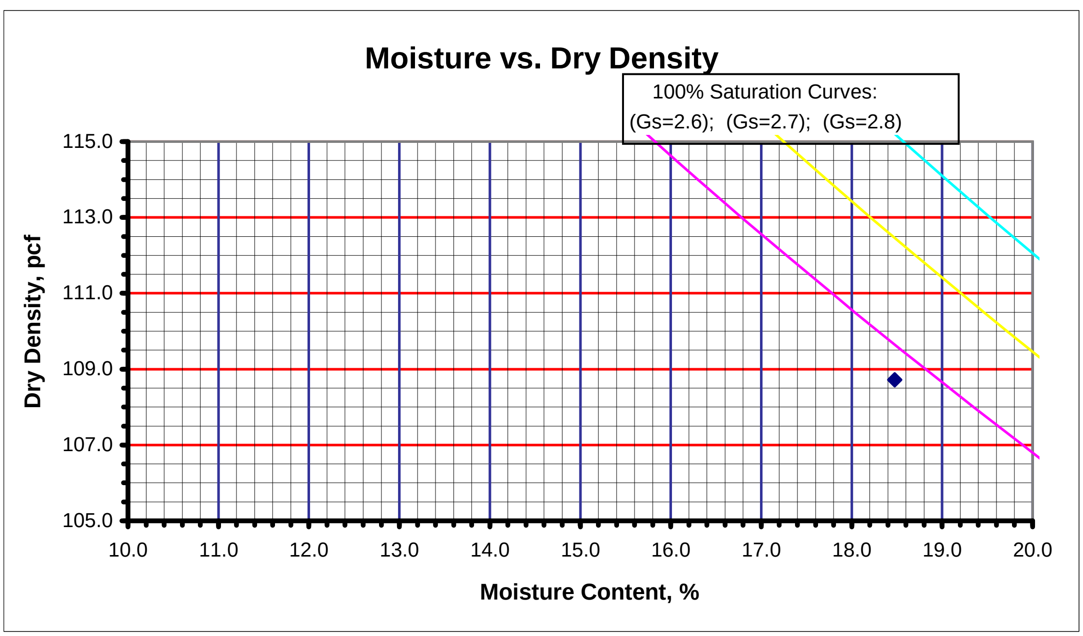
	Coarse + Fine Fraction	Coarse Fraction
Mass of Wet Sample & Tare, g		
Mass of Dry Sample & Tare, g		
Mass of Tare, g		
Moisture Content, %		

Procedure: B

TEST DATA

Points	1	2	3	4	5
Mass of Mold and Soil, g	6196.0				
Mass of Wet Sample & Tare, g	1092.1				
Mass of Dry Sample & Tare, g	953.6				
Mass of Tare, g	203.9				
Moisture Content, %	18.5				
Wet Density, pcf	128.8				
Dry Density, pcf	108.7				

Mold ID Number	321B
Mass of Mold, g	4250.5
Volume of Mold, ft^3	0.0333
Hammer ID Number	318
Number of Blows per layer	25
Number of Layers	3



Method A: Material retained on No. 4 ≤ 20%
Method B: Material retained on No. 4 > 20% and material retained on 3/8" ≤ 20%
Method C: Material retained on 3/8" > 20% and material retained on 3/4" < 30%

REMARKS

One Point Proctor was performed for material (<3/8") @ as-received moisture content

DESCRIPTION

NA

USCS (ASTM D2487; D2488): NA

Maximum Dry Density, pcf		**Corrected Maximum Dry Density, pcf**	**NA**
Optimum Moisture Content, %		**Corrected Optimum Moisture Content, %**	**NA**

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Tested By	EB
Date	05/11/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13551/Soil 1	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	3.004	in	7.63	cm
Diameter	2.852	in	7.24	cm
Area	6.39	in^2	41.22	cm^2
Volume	314.48	cm^3	0.0111	ft^3
Mass	647.50	g	1.43	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	108.4	pcf		

Moisture Content

Mass of wet sample & tare	1092.10	g
Mass of dry sample & tare	953.60	g
Mass of tare	203.90	g
% Moisture	18.5	

Test Data

Speed	10	
Board Number	4	
Cell Number	5	
Flow Pump Number	1B	
Flow Pump Rate	2.24E-04	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	85.81	cm
Min Head	85.11	cm
Maximum Gradient	12.48	
Minimum Gradient	12.38	

Final Data (After Test)

Average Height of Sample			2.707	in	6.88	cm
Average Diameter of Sample			2.881	in	7.32	cm
Area	6.52	in^2	42.06	cm^2		
Volume	289.18	cm^3	0.0102	ft^3		
Mass	636.50	g	1.40	lb		

Dry Density	118.9	pcf
Vol. of Voids	85.11	cm^3
Vol. of Solids	204.07	cm^3
Void Ratio	0.42	
Saturation	100.5	%

Moisture Content

Mass of wet sample & tare	723.30	g
Mass of dry sample & tare	637.80	g
Mass of tare	86.90	g
% Moisture	15.5	

TIME FUNCTION			Δt	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x (°C)	@ T_x	R_T	@ 20 °C	
05/11/12	8	0	-	1.22	85.81	12.48	24.0	-	-	-	
05/11/12	8	5	300	1.21	85.11	12.38	24.0	4.28E-07	0.910	3.90E-07	
05/11/12	8	10	300	1.21	85.11	12.38	24.0	4.30E-07	0.910	3.91E-07	
05/11/12	8	15	300	1.22	85.81	12.48	24.0	4.28E-07	0.910	3.90E-07	*
05/11/12	8	20	300	1.21	85.11	12.38	24.0	4.28E-07	0.910	3.90E-07	*
05/11/12	8	25	300	1.22	85.81	12.48	24.0	4.28E-07	0.910	3.90E-07	*
05/11/12	8	30	300	1.22	85.81	12.48	24.0	4.27E-07	0.910	3.88E-07	*

Reported Average Hydraulic Conductivity* 3.9E-07 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Material passed 3/8" sieve used for testing. Material was remolded to 99.8% of dry density (one point standard proctor) at as-received moisture content.

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	63	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	141			Pore Pressure Transducer ID #	26/27

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Tested By	ER/AV
Date	05/07/12
Checked By	

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13552/Soil 2	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 422/AASHTO T 88

Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

As-Received Moisture Content (Total Sample)

Mass of Wet Sample & Tare, g	921.6
Mass of Dry Sample & Tare, g	821.8
Mass of Tare, g	195.0
Moisture Content, %	15.9

Moisture Content of FINER PORTION

	1st Subsample	2nd Subsample
Mass of Wet Sample & Tare, g	422.2	481.20
Mass of Dry Sample & Tare, g	396.5	453.70
Mass of Tare, g	99.8	140.70
Moisture Content, %	8.7	8.8

Mass of Total Sample before separation on 3/8" sieve & Tare, g	78950
Mass of Tare, g	0.0
Total Mass of Dry Sample, g	68106

	1st Subsample	2nd Subsample
Mass of Wet Finer Portion & Tare, g	1238.0	101.42
Mass of Tare	0.0	0.0
Dry Mass, g	1139.3	93.23
% of Total Sample passing Split Sieve	90.8	88.3

SIEVE ANALYSIS

COARSER PORTION OF SAMPLE (RETAINED ON 3/8" SIEVE)

Mass of Tare, g: 0.00

Sieve Size		Sample & Tare, g	% RETAINED	% PASSING (of Total)
12"	COBBLES		0	100
3"	COARSE GRAVEL		0	100
2.5"		0.0	0	100
2"		159.5	0	100
1.5"		744.9	1	99
1"		2488.8	4	96
.75"	FINE GRAVEL	4293.2	6	94
.5"		5278.1	8	92
.375"		6283.0	9	91
#4	COARSE SAND	31.7	3	88

#4 <First Subsample of Finer Portion<3/8"

2nd Subsample of FINER PORTION OF SAMPLE (PASSING #4 SIEVE:Hydrometer Backsieve)

Sieve Size		Cumulative Mass retained, g	% PASSING (of Total)
#10	MEDIUM SAND	4.19	84
#20		10.18	79
#40	FINE SAND	20.59	69
#60		38.96	51
#100		54.00	37
#200	FINES	65.21	27

Remarks

HYDROMETER ANALYSIS

Length of Dispersion Period	1 Minute
Mechanical Dispersion Device ID #	61
Amount of Dispersing Agent (ml)	125.0
Specific Gravity (assumed)	2.650
Specific Gravity (tested)	
Starting time	11:48

PARTICLE-SIZE ANALYSIS

% COBBLES	0	% MEDIUM SAND	16
% COARSE GRAVEL	6	% FINE SAND	42
% FINE GRAVEL	5	% FINES	27
% COARSE SAND	4	% TOTAL SAMPLE	100
% CLAY(<0.005mm)	8	% CLAY(<0.002mm)	6

Date	Time	Testing time (min)	Reading	Temp (^oC)	K	Composite Correction	Actual Reading	Effective Depth (cm)	a	Particle Diam. (mm)	Percent Passing
	11:50	2	23.0	21.4	0.01348	5.0	18.0	13.4	1.00	0.0349	17.0
01/00/00	11:53	5	21.0	21.4	0.01348	5.0	16.0	13.7	1.00	0.0223	15.1
01/00/00	12:03	15	18.0	21.4	0.01348	5.0	13.0	14.2	1.00	0.0131	12.3
01/00/00	12:18	30	16.0	21.4	0.01348	5.0	11.0	14.6	1.00	0.0094	10.4
01/00/00	12:48	60	14.5	21.4	0.01348	5.0	9.5	14.8	1.00	0.0067	9.0
01/00/00	15:58	250	12.0	21.4	0.01348	5.0	7.0	15.2	1.00	0.0033	6.6
01/01/00	11:48	1440	11.0	21.4	0.01348	5.0	6.0	15.4	1.00	0.0014	5.7

Hydrometer 152H ID #	451190	Oven ID #	12/13/14/15
Sieve Shaker ID #	54/130	Balance ID#	1/6/7

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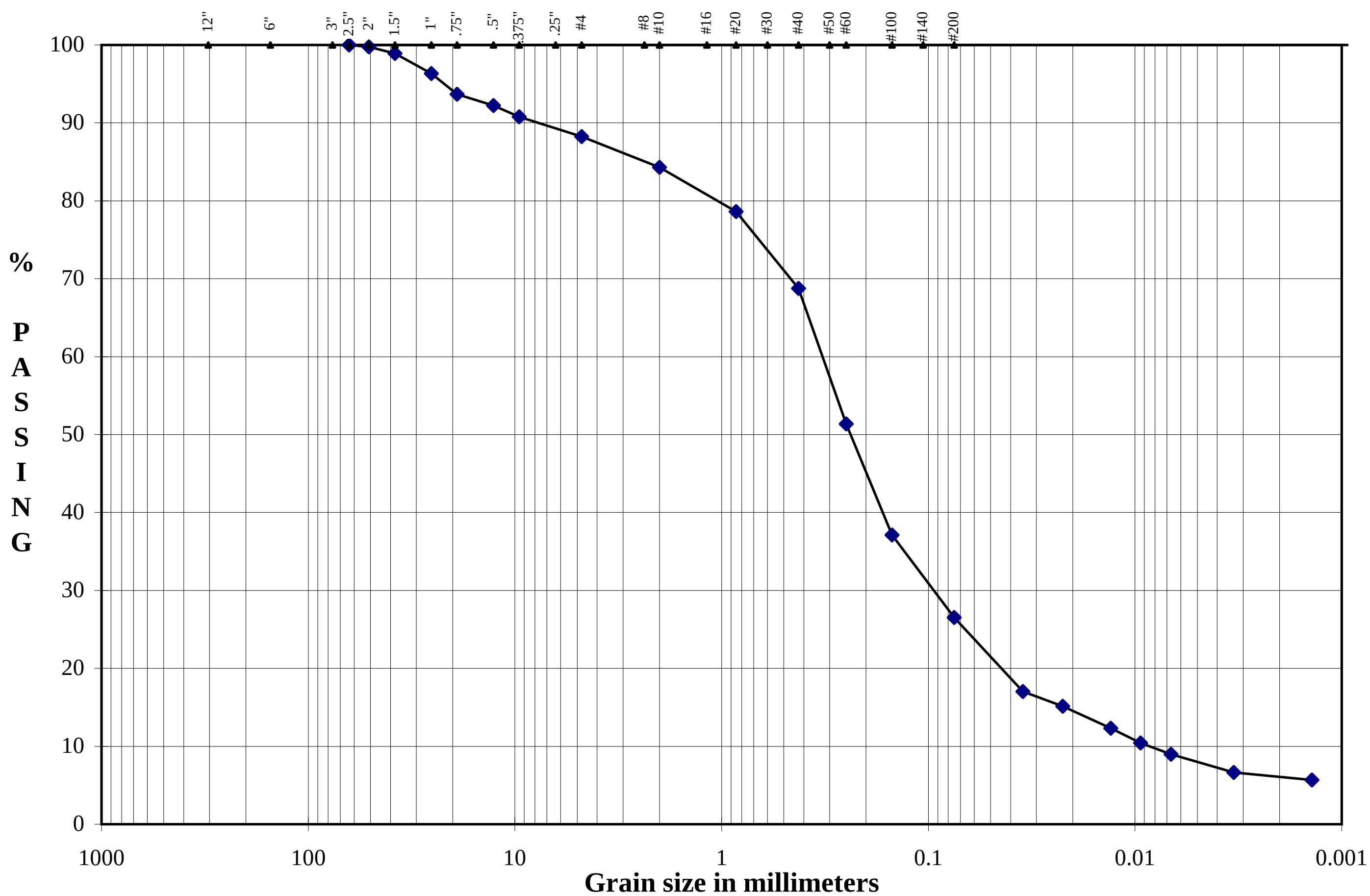
Tested By	ER/AV
Date	05/07/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13552/Soil 2	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 422/AASHTO T 88

Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

Particle-Size Analysis



Boulders	Cobbles	Gravel		Sand			Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

D_{10}	NA	mm
D_{30}	NA	mm
D_{60}	NA	mm
Cu	NA	
Cc	NA	

DESCRIPTION: NA

USCS (ASTM D2487; D2488): NA

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			Date	05/14/12
			Checked By	*(initials)*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13552/Soil 2	Depth/Elev.	-
Location	-	Add. Info	-

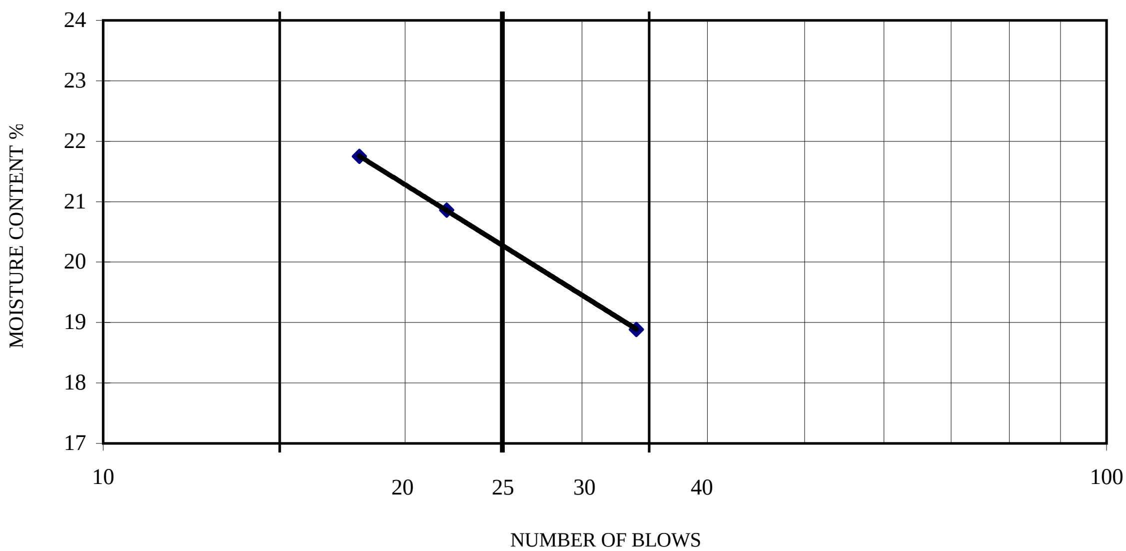
ASTM D 4318/AASHTO T 88, T 89

Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (Atterberg Limits)

LIQUID LIMIT

Number of Blows	34	22	18
Mass of Wet Sample & Tare, g	40.97	45.94	42.26
Mass of Dry Sample & Tare, g	38.56	42.60	39.30
Mass of Tare, g	25.80	26.59	25.69
Moisture Content, %	18.89	20.86	21.75

Oven ID #	12/13/14/15
Balance ID #	2
Liquid Limit Device ID #	56



PLASTIC LIMIT

Mass of Wet Sample & Tare, g	35.65	32.84
Mass of Dry Sample & Tare, g	33.84	31.55
Mass of Tare, g	24.00	24.55
Moisture Content, %	18.39	18.43

PREPARATION PROCEDURE: DRY

NOTE: MATERIAL PASSING NO. 40 SIEVE WAS USED FOR TEST

NATURAL MOISTURE

Mass of Wet Sample & Tare, g	921.60
Mass of Dry Sample & Tare, g	821.80
Mass of Tare, g	195.00
Moisture Content, %	15.92

LIQUID LIMIT (LL)	20
PLASTIC LIMIT (PL)	18
PLASTICITY INDEX (PI)	2
LIQUIDITY INDEX (LI)	-1.04

DESCRIPTION: NA

USCS (ASTM D2487; D2488): NA

AASHTO (M 145): NA

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Web: www.test-llc.com

Tested By	RI
Date	05/09/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13552/Soil 2	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 698
Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3))

DETERMINATION OF TEST PROCEDURE

	wet	dry
Mass of Soil before sieving, g		
Mass of Mat. Retained on No. 4 sieve, g		
Mass of Mat. Retained on 3/8" sieve, g		
Mass of Mat. Retained on 3/4" sieve, g		

Material Retained on No. 4 Sieve, %	
Material Retained on 3/8" Sieve, %	
Material Retained on 3/4" Sieve, %	
Total, % (oversized)	

MOISTURE CONTENT

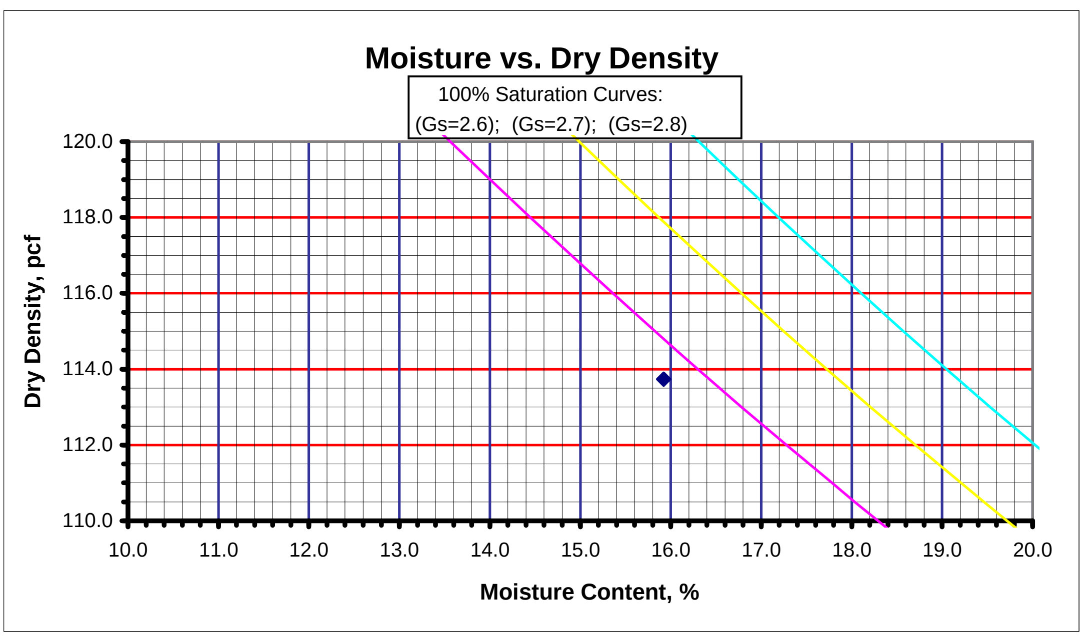
	Coarse + Fine Fraction	Coarse Fraction
Mass of Wet Sample & Tare, g		
Mass of Dry Sample & Tare, g		
Mass of Tare, g		
Moisture Content, %		

Procedure: B

TEST DATA

Points	1	2	3	4	5
Mass of Mold and Soil, g	6242.0				
Mass of Wet Sample & Tare, g	921.6				
Mass of Dry Sample & Tare, g	821.8				
Mass of Tare, g	195.0				
Moisture Content, %	15.9				
Wet Density, pcf	131.8				
Dry Density, pcf	113.7				

Mold ID Number	321B
Mass of Mold, g	4250.5
Volume of Mold, ft^3	0.0333
Hammer ID Number	318
Number of Blows per layer	25
Number of Layers	3



Method A: Material retained on No. 4 ≤ 20%
Method B: Material retained on No. 4 > 20% and material retained on 3/8" ≤ 20%
Method C: Material retained on 3/8" > 20% and material retained on 3/4" < 30%

REMARKS
One Point Proctor was performed for material (<3/8") @ as-received moisture content

DESCRIPTION
NA

USCS (ASTM D2487; D2488)
NA

Maximum Dry Density, pcf	
Optimum Moisture Content, %	

Corrected Maximum Dry Density, pcf	**NA**
Corrected Optimum Moisture Content, %	**NA**

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Web: www.test-llc.com

Tested By	EB
Date	05/11/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13552/Soil 2	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	3.004	in	7.63	cm
Diameter	2.852	in	7.24	cm
Area	6.39	in^2	41.22	cm^2
Volume	314.48	cm^3	0.0111	ft^3
Mass	664.90	g	1.47	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	113.8	pcf		

Moisture Content

Mass of wet sample & tare	921.6	g
Mass of dry sample & tare	821.8	g
Mass of tare	195.0	g
% Moisture	15.9	

Test Data

Speed	8	
Board Number	3	
Cell Number	1	
Flow Pump Number	1A	
Flow Pump Rate	8.96E-04	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	34.47	cm
Min Head	33.76	cm
Maximum Gradient	4.59	
Minimum Gradient	4.50	

Final Data (After Test)

Average Height of Sample			2.957	in	7.51	cm
Average Diameter of Sample			2.850	in	7.24	cm
Area	6.38	in^2	41.16	cm^2		
Volume	309.12	cm^3	0.0109	ft^3		
Mass	671.60	g	1.48	lb		

Dry Density	116.2	pcf
Vol. of Voids	95.84	cm^3
Vol. of Solids	213.28	cm^3
Void Ratio	0.45	
Saturation	99.9	%

Moisture Content

Mass of wet sample & tare	773.80	g
Mass of dry sample & tare	678.10	g
Mass of tare	102.50	g
% Moisture	16.6	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
05/11/12	7	0	-	0.49	34.47	4.59	24.0	-	-	-	
05/11/12	7	5	300	0.48	33.76	4.50	24.0	4.79E-06	0.910	4.36E-06	
05/11/12	7	10	300	0.48	33.76	4.50	24.0	4.84E-06	0.910	4.41E-06	
05/11/12	7	15	300	0.49	34.47	4.59	24.0	4.79E-06	0.910	4.36E-06	*
05/11/12	7	20	300	0.48	33.76	4.50	24.0	4.79E-06	0.910	4.36E-06	*
05/11/12	7	25	300	0.49	34.47	4.59	24.0	4.79E-06	0.910	4.36E-06	*
05/11/12	7	30	300	0.49	34.47	4.59	24.0	4.74E-06	0.910	4.32E-06	*

Reported Average Hydraulic Conductivity* 4.3E-06 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488): NA

REMARKS

Material passed 3/8" sieve used for testing. Material was remolded to 100.1% of dry density (one point standard proctor) at as-received moisture content.

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	63	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

T.E. S.T.
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Tested By	ER/AV
Date	05/07/12
Checked By	

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13553/Soil 3	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 422/AASHTO T 88

Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

As-Received Moisture Content (Total Sample)

Mass of Wet Sample & Tare, g	1075.8
Mass of Dry Sample & Tare, g	931.9
Mass of Tare, g	295.4
Moisture Content, %	22.6

Moisture Content of FINER PORTION

	1st Subsample	2nd Subsample
Mass of Wet Sample & Tare, g	460.4	442.30
Mass of Dry Sample & Tare, g	421.9	406.80
Mass of Tare, g	95.7	112.70
Moisture Content, %	11.8	12.1

Mass of Total Sample before separation on 3/8" sieve & Tare, g	69500
Mass of Tare, g	0.0
Total Mass of Dry Sample, g	56685

	1st Subsample	2nd Subsample
Mass of Wet Finer Portion & Tare, g	1545.0	100.72
Mass of Tare	0.0	0.0
Dry Mass, g	1381.9	89.87
% of Total Sample passing Split Sieve	98.9	98.1

SIEVE ANALYSIS

COARSER PORTION OF SAMPLE (RETAINED ON 3/8" SIEVE)

Mass of Tare, g: 0.00

Sieve Size		Sample & Tare, g	% RETAINED	% PASSING (of Total)
12"	COBBLES		0	100
3"	COARSE GRAVEL		0	100
2.5"			0	100
2"		0.0	0	100
1.5"		97.3	0	100
1"		97.3	0	100
.75"	FINE GRAVEL	267.7	0	100
.5"		462.5	1	99
.375"		601.3	1	99
#4	COARSE SAND	12.3	1	98

#4 <First Subsample of Finer Portion<3/8"

2nd Subsample of FINER PORTION OF SAMPLE (PASSING #4 SIEVE:Hydrometer Backsieve)

Sieve Size		Cumulative Mass retained, g	% PASSING (of Total)
#10	MEDIUM SAND	2.73	95
#20		9.67	88
#40	FINE SAND	19.26	77
#60		33.15	62
#100		45.18	49
#200	FINES	56.15	37

Remarks

HYDROMETER ANALYSIS

Length of Dispersion Period	1 Minute
Mechanical Dispersion Device ID #	61
Amount of Dispersing Agent (ml)	125.0
Specific Gravity (assumed)	2.650
Specific Gravity (tested)	
Starting time	11:50

PARTICLE-SIZE ANALYSIS

% COBBLES	0	% MEDIUM SAND	18
% COARSE GRAVEL	0	% FINE SAND	40
% FINE GRAVEL	1	% FINES	37
% COARSE SAND	3	% TOTAL SAMPLE	100
% CLAY(<0.005mm)	14	% CLAY(<0.002mm)	10

Date	Time	Testing time (min)	Reading	Temp (°C)	K	Composite Correction	Actual Reading	Effective Depth (cm)	a	Particle Diam. (mm)	Percent Passing
	11:52	2	29.5	21.4	0.01348	5.0	24.5	12.3	1.00	0.0334	26.7
01/00/00	11:55	5	26.5	21.4	0.01348	5.0	21.5	12.8	1.00	0.0216	23.5
01/00/00	12:05	15	23.0	21.4	0.01348	5.0	18.0	13.4	1.00	0.0127	19.6
01/00/00	12:20	30	21.0	21.4	0.01348	5.0	16.0	13.7	1.00	0.0091	17.5
01/00/00	12:50	60	19.0	21.4	0.01348	5.0	14.0	14.1	1.00	0.0065	15.3
01/00/00	16:00	250	16.0	21.4	0.01348	5.0	11.0	14.6	1.00	0.0033	12.0
01/01/00	11:50	1440	13.5	21.4	0.01348	5.0	8.5	15.0	1.00	0.0014	9.3

Hydrometer 152H ID #	451190	Oven ID #	12/13/14/15
Sieve Shaker ID #	54/130	Balance ID#	1/6/7

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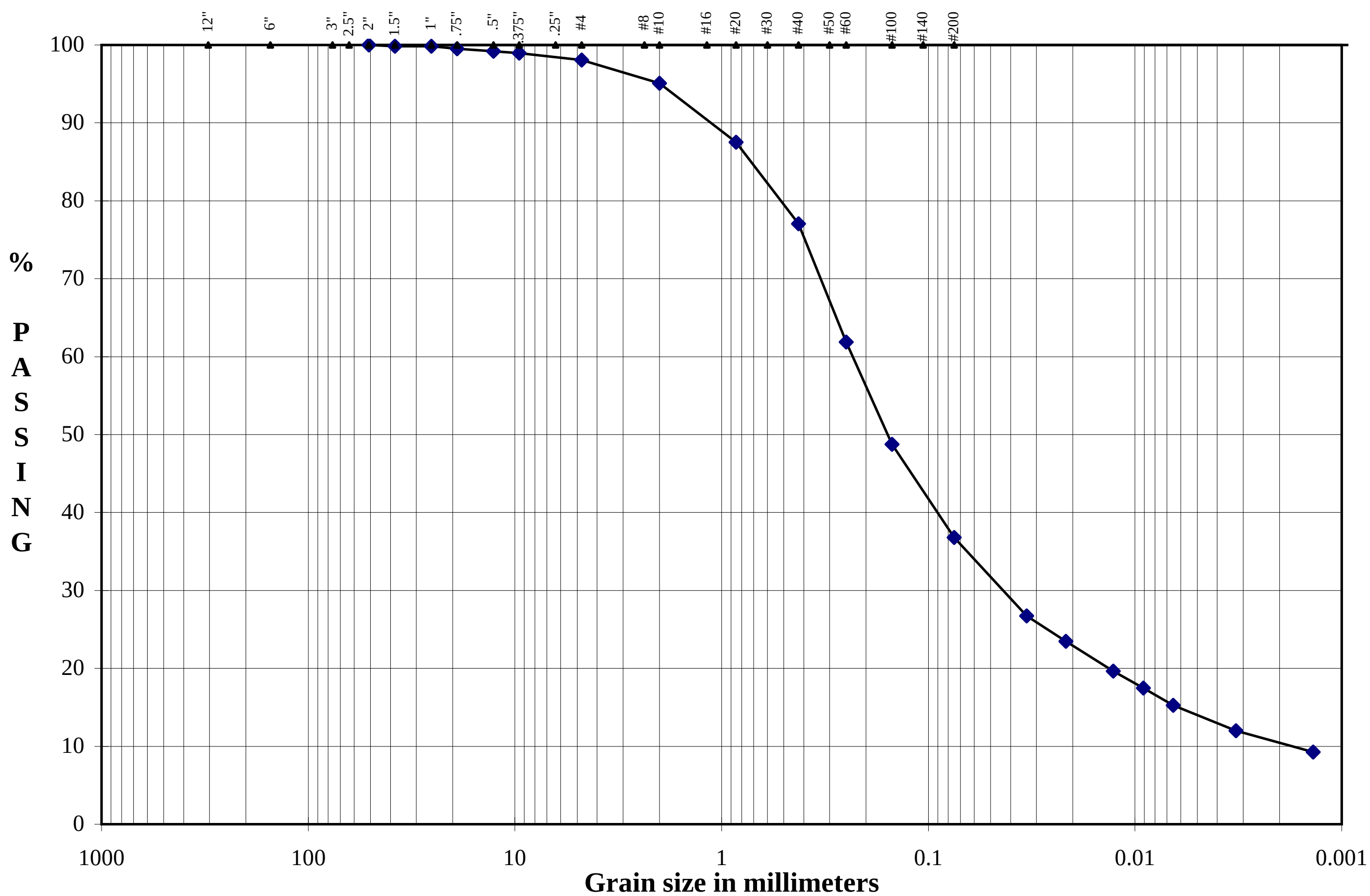
Tested By	ER/AV
Date	05/07/12
Checked By	

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13553/Soil 3	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 422/AASHTO T 88
Standard Test Method for Particle-Size Analysis of Soils (with Double Separation per ASTM D6913 and Hydrometer Analysis)

Particle-Size Analysis



Boulders	Cobbles	Gravel (Coarse)	Gravel (Fine)	Sand (Coarse)	Sand (Medium)	Sand (Fine)	Fines (Silt or Clay)

D_{10}	NA	mm
D_{30}	NA	mm
D_{60}	NA	mm
Cu	NA	
Cc	NA	

DESCRIPTION: NA

USCS (ASTM D2487; D2488): NA

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Tested By	NK
Date	05/14/12
Checked By	

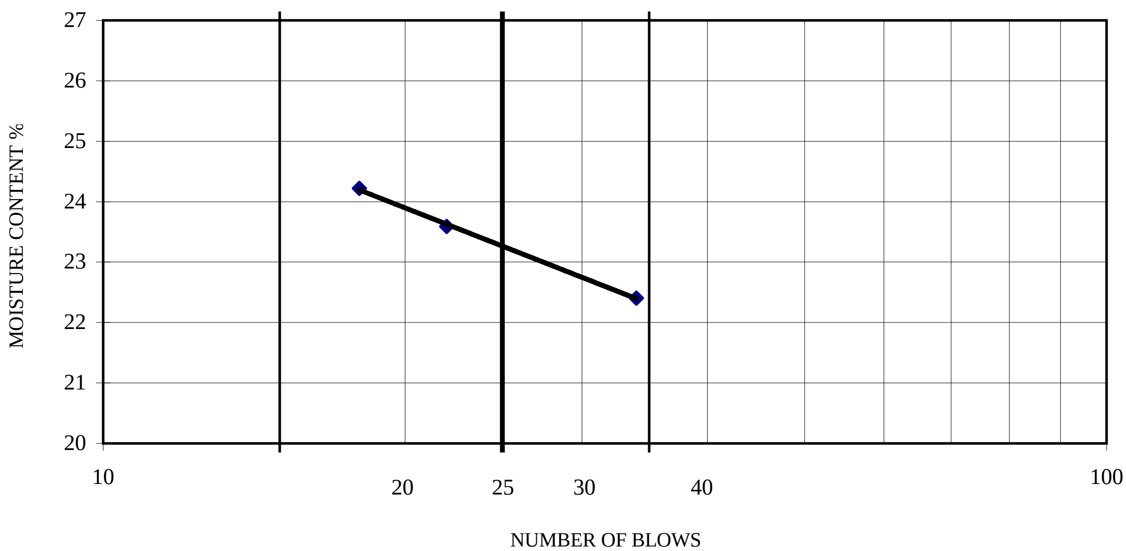
Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13553/Soil 3	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 4318/AASHTO T 88, T 89
Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (Atterberg Limits)

LIQUID LIMIT

Number of Blows	34	22	18
Mass of Wet Sample & Tare, g	44.62	42.22	40.51
Mass of Dry Sample & Tare, g	41.51	38.92	37.79
Mass of Tare, g	27.63	24.93	26.56
Moisture Content, %	22.41	23.59	24.22

Oven ID #	12/13/14/15
Balance ID #	2
Liquid Limit Device ID #	56



PLASTIC LIMIT

Mass of Wet Sample & Tare, g	37.11	32.75
Mass of Dry Sample & Tare, g	35.50	31.55
Mass of Tare, g	25.91	24.40
Moisture Content, %	16.79	16.78

PREPARATION PROCEDURE: DRY

NOTE: MATERIAL PASSING NO. 40 SIEVE WAS USED FOR TEST

NATURAL MOISTURE

Mass of Wet Sample & Tare, g	1075.80
Mass of Dry Sample & Tare, g	931.90
Mass of Tare, g	295.40
Moisture Content, %	22.61

LIQUID LIMIT (LL)	23
PLASTIC LIMIT (PL)	17
PLASTICITY INDEX (PI)	6
LIQUIDITY INDEX (LI)	0.93

DESCRIPTION: NA

USCS (ASTM D2487; D2488): NA

AASHTO (M 145): NA

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Tested By	RI
Date	05/09/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13553/Soil 3	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 698
Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3))

DETERMINATION OF TEST PROCEDURE

	wet	dry
Mass of Soil before sieving, g		
Mass of Mat. Retained on No. 4 sieve, g		
Mass of Mat. Retained on 3/8" sieve, g		
Mass of Mat. Retained on 3/4" sieve, g		

Material Retained on No. 4 Sieve, %	
Material Retained on 3/8" Sieve, %	
Material Retained on 3/4" Sieve, %	
Total, % (oversized)	

MOISTURE CONTENT

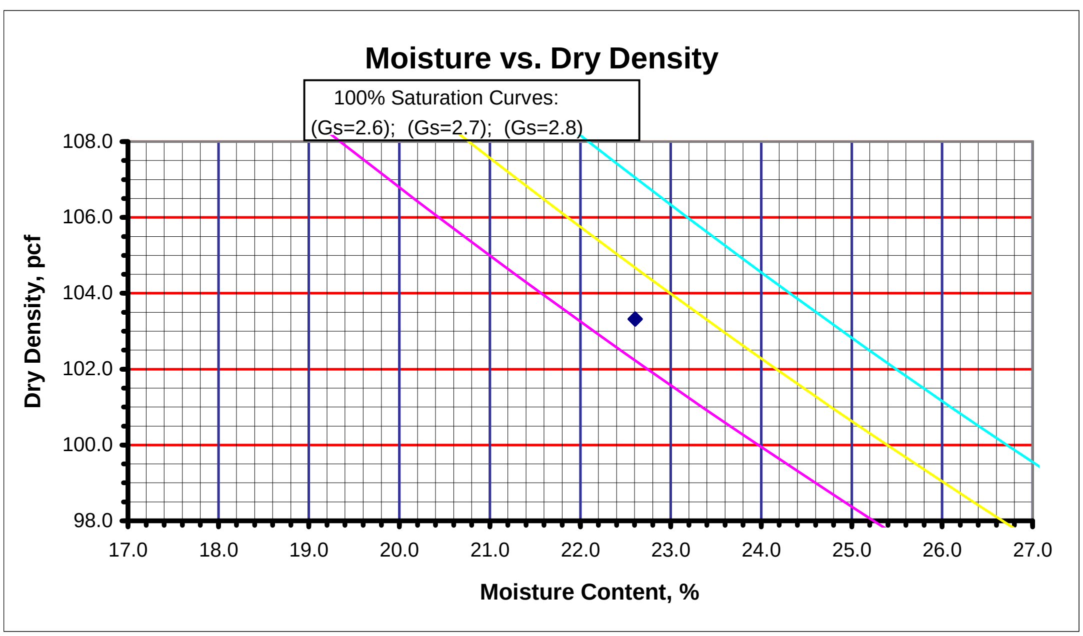
	Coarse + Fine Fraction	Coarse Fraction
Mass of Wet Sample & Tare, g		
Mass of Dry Sample & Tare, g		
Mass of Tare, g		
Moisture Content, %		

Procedure: B

TEST DATA

Points	1	2	3	4	5
Mass of Mold and Soil, g	6164.0				
Mass of Wet Sample & Tare, g	1075.8				
Mass of Dry Sample & Tare, g	931.9				
Mass of Tare, g	295.4				
Moisture Content, %	22.6				
Wet Density, pcf	126.7				
Dry Density, pcf	103.3				

Mold ID Number	321B
Mass of Mold, g	4250.5
Volume of Mold, ft^3	0.0333
Hammer ID Number	318
Number of Blows per layer	25
Number of Layers	3



Method A: Material retained on No. 4 ≤ 20%
Method B: Material retained on No. 4 > 20% and material retained on 3/8" ≤ 20%
Method C: Material retained on 3/8" > 20% and material retained on 3/4" < 30%

REMARKS

One Point Proctor was performed for material (<3/8") @ as-received moisture content

DESCRIPTION

NA

USCS (ASTM D2487; D2488)

NA

Maximum Dry Density, pcf		**Corrected Maximum Dry Density, pcf**	**NA**
Optimum Moisture Content, %		**Corrected Optimum Moisture Content, %**	**NA**

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Tested By	EB
Date	05/11/12
Checked By	[initials]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Bulk
Sample ID	13553/Soil 3	Depth/Elev.	-
Location	-	Add. Info	-

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	3.004	in	7.63	cm
Diameter	2.852	in	7.24	cm
Area	6.39	in^2	41.22	cm^2
Volume	314.48	cm^3	0.0111	ft^3
Mass	638.40	g	1.41	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	103.3	pcf		

Moisture Content

Mass of wet sample & tare	1075.80	g
Mass of dry sample & tare	931.90	g
Mass of tare	295.40	g
% Moisture	22.6	

Test Data

Speed	12	
Board Number	11	
Cell Number	17	
Flow Pump Number	1B	
Flow Pump Rate	5.60E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	68.93	cm
Min Head	68.23	cm
Maximum Gradient	10.58	
Minimum Gradient	10.48	

Final Data (After Test)

Average Height of Sample			2.564	in	6.51	cm
Average Diameter of Sample			2.932	in	7.45	cm
Area	6.75	in^2	43.56	cm^2		
Volume	283.69	cm^3	0.0100	ft^3		
Mass	614.20	g	1.35	lb		

Dry Density	115.5	pcf
Vol. of Voids	89.27	cm^3
Vol. of Solids	194.42	cm^3
Void Ratio	0.46	
Saturation	100.0	%

Moisture Content

Mass of wet sample & tare	714.80	g
Mass of dry sample & tare	625.60	g
Mass of tare	101.10	g
% Moisture	17.0	

TIME FUNCTION			Δt	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
05/11/12	11	0	-	0.98	68.93	10.58	24.0	-	-	-	
05/11/12	11	5	300	0.97	68.23	10.48	24.0	1.22E-07	0.910	1.11E-07	
05/11/12	11	10	300	0.97	68.23	10.48	24.0	1.23E-07	0.910	1.12E-07	
05/11/12	11	15	300	0.98	68.93	10.58	24.0	1.22E-07	0.910	1.11E-07	*
05/11/12	11	20	300	0.97	68.23	10.48	24.0	1.22E-07	0.910	1.11E-07	*
05/11/12	11	25	300	0.98	68.93	10.58	24.0	1.22E-07	0.910	1.11E-07	*
05/11/12	11	30	300	0.98	68.93	10.58	24.0	1.21E-07	0.910	1.11E-07	*

Reported Average Hydraulic Conductivity* 1.1E-07 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Material passed 3/8" sieve used for testing. Material was remolded to 100.0% of dry density (one point standard proctor) at as-received moisture content.

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	63	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	141			Pore Pressure Transducer ID #	28

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Batch Worksheet

BATCH-SAMPLE ID	13551/(Soil 1)-1-1			BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/21/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**1110.0**
Soil Moisture Content, %	**18.5**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
Mass of Dry Soil, g	**6000.0**
Total Water/Cem. Mat. Ratio	**4.517**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13551	**Soil (wet)**	100.0	**7110.0**
13661	GGBFS	4.5	**270.0**
13662	Cement	1.5	**90.0**
	Water, mL	216	

Remarks

300 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	End Preparation: Comments
13551-1-1-1	UCS	3	6					7 days
13551-1-1-2	UCS	3	6					14 days
13551-1-1-3	UCS	3	6					28 days
13551-1-1-4	Perm	3	3					7 days
13551-1-1-5	Perm	3	3					28 days

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Batch Worksheet

BATCH-SAMPLE ID	13551/(Soil 1)-2-1			BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/21/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**1110.0**
Soil Moisture Content, %	**18.5**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
Mass of Dry Soil, g	**6000.0**
Total Water/Cem. Mat. Ratio	**3.119**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13551	**Soil (wet)**	100.0	**7110.0**
13661	GGBFS	6.75	**405.0**
13662	Cement	2.25	**135.0**
	Water, mL	324	

Remarks

250 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	End Preparation: Comments
13551-2-1-1	UCS	3	6					7 days
13551-2-1-2	UCS	3	6					14 days
13551-2-1-3	UCS	3	6					28 days
13551-2-1-4	Perm	3	3					7 days
13551-2-1-5	Perm	3	3					28 days

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Batch Worksheet

BATCH-SAMPLE ID	13551/(Soil 1)-3-1			BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/21/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	1110.0
Soil Moisture Content, %	18.5
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	0.60
Mass of Dry Soil, g	6000.0
Total Water/Cem. Mat. Ratio	2.419

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13551	**Soil (wet)**	100.0	**7110.0**
13661	GGBFS	9.0	**540.0**
13662	Cement	3.0	**180.0**
	Water, mL	432	

Remarks

200 mL of water was added to make soil/grout mixable/moldable

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	End Preparation: Comments
13551-3-1-1	UCS	3	6					7 days
13551-3-1-2	UCS	3	6					14 days
13551-3-1-3	UCS	3	6					28 days
13551-3-1-4	Perm	3	3					7 days
13551-3-1-5	Perm	3	3					28 days

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Batch Worksheet

	BATCH-SAMPLE ID	13552/(Soil 2)-1-1		BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/22/2012

Time Batch Mixing Started		**Soil Moisture Mass, g**	**954.0**
Total Time Batch was Mixed, min		**Soil Moisture Content, %**	**15.9**
Time Batch Completely in Molds		Type of Cement Used	I/II
		Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
		Mass of Dry Soil, g	**6000.0**
		Total Water/Cem. Mat. Ratio	**4.639**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13552	**Soil (wet)**	100.0	**6954.0**
13661	GGBFS	4.5	**270.0**
13662	Cement	1.5	**90.0**
	Water, mL	216	

Remarks

500 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size Diam., in.	Nominal Mold Size Height, in.	Tamping Tech	End Preparation Removal Tech	End Preparation Trim Tech	End Preparation Method	End Preparation Comments
13552-1-1-1	UCS	3	6					7 days
13552-1-1-2	UCS	3	6					14 days
13552-1-1-3	UCS	3	6					28 days
13552-1-1-4	Perm	3	3					7 days
13552-1-1-5	Perm	3	3					28 days

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Fax: 770-923-8973
Web: www.test-llc.com

Batch Worksheet

	BATCH-SAMPLE ID	13552/(Soil 2)-2-1		BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/22/2012

Time Batch Mixing Started		Soil Moisture Mass, g	954.0
Total Time Batch was Mixed, min		Soil Moisture Content, %	15.9
Time Batch Completely in Molds		Type of Cement Used	I/II
		Grout Water/Cem. Mat (Solids) Ratio*	0.60
		Mass of Dry Soil, g	6000.0
		Total Water/Cem. Mat. Ratio	3.200

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13552	**Soil (wet)**	100.0	**6954.0**
13661	GGBFS	6.75	**405.0**
13662	Cement	2.25	**135.0**
	Water, mL	324	

Remarks

450 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	Comments
13552-2-1-1	UCS	3	6					7 days
13552-2-1-2	UCS	3	6					14 days
13552-2-1-3	UCS	3	6					28 days
13552-2-1-4	Perm	3	3					7 days
13552-2-1-5	Perm	3	3					28 days

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Batch Worksheet

	BATCH-SAMPLE ID	13552/(Soil 2)-3-1		BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/22/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**954.0**
Soil Moisture Content, %	**15.9**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
Mass of Dry Soil, g	**6000.0**
Total Water/Cem. Mat. Ratio	**2.481**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13552	**Soil (wet)**	100.0	**6954.0**
13661	GGBFS	9.0	**540.0**
13662	Cement	3.0	**180.0**
	Water, mL	432	

Remarks

400 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	End Preparation: Comments
13552-3-1-1	UCS	3	6					7 days
13552-3-1-2	UCS	3	6					14 days
13552-3-1-3	UCS	3	6					28 days
13552-3-1-4	Perm	3	3					7 days
13552-3-1-5	Perm	3	3					28 days

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Batch Worksheet

	BATCH-SAMPLE ID	13553/(Soil 3)-1-1		BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/23/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**1356.0**
Soil Moisture Content, %	**22.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
Mass of Dry Soil, g	**6000.0**
Total Water/Cem. Mat. Ratio	**4.922**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13553	**Soil (wet)**	100.0	**7356.0**
13661	GGBFS	4.5	**270.0**
13662	Cement	1.5	**90.0**
	Water, mL	216	

Remarks

200 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	Comments
13553-1-1-1	UCS	3	6					7 days
13553-1-1-2	UCS	3	6					14 days
13553-1-1-3	UCS	3	6					28 days
13553-1-1-4	Perm	3	3					7 days
13553-1-1-5	Perm	3	3					28 days

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Batch Worksheet

	BATCH-SAMPLE ID	13553/(Soil 3)-2-1		BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/23/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**1356.0**
Soil Moisture Content, %	**22.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
Mass of Dry Soil, g	**6000.0**
Total Water/Cem. Mat. Ratio	**3.519**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13553	**Soil (wet)**	100.0	**7356.0**
13661	GGBFS	6.75	**405.0**
13662	Cement	2.25	**135.0**
	Water, mL	324	

Remarks

220 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size: Diam., in.	Nominal Mold Size: Height, in.	Tamping Tech	End Preparation: Removal Tech	End Preparation: Trim Tech	End Preparation: Method	End Preparation: Comments
13553-2-1-1	UCS	3	6					7 days
13553-2-1-2	UCS	3	6					14 days
13553-2-1-3	UCS	3	6					28 days
13553-2-1-4	Perm	3	3					7 days
13553-2-1-5	Perm	3	3					28 days

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Batch Worksheet

BATCH-SAMPLE ID	13553/(Soil 3)-3-1			BATCH #	1
PR. NUMBER	-	LOCATION	-	MIXING TECH	RI/AV
PR. NAME	Williamsburg Works Former MGP Site	SAMPLE TYPE	Mold	BATCH DATE	5/23/2012

Time Batch Mixing Started	
Total Time Batch was Mixed, min	
Time Batch Completely in Molds	

Soil Moisture Mass, g	**1356.0**
Soil Moisture Content, %	**22.6**
Type of Cement Used	I/II
Grout Water/Cem. Mat (Solids) Ratio*	**0.60**
Mass of Dry Soil, g	**6000.0**
Total Water/Cem. Mat. Ratio	**2.692**

Mix Constituents:

Component ID	Component Name	Amount, % (based on soil dry mass)	Amount, g
13553	**Soil (wet)**	100.0	**7356.0**
13661	GGBFS	9.0	**540.0**
13662	Cement	3.0	**180.0**
	Water, mL	432	

Remarks

150 **mL of water was added to make soil/grout mixable/moldable**

* Cementous Materials (solids) is total mass of GGBFS and cement

Sample ID	Required Test	Nominal Mold Size Diam., in.	Nominal Mold Size Height, in.	Tamping Tech	End Preparation Removal Tech	End Preparation Trim Tech	End Preparation Method	Comments
13553-3-1-1	UCS	3	6					7 days
13553-3-1-2	UCS	3	6					14 days
13553-3-1-3	UCS	3	6					28 days
13553-3-1-4	Perm	3	3					7 days
13553-3-1-5	Perm	3	3					28 days

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Web: www.test-llc.com

Tested By	EB/KP
Date	05/28/12
Checked By	[illegible]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-1-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.846	in	7.23	cm
Diameter	2.980	in	7.57	cm
Area	6.97	in^2	45.00	cm^2
Volume	325.28	cm^3	0.0115	ft^3
Mass	654.20	g	1.44	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	101.7	pcf		

Moisture Content

Mass of wet sample & tare	654.20	g
Mass of dry sample & tare	530.30	g
Mass of tare	0.00	g
% Moisture	23.4	

Test Data

Speed	13	
Board Number	3	
Cell Number	4	
Flow Pump Number	1A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	64.01	cm
Min Head	62.60	cm
Maximum Gradient	8.85	
Minimum Gradient	8.65	

Final Data (After Test)

Average Height of Sample			2.849	in	7.24	cm
Average Diameter of Sample			2.980	in	7.57	cm
Area	6.97	in^2	45.00	cm^2		
Volume	325.62	cm^3	0.0115	ft^3		
Mass	661.00	g	1.46	lb		

Dry Density	101.6	pcf
Vol. of Voids	129.25	cm^3
Vol. of Solids	196.38	cm^3
Void Ratio	0.66	
Saturation	101.2	%

Moisture Content

Mass of wet sample & tare	759.60	g
Mass of dry sample & tare	628.80	g
Mass of tare	98.50	g
% Moisture	24.7	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
05/28/12	8	5	-	0.90	63.31	8.75	25.1	-	-	-	
05/28/12	8	15	600	0.91	64.01	8.85	25.1	7.07E-08	0.887	6.28E-08	
05/28/12	8	25	600	0.89	62.60	8.65	25.1	7.11E-08	0.887	6.31E-08	
05/28/12	8	35	600	0.91	64.01	8.85	25.1	7.11E-08	0.887	6.31E-08	*
05/28/12	8	45	600	0.89	62.60	8.65	25.1	7.11E-08	0.887	6.31E-08	*
05/28/12	8	55	600	0.89	62.60	8.65	25.1	7.19E-08	0.887	6.38E-08	*
05/28/12	9	5	600	0.90	63.31	8.75	25.1	7.15E-08	0.887	6.35E-08	*

Reported Average Hydraulic Conductivity* 6.3E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

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AAP

Tested By	EB
Date	06/18/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-1-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.952	in	7.50	cm
Diameter	3.005	in	7.63	cm
Area	7.09	in^2	45.76	cm^2
Volume	343.08	cm^3	0.0121	ft^3
Mass	672.40	g	1.48	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	100.1	pcf		

Moisture Content

Mass of wet sample & tare	672.40	g
Mass of dry sample & tare	550.40	g
Mass of tare	0.00	g
% Moisture	22.2	

Test Data

Speed	14	
Board Number	17	
Cell Number	9	
Flow Pump Number	2B	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	78.78	cm
Min Head	78.08	cm
Maximum Gradient	10.53	
Minimum Gradient	10.44	

Final Data (After Test)

Average Height of Sample			2.945	in	7.48	cm
Average Diameter of Sample			3.000	in	7.62	cm
Area	7.07	in^2	45.60	cm^2		
Volume	341.13	cm^3	0.0120	ft^3		
Mass	681.60	g	1.50	lb		

Dry Density	100.8	pcf
Vol. of Voids	137.13	cm^3
Vol. of Solids	204.00	cm^3
Void Ratio	0.67	
Saturation	95.4	%

Moisture Content

Mass of wet sample & tare	771.30	g
Mass of dry sample & tare	640.60	g
Mass of tare	90.20	g
% Moisture	23.7	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
06/18/12	9	0	-	1.12	78.78	10.53	25.0	-	-	-	
06/18/12	9	10	600	1.11	78.08	10.44	25.0	2.93E-08	0.889	2.60E-08	
06/18/12	9	20	600	1.12	78.78	10.53	25.0	2.93E-08	0.889	2.60E-08	
06/18/12	9	30	600	1.11	78.08	10.44	25.0	2.93E-08	0.889	2.60E-08	*
06/18/12	9	40	600	1.12	78.78	10.53	25.0	2.93E-08	0.889	2.60E-08	*
06/18/12	9	50	600	1.12	78.78	10.53	25.0	2.91E-08	0.889	2.59E-08	*
06/18/12	10	0	600	1.12	78.78	10.53	25.0	2.91E-08	0.889	2.59E-08	*

Reported Average Hydraulic Conductivity* 2.6E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	246			Pore Pressure Transducer ID #	28

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Web: www.test-llc.com

Tested By	EB
Date	05/28/12
Checked By	

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-1-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.766
Initial Diameter, in	2.999
Height-to-Diameter Ratio	1.92
Area, in^2	7.06
Volume, in^3	40.73
Mass of Sample, g	1320.00
Wet Density, pcf	123.5
Dry Density, pcf	100.2
Machine Speed, in/min	0.050
Strain rate, % / min	0.87

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1651.60
Mass of Dry Sample and Tare, g	1404.20
Mass of Tare, g	333.80
Moisture, %	23.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

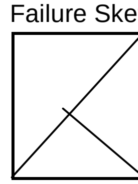
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	1734
Specimen Cross-sectional Area, in^2	7.06
Compressive Strength at Failure, psi	245
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**245**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/04/12
Checked By	

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-1-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.781
Initial Diameter, in	3.002
Height-to-Diameter Ratio	1.93
Area, in^2	7.08
Volume, in^3	40.92
Mass of Sample, g	1323.60
Wet Density, pcf	123.2
Dry Density, pcf	100.0
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1741.60
Mass of Dry Sample and Tare, g	1493.10
Mass of Tare, g	419.90
Moisture, %	23.2

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

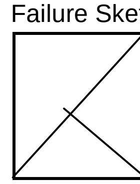
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	2509
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	354
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**354**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/18/12
Checked By	48

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-1-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.893
Initial Diameter, in	3.000
Height-to-Diameter Ratio	1.96
Area, in^2	7.07
Volume, in^3	41.66
Mass of Sample, g	1351.00
Wet Density, pcf	123.6
Dry Density, pcf	100.6
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1556.00
Mass of Dry Sample and Tare, g	1305.30
Mass of Tare, g	206.50
Moisture, %	22.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

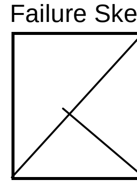
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3235
Specimen Cross-sectional Area, in^2	7.07
Compressive Strength at Failure, psi	458
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**458**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB/KP
Date	05/28/12
Checked By	*(initials)*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-2-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.880	in	7.32	cm
Diameter	3.006	in	7.64	cm
Area	7.10	in^2	45.79	cm^2
Volume	334.94	cm^3	0.0118	ft^3
Mass	661.30	g	1.46	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	100.6	pcf		

Moisture Content

Mass of wet sample & tare	661.30	g
Mass of dry sample & tare	539.80	g
Mass of tare	0.00	g
% Moisture	22.5	

Test Data

Speed	13	
Board Number	2	
Cell Number	12	
Flow Pump Number	1B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	148.42	cm
Min Head	147.71	cm
Maximum Gradient	20.25	
Minimum Gradient	20.15	

Final Data (After Test)

Average Height of Sample			2.886	in	7.33	cm
Average Diameter of Sample			3.005	in	7.63	cm
Area	7.09	in^2	45.76	cm^2		
Volume	335.41	cm^3	0.0118	ft^3		
Mass	673.60	g	1.49	lb		

Dry Density	100.4	pcf
Vol. of Voids	135.45	cm^3
Vol. of Solids	199.96	cm^3
Void Ratio	0.68	
Saturation	98.7	%

Moisture Content

Mass of wet sample & tare	767.30	g
Mass of dry sample & tare	633.60	g
Mass of tare	93.80	g
% Moisture	24.8	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
05/28/12	8	5	-	2.10	147.71	20.15	25.1	-	-	-	
05/28/12	8	15	600	2.11	148.42	20.25	25.1	3.03E-08	0.887	2.69E-08	
05/28/12	8	25	600	2.10	147.71	20.15	25.1	3.03E-08	0.887	2.69E-08	
05/28/12	8	35	600	2.11	148.42	20.25	25.1	3.03E-08	0.887	2.69E-08	*
05/28/12	8	45	600	2.10	147.71	20.15	25.1	3.03E-08	0.887	2.69E-08	*
05/28/12	8	55	600	2.10	147.71	20.15	25.1	3.04E-08	0.887	2.69E-08	*
05/28/12	9	5	600	2.10	147.71	20.15	25.1	3.04E-08	0.887	2.69E-08	*

Reported Average Hydraulic Conductivity* 2.7E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	141			Pore Pressure Transducer ID #	26/27

TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/18/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-2-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.907	in	7.38	cm
Diameter	3.016	in	7.66	cm
Area	7.14	in^2	46.09	cm^2
Volume	340.33	cm^3	0.0120	ft^3
Mass	667.00	g	1.47	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	99.8	pcf		

Moisture Content

Mass of wet sample & tare	667.00	g
Mass of dry sample & tare	544.20	g
Mass of tare	0.00	g
% Moisture	22.6	

Test Data

Speed	14	
Board Number	16	
Cell Number	10	
Flow Pump Number	2A	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	90.04	cm
Min Head	89.33	cm
Maximum Gradient	12.20	
Minimum Gradient	12.11	

Final Data (After Test)

Average Height of Sample			2.905	in	7.38	cm
Average Diameter of Sample			3.010	in	7.65	cm
Area	7.12	in^2	45.91	cm^2		
Volume	338.74	cm^3	0.0120	ft^3		
Mass	674.70	g	1.49	lb		

Dry Density	100.3	pcf
Vol. of Voids	137.10	cm^3
Vol. of Solids	201.65	cm^3
Void Ratio	0.68	
Saturation	95.0	%

Moisture Content

Mass of wet sample & tare	772.90	g
Mass of dry sample & tare	642.70	g
Mass of tare	98.50	g
% Moisture	23.9	

TIME FUNCTION			Δt	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
06/18/12	7	30	-	1.28	90.04	12.20	25.0	-	-	-	
06/18/12	7	40	600	1.27	89.33	12.11	25.0	2.51E-08	0.889	2.23E-08	
06/18/12	7	50	600	1.27	89.33	12.11	25.0	2.52E-08	0.889	2.24E-08	
06/18/12	8	0	600	1.28	90.04	12.20	25.0	2.51E-08	0.889	2.23E-08	*
06/18/12	8	10	600	1.28	90.04	12.20	25.0	2.50E-08	0.889	2.22E-08	*
06/18/12	8	20	600	1.27	89.33	12.11	25.0	2.51E-08	0.889	2.23E-08	*
06/18/12	8	30	600	1.28	90.04	12.20	25.0	2.51E-08	0.889	2.23E-08	*

Reported Average Hydraulic Conductivity* 2.2E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	245			Pore Pressure Transducer ID #	28

TIMELY ENGINEERING SOIL TESTS, LLC

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Web: www.test-llc.com

Tested By	EB
Date	05/28/12
Checked By	48

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-2-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.830
Initial Diameter, in	3.000
Height-to-Diameter Ratio	1.94
Area, in^2	7.07
Volume, in^3	41.21
Mass of Sample, g	1337.00
Wet Density, pcf	123.6
Dry Density, pcf	100.3
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1593.10
Mass of Dry Sample and Tare, g	1341.70
Mass of Tare, g	258.00
Moisture, %	23.2

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

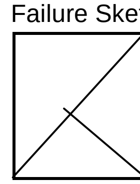
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3109
Specimen Cross-sectional Area, in^2	7.07
Compressive Strength at Failure, psi	440
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**440**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/04/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-2-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.832
Initial Diameter, in	2.999
Height-to-Diameter Ratio	1.94
Area, in^2	7.06
Volume, in^3	41.20
Mass of Sample, g	1337.50
Wet Density, pcf	123.7
Dry Density, pcf	100.4
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1595.50
Mass of Dry Sample and Tare, g	1344.60
Mass of Tare, g	259.90
Moisture, %	23.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

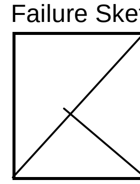
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3803
Specimen Cross-sectional Area, in^2	7.06
Compressive Strength at Failure, psi	538
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**538**

Failure Code 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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	Tested By	RI
	Date	06/18/12
	Checked By	[signature]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-2-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD | B |

SAMPLE DATA

Initial Height, in	5.902
Initial Diameter, in	3.031
Height-to-Diameter Ratio	1.95
Area, in^2	7.22
Volume, in^3	42.59
Mass of Sample, g	1349.60
Wet Density, pcf	120.7
Dry Density, pcf	98.2
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1555.10
Mass of Dry Sample and Tare, g	1303.50
Mass of Tare, g	207.10
Moisture, %	22.9

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

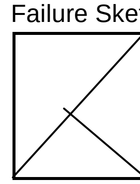
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	4708
Specimen Cross-sectional Area, in^2	7.22
Compressive Strength at Failure, psi	652
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**652**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type:
Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB/KP
Date	05/28/12
Checked By	[illegible]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-3-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.858	in	7.26	cm
Diameter	3.013	in	7.65	cm
Area	7.13	in^2	46.00	cm^2
Volume	333.93	cm^3	0.0118	ft^3
Mass	656.60	g	1.45	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	100.4	pcf		

Moisture Content

Mass of wet sample & tare	656.60	g
Mass of dry sample & tare	537.10	g
Mass of tare	0.00	g
% Moisture	22.2	

Test Data

Speed	13	
Board Number	1	
Cell Number	2	
Flow Pump Number	1B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	208.91	cm
Min Head	207.50	cm
Maximum Gradient	28.81	
Minimum Gradient	28.61	

Final Data (After Test)

Average Height of Sample			2.855	in	7.25	cm
Average Diameter of Sample			3.014	in	7.66	cm
Area	7.13	in^2	46.03	cm^2		
Volume	333.80	cm^3	0.0118	ft^3		
Mass	666.30	g	1.47	lb		

Dry Density	100.4	pcf
Vol. of Voids	134.87	cm^3
Vol. of Solids	198.93	cm^3
Void Ratio	0.68	
Saturation	95.8	%

Moisture Content

Mass of wet sample & tare	774.90	g
Mass of dry sample & tare	645.70	g
Mass of tare	108.60	g
% Moisture	24.1	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
05/28/12	9	30	-	2.95	207.50	28.61	25.1	-	-	-	
05/28/12	9	40	600	2.97	208.91	28.81	25.1	2.12E-08	0.887	1.88E-08	
05/28/12	9	50	600	2.95	207.50	28.61	25.1	2.12E-08	0.887	1.88E-08	
05/28/12	10	0	600	2.96	208.21	28.71	25.1	2.12E-08	0.887	1.88E-08	*
05/28/12	10	10	600	2.96	208.21	28.71	25.1	2.12E-08	0.887	1.88E-08	*
05/28/12	10	20	600	2.95	207.50	28.61	25.1	2.12E-08	0.887	1.88E-08	*
05/28/12	10	30	600	2.95	207.50	28.61	25.1	2.13E-08	0.887	1.89E-08	*

Reported Average Hydraulic Conductivity* 1.9E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	141			Pore Pressure Transducer ID #	26/27

T.E. S.T.
TIMELY ENGINEERING SOIL TESTS, LLC
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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

		Tested By	EB
		Date	06/18/12
		Checked By	LB
Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-3-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.903	in	7.37	cm
Diameter	3.006	in	7.64	cm
Area	7.10	in^2	45.79	cm^2
Volume	337.61	cm^3	0.0119	ft^3
Mass	663.30	g	1.46	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	100.1	pcf		

Moisture Content

Mass of wet sample & tare	663.30	g
Mass of dry sample & tare	541.50	g
Mass of tare	0.00	g
% Moisture	22.5	

Test Data

Speed	14	
Board Number	15	
Cell Number	12	
Flow Pump Number	2B	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	131.54	cm
Min Head	128.72	cm
Maximum Gradient	17.89	
Minimum Gradient	17.51	

Final Data (After Test)

Average Height of Sample			2.895	in	7.35	cm
Average Diameter of Sample			2.995	in	7.61	cm
Area	7.05	in^2	45.45	cm^2		
Volume	334.22	cm^3	0.0118	ft^3		
Mass	669.50	g	1.48	lb		

Dry Density	101.2	pcf
Vol. of Voids	133.45	cm^3
Vol. of Solids	200.77	cm^3
Void Ratio	0.66	
Saturation	95.5	%

Moisture Content

Mass of wet sample & tare	781.40	g
Mass of dry sample & tare	654.10	g
Mass of tare	112.60	g
% Moisture	23.5	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
06/18/12	7	30	-	1.84	129.43	17.60	25.0	-	-	-	
06/18/12	7	40	600	1.83	128.72	17.51	25.0	1.75E-08	0.889	1.56E-08	
06/18/12	7	50	600	1.84	129.43	17.60	25.0	1.75E-08	0.889	1.56E-08	
06/18/12	8	0	600	1.85	130.13	17.70	25.0	1.75E-08	0.889	1.55E-08	*
06/18/12	8	10	600	1.86	130.83	17.79	25.0	1.74E-08	0.889	1.54E-08	*
06/18/12	8	20	600	1.87	131.54	17.89	25.0	1.73E-08	0.889	1.54E-08	*
06/18/12	8	30	600	1.86	130.83	17.79	25.0	1.73E-08	0.889	1.54E-08	*

Reported Average Hydraulic Conductivity* 1.5E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS:

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	246			Pore Pressure Transducer ID #	28

TIMELY ENGINEERING SOIL TESTS, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	05/28/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-3-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.810
Initial Diameter, in	3.006
Height-to-Diameter Ratio	1.93
Area, in^2	7.10
Volume, in^3	41.23
Mass of Sample, g	1332.10
Wet Density, pcf	123.1
Dry Density, pcf	99.9
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1663.40
Mass of Dry Sample and Tare, g	1413.70
Mass of Tare, g	333.40
Moisture, %	23.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

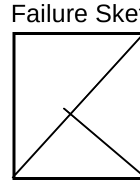
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	4055
Specimen Cross-sectional Area, in^2	7.10
Compressive Strength at Failure, psi	571
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**571**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type:
Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/04/12
Checked By	[signature]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-3-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.878
Initial Diameter, in	3.002
Height-to-Diameter Ratio	1.96
Area, in^2	7.08
Volume, in^3	41.60
Mass of Sample, g	1347.50
Wet Density, pcf	123.4
Dry Density, pcf	100.3
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1601.80
Mass of Dry Sample and Tare, g	1350.10
Mass of Tare, g	256.20
Moisture, %	23.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

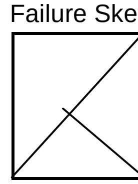
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	4711
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	666
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**666**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/18/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13551/(Soil 1)-3-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.915
Initial Diameter, in	3.007
Height-to-Diameter Ratio	1.97
Area, in^2	7.10
Volume, in^3	42.01
Mass of Sample, g	1362.30
Wet Density, pcf	123.5
Dry Density, pcf	100.4
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1572.10
Mass of Dry Sample and Tare, g	1317.10
Mass of Tare, g	210.60
Moisture, %	23.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

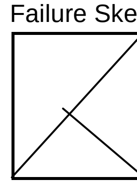
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	6163
Specimen Cross-sectional Area, in^2	7.10
Compressive Strength at Failure, psi	868
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**868**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

T.E.S.T.

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AAP

Tested By	EB/KI
Date	05/29/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-1-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.821	in	7.17	cm
Diameter	2.997	in	7.61	cm
Area	7.05	in^2	45.51	cm^2
Volume	326.11	cm^3	0.0115	ft^3
Mass	642.50	g	1.42	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	100.1	pcf		

Moisture Content

Mass of wet sample & tare	642.50	g
Mass of dry sample & tare	523.20	g
Mass of tare	0.00	g
% Moisture	22.8	

Test Data

Speed	13	
Board Number	3	
Cell Number	4	
Flow Pump Number	2A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	24.62	cm
Min Head	23.92	cm
Maximum Gradient	3.42	
Minimum Gradient	3.32	

Final Data (After Test)

Average Height of Sample			2.833	in	7.20	cm
Average Diameter of Sample			3.001	in	7.62	cm
Area	7.07	in^2	45.63	cm^2		
Volume	328.37	cm^3	0.0116	ft^3		
Mass	656.20	g	1.45	lb		

Dry Density	99.5	pcf
Vol. of Voids	134.42	cm^3
Vol. of Solids	193.96	cm^3
Void Ratio	0.69	
Saturation	98.6	%

Moisture Content

Mass of wet sample & tare	739.30	g
Mass of dry sample & tare	606.90	g
Mass of tare	83.70	g
% Moisture	25.3	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
05/29/12	11	0	-	0.35	24.62	3.42	26.0	-	-	-	
05/29/12	11	10	600	0.34	23.92	3.32	26.0	1.82E-07	0.869	1.58E-07	
05/29/12	11	20	600	0.34	23.92	3.32	26.0	1.85E-07	0.869	1.61E-07	
05/29/12	11	30	600	0.35	24.62	3.42	26.0	1.82E-07	0.869	1.58E-07	*
05/29/12	11	40	600	0.34	23.92	3.32	26.0	1.82E-07	0.869	1.58E-07	*
05/29/12	11	50	600	0.35	24.62	3.42	26.0	1.82E-07	0.869	1.58E-07	*
05/29/12	12	0	600	0.35	24.62	3.42	26.0	1.79E-07	0.869	1.56E-07	*

Reported Average Hydraulic Conductivity* 1.6E-07 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	262
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	245			Pore Pressure Transducer ID #	26/27

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Web: www.test-llc.com

Tested By	EB
Date	06/19/12
Checked By	[signature]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-1-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.927	in	7.43	cm
Diameter	3.019	in	7.67	cm
Area	7.16	in^2	46.18	cm^2
Volume	343.35	cm^3	0.0121	ft^3
Mass	660.40	g	1.46	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	97.7	pcf		

Moisture Content

Mass of wet sample & tare	660.40	g
Mass of dry sample & tare	537.40	g
Mass of tare	0.00	g
% Moisture	22.9	

Test Data

Speed	13	
Board Number	1	
Cell Number	2	
Flow Pump Number	1B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	65.42	cm
Min Head	64.71	cm
Maximum Gradient	8.82	
Minimum Gradient	8.73	

Final Data (After Test)

Average Height of Sample			2.920	in	7.42	cm
Average Diameter of Sample			3.010	in	7.65	cm
Area	7.12	in^2	45.91	cm^2		
Volume	340.49	cm^3	0.0120	ft^3		
Mass	672.10	g	1.48	lb		

Dry Density	98.5	pcf
Vol. of Voids	141.34	cm^3
Vol. of Solids	199.16	cm^3
Void Ratio	0.71	
Saturation	95.1	%

Moisture Content

Mass of wet sample & tare	744.90	g
Mass of dry sample & tare	610.60	g
Mass of tare	73.20	g
% Moisture	25.0	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
06/19/12	6	30	-	0.93	65.42	8.82	25.0	-	-	-	
06/19/12	6	40	600	0.92	64.71	8.73	25.0	6.95E-08	0.889	6.18E-08	
06/19/12	6	50	600	0.93	65.42	8.82	25.0	6.95E-08	0.889	6.18E-08	
06/19/12	7	0	600	0.92	64.71	8.73	25.0	6.95E-08	0.889	6.18E-08	*
06/19/12	7	10	600	0.92	64.71	8.73	25.0	6.99E-08	0.889	6.22E-08	*
06/19/12	7	20	600	0.93	65.42	8.82	25.0	6.95E-08	0.889	6.18E-08	*
06/19/12	7	30	600	0.93	65.42	8.82	25.0	6.92E-08	0.889	6.15E-08	*

Reported Average Hydraulic Conductivity* 6.2E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	141			Pore Pressure Transducer ID #	26/27

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Tested By	RI
Date	05/29/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-1-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.816
Initial Diameter, in	3.001
Height-to-Diameter Ratio	1.94
Area, in^2	7.07
Volume, in^3	41.14
Mass of Sample, g	1316.10
Wet Density, pcf	121.9
Dry Density, pcf	98.1
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1733.30
Mass of Dry Sample and Tare, g	1477.50
Mass of Tare, g	418.50
Moisture, %	24.2

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	447
Specimen Cross-sectional Area, in^2	7.07
Compressive Strength at Failure, psi	63
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**63**

Failure Code 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch

Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Tested By	RI
Date	06/05/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-1-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.810
Initial Diameter, in	3.000
Height-to-Diameter Ratio	1.94
Area, in^2	7.07
Volume, in^3	41.07
Mass of Sample, g	1315.50
Wet Density, pcf	122.0
Dry Density, pcf	98.4
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1575.50
Mass of Dry Sample and Tare, g	1322.10
Mass of Tare, g	261.80
Moisture, %	23.9

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

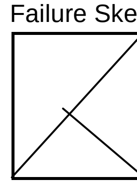
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	1486
Specimen Cross-sectional Area, in^2	7.07
Compressive Strength at Failure, psi	210
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**210**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type:
Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Tested By	EB
Date	06/19/12
Checked By	*[signature]*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-1-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.908
Initial Diameter, in	3.011
Height-to-Diameter Ratio	1.96
Area, in^2	7.12
Volume, in^3	42.07
Mass of Sample, g	1337.00
Wet Density, pcf	121.1
Dry Density, pcf	98.0
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1673.00
Mass of Dry Sample and Tare, g	1418.30
Mass of Tare, g	336.40
Moisture, %	23.5

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

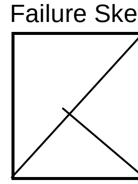
Maximum Load at Failure, lbf	2682
Specimen Cross-sectional Area, in^2	7.12
Compressive Strength at Failure, psi	377
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**377**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

Failure Sketch



Failure Type: Cone and Shear

USCS (ASTM D2487: D2488)

REMARKS

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB/KI
Date	05/29/12
Checked By	[handwritten initials]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-2-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.868	in	7.28	cm
Diameter	3.001	in	7.62	cm
Area	7.07	in^2	45.63	cm^2
Volume	332.43	cm^3	0.0117	ft^3
Mass	647.10	g	1.43	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	98.8	pcf		

Moisture Content

Mass of wet sample & tare	647.10	g
Mass of dry sample & tare	526.10	g
Mass of tare	0.00	g
% Moisture	23.0	

Test Data

Speed	13	
Board Number	4	
Cell Number	12	
Flow Pump Number	2B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	109.03	cm
Min Head	108.32	cm
Maximum Gradient	14.90	
Minimum Gradient	14.81	

Final Data (After Test)

Average Height of Sample			2.880	in	7.32	cm
Average Diameter of Sample			3.012	in	7.65	cm
Area	7.13	in^2	45.97	cm^2		
Volume	336.27	cm^3	0.0119	ft^3		
Mass	663.10	g	1.46	lb		

Dry Density	97.7	pcf
Vol. of Voids	141.19	cm^3
Vol. of Solids	195.09	cm^3
Void Ratio	0.72	
Saturation	96.6	%

Moisture Content

Mass of wet sample & tare	759.50	g
Mass of dry sample & tare	623.30	g
Mass of tare	97.20	g
% Moisture	25.9	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
05/29/12	11	0	-	1.55	109.03	14.90	26.0	-	-	-	
05/29/12	11	10	600	1.54	108.32	14.81	26.0	4.10E-08	0.869	3.56E-08	
05/29/12	11	20	600	1.54	108.32	14.81	26.0	4.11E-08	0.869	3.58E-08	
05/29/12	11	30	600	1.55	109.03	14.90	26.0	4.10E-08	0.869	3.56E-08	*
05/29/12	11	40	600	1.54	108.32	14.81	26.0	4.10E-08	0.869	3.56E-08	*
05/29/12	11	50	600	1.55	109.03	14.90	26.0	4.10E-08	0.869	3.56E-08	*
05/29/12	12	0	600	1.55	109.03	14.90	26.0	4.09E-08	0.869	3.55E-08	*

Reported Average Hydraulic Conductivity* 3.6E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS:

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	246			Pore Pressure Transducer ID #	26/27

TIMELY ENGINEERING SOIL TESTS, LLC	1874 Forge Street Tucker, GA 30084 Phone: 770-938-8233 Fax: 770-923-8973 Web: www.test-llc.com	Tested By	EB
		Date	06/19/12
		Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-2-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.955	in	7.51	cm
Diameter	3.009	in	7.64	cm
Area	7.11	in^2	45.88	cm^2
Volume	344.34	cm^3	0.0122	ft^3
Mass	666.00	g	1.47	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	97.5	pcf		

Moisture Content

Mass of wet sample & tare	666.00	g
Mass of dry sample & tare	538.20	g
Mass of tare	0.00	g
% Moisture	23.7	

Test Data

Speed	13	
Board Number	2	
Cell Number	15	
Flow Pump Number	1A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	176.55	cm
Min Head	175.85	cm
Maximum Gradient	23.56	
Minimum Gradient	23.47	

Final Data (After Test)

Average Height of Sample			2.950	in	7.49	cm
Average Diameter of Sample			3.002	in	7.63	cm
Area	7.08	in^2	45.66	cm^2		
Volume	342.16	cm^3	0.0121	ft^3		
Mass	674.60	g	1.49	lb		

Dry Density	98.3	pcf
Vol. of Voids	142.56	cm^3
Vol. of Solids	199.60	cm^3
Void Ratio	0.71	
Saturation	95.2	%

Moisture Content

Mass of wet sample & tare	750.60	g
Mass of dry sample & tare	615.10	g
Mass of tare	76.90	g
% Moisture	25.2	

TIME FUNCTION			Δt	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
06/19/12	6	30	-	2.51	176.55	23.56	25.0	-	-	-	
06/19/12	6	40	600	2.50	175.85	23.47	25.0	2.61E-08	0.889	2.32E-08	
06/19/12	6	50	600	2.50	175.85	23.47	25.0	2.61E-08	0.889	2.32E-08	
06/19/12	7	0	600	2.51	176.55	23.56	25.0	2.61E-08	0.889	2.32E-08	*
06/19/12	7	10	600	2.50	175.85	23.47	25.0	2.61E-08	0.889	2.32E-08	*
06/19/12	7	20	600	2.51	176.55	23.56	25.0	2.61E-08	0.889	2.32E-08	*
06/19/12	7	30	600	2.51	176.55	23.56	25.0	2.60E-08	0.889	2.31E-08	*

Reported Average Hydraulic Conductivity* 2.3E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

Timely Engineering Soil Tests, LLC

1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	05/29/12
Checked By	[illegible]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-2-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.817
Initial Diameter, in	3.004
Height-to-Diameter Ratio	1.94
Area, in^2	7.09
Volume, in^3	41.23
Mass of Sample, g	1315.40
Wet Density, pcf	121.5
Dry Density, pcf	97.9
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1645.70
Mass of Dry Sample and Tare, g	1390.80
Mass of Tare, g	331.60
Moisture, %	24.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

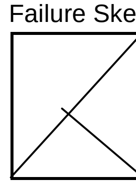
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	1890
Specimen Cross-sectional Area, in^2	7.09
Compressive Strength at Failure, psi	267
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**267**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type:
Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/05/12
Checked By	*[signature]*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-2-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.817
Initial Diameter, in	3.005
Height-to-Diameter Ratio	1.94
Area, in^2	7.09
Volume, in^3	41.26
Mass of Sample, g	1314.30
Wet Density, pcf	121.4
Dry Density, pcf	97.7
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1729.30
Mass of Dry Sample and Tare, g	1474.10
Mass of Tare, g	416.20
Moisture, %	24.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

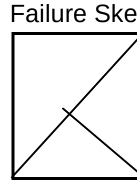
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3292
Specimen Cross-sectional Area, in^2	7.09
Compressive Strength at Failure, psi	464
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**464**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/19/12
Checked By	KB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-2-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD | **B**

SAMPLE DATA

Initial Height, in	5.922
Initial Diameter, in	3.012
Height-to-Diameter Ratio	1.97
Area, in^2	7.13
Volume, in^3	42.20
Mass of Sample, g	1340.60
Wet Density, pcf	121.0
Dry Density, pcf	97.6
Machine Speed, in/min	0.050
Strain rate, % / min	0.84

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1600.30
Mass of Dry Sample and Tare, g	1340.90
Mass of Tare, g	259.90
Moisture, %	24.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

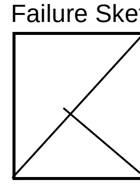
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	4335
Specimen Cross-sectional Area, in^2	7.13
Compressive Strength at Failure, psi	608
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**608**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

		Tested By	EB/KI
		Date	05/29/12
		Checked By	*(initials)*
Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-3-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.900	in	7.37	cm
Diameter	3.002	in	7.63	cm
Area	7.08	in^2	45.66	cm^2
Volume	336.36	cm^3	0.0119	ft^3
Mass	657.20	g	1.45	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	99.4	pcf		

Moisture Content

Mass of wet sample & tare	657.20	g
Mass of dry sample & tare	535.60	g
Mass of tare	0.00	g
% Moisture	22.7	

Test Data

Speed	13	
Board Number	11	
Cell Number	2	
Flow Pump Number	2B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	144.20	cm
Min Head	143.49	cm
Maximum Gradient	19.52	
Minimum Gradient	19.43	

Final Data (After Test)

Average Height of Sample			2.908	in	7.39	cm
Average Diameter of Sample			3.005	in	7.63	cm
Area	7.09	in^2	45.76	cm^2		
Volume	337.97	cm^3	0.0119	ft^3		
Mass	668.90	g	1.47	lb		

Dry Density	98.9	pcf
Vol. of Voids	139.54	cm^3
Vol. of Solids	198.43	cm^3
Void Ratio	0.70	
Saturation	95.4	%

Moisture Content

Mass of wet sample & tare	767.40	g
Mass of dry sample & tare	634.30	g
Mass of tare	98.70	g
% Moisture	24.9	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
05/29/12	9	30	-	2.05	144.20	19.52	26.0	-	-	-	
05/29/12	9	40	600	2.04	143.49	19.43	26.0	3.14E-08	0.869	2.73E-08	
05/29/12	9	50	600	2.04	143.49	19.43	26.0	3.15E-08	0.869	2.74E-08	
05/29/12	10	0	600	2.05	144.20	19.52	26.0	3.14E-08	0.869	2.73E-08	*
05/29/12	10	10	600	2.04	143.49	19.43	26.0	3.14E-08	0.869	2.73E-08	*
05/29/12	10	20	600	2.05	144.20	19.52	26.0	3.14E-08	0.869	2.73E-08	*
05/29/12	10	30	600	2.05	144.20	19.52	26.0	3.13E-08	0.869	2.73E-08	*

Reported Average Hydraulic Conductivity* 2.7E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS:

Flow pump ID #	244	Balance ID #	1/6/7	Differential Pressure Transducer ID #	263
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	246			Pore Pressure Transducer ID #	28

T.E. S.T.
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Web: www.test-llc.com

Tested By	EB
Date	06/19/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-3-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.928	in	7.44	cm
Diameter	3.013	in	7.65	cm
Area	7.13	in^2	46.00	cm^2
Volume	342.11	cm^3	0.0121	ft^3
Mass	662.70	g	1.46	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	98.1	pcf		

Moisture Content

Mass of wet sample & tare	662.70	g
Mass of dry sample & tare	538.10	g
Mass of tare	0.00	g
% Moisture	23.2	

Test Data

Speed	14	
Board Number	3	
Cell Number	16	
Flow Pump Number	1A	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	126.61	cm
Min Head	125.91	cm
Maximum Gradient	17.07	
Minimum Gradient	16.98	

Final Data (After Test)

Average Height of Sample			2.920	in	7.42	cm
Average Diameter of Sample			3.003	in	7.63	cm
Area	7.08	in^2	45.69	cm^2		
Volume	338.91	cm^3	0.0120	ft^3		
Mass	671.10	g	1.48	lb		

Dry Density	99.2	pcf
Vol. of Voids	139.38	cm^3
Vol. of Solids	199.53	cm^3
Void Ratio	0.70	
Saturation	95.0	%

Moisture Content

Mass of wet sample & tare	794.50	g
Mass of dry sample & tare	662.30	g
Mass of tare	124.20	g
% Moisture	24.6	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
06/19/12	10	0	-	1.80	126.61	17.07	25.0	-	-	-	
06/19/12	10	10	600	1.79	125.91	16.98	25.0	1.80E-08	0.889	1.60E-08	
06/19/12	10	20	600	1.79	125.91	16.98	25.0	1.80E-08	0.889	1.60E-08	
06/19/12	10	30	600	1.80	126.61	17.07	25.0	1.80E-08	0.889	1.60E-08	*
06/19/12	10	40	600	1.79	125.91	16.98	25.0	1.80E-08	0.889	1.60E-08	*
06/19/12	10	50	600	1.80	126.61	17.07	25.0	1.80E-08	0.889	1.60E-08	*
06/19/12	11	0	600	1.80	126.61	17.07	25.0	1.79E-08	0.889	1.60E-08	*

Reported Average Hydraulic Conductivity* 1.6E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

TIMELY ENGINEERING SOIL TESTS, LLC

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Web: www.test-llc.com

Tested By	RI
Date	05/29/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-3-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD **B**

SAMPLE DATA

Initial Height, in	5.841
Initial Diameter, in	3.003
Height-to-Diameter Ratio	1.95
Area, in^2	7.08
Volume, in^3	41.37
Mass of Sample, g	1322.20
Wet Density, pcf	121.8
Dry Density, pcf	98.3
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1581.90
Mass of Dry Sample and Tare, g	1327.60
Mass of Tare, g	261.30
Moisture, %	23.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

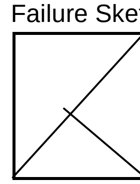
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3720
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	525
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**525**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/05/12
Checked By	*[signature]*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-3-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.811
Initial Diameter, in	3.004
Height-to-Diameter Ratio	1.93
Area, in^2	7.09
Volume, in^3	41.19
Mass of Sample, g	1315.70
Wet Density, pcf	121.7
Dry Density, pcf	98.0
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1576.40
Mass of Dry Sample and Tare, g	1320.90
Mass of Tare, g	261.70
Moisture, %	24.1

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

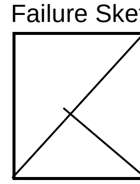
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	4815
Specimen Cross-sectional Area, in^2	7.09
Compressive Strength at Failure, psi	679
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**679**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
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Web: www.test-llc.com

Tested By	EB
Date	06/19/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13552/(Soil 2)-3-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.889
Initial Diameter, in	3.014
Height-to-Diameter Ratio	1.95
Area, in^2	7.13
Volume, in^3	42.02
Mass of Sample, g	1335.00
Wet Density, pcf	121.0
Dry Density, pcf	97.6
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1751.10
Mass of Dry Sample and Tare, g	1493.00
Mass of Tare, g	416.20
Moisture, %	24.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

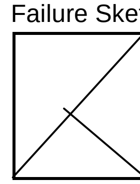
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	5638
Specimen Cross-sectional Area, in^2	7.13
Compressive Strength at Failure, psi	790
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**790**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	05/30/12
Checked By	[signature]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-1-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.958	in	7.51	cm
Diameter	2.976	in	7.56	cm
Area	6.96	in^2	44.88	cm^2
Volume	337.17	cm^3	0.0119	ft^3
Mass	653.70	g	1.44	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	96.5	pcf		

Moisture Content

Mass of wet sample & tare	653.70	g
Mass of dry sample & tare	521.70	g
Mass of tare	0.00	g
% Moisture	25.3	

Test Data

Speed	13	
Board Number	3	
Cell Number	12	
Flow Pump Number	1A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	80.89	cm
Min Head	80.19	cm
Maximum Gradient	10.76	
Minimum Gradient	10.67	

Final Data (After Test)

Average Height of Sample			2.959	in	7.52	cm
Average Diameter of Sample			2.977	in	7.56	cm
Area	6.96	in^2	44.91	cm^2		
Volume	337.52	cm^3	0.0119	ft^3		
Mass	667.20	g	1.47	lb		

Dry Density	96.6	pcf
Vol. of Voids	144.03	cm^3
Vol. of Solids	193.48	cm^3
Void Ratio	0.74	
Saturation	100.5	%

Moisture Content

Mass of wet sample & tare	769.10	g
Mass of dry sample & tare	624.50	g
Mass of tare	102.80	g
% Moisture	27.7	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x (^oC)	@ T_x	R_T	@ 20 ^oC	
05/30/12	9	0	-	1.15	80.89	10.76	26.0	-	-	-	
05/30/12	9	10	600	1.14	80.19	10.67	26.0	5.82E-08	0.869	5.06E-08	
05/30/12	9	20	600	1.14	80.19	10.67	26.0	5.84E-08	0.869	5.08E-08	
05/30/12	9	30	600	1.15	80.89	10.76	26.0	5.82E-08	0.869	5.06E-08	*
05/30/12	9	40	600	1.14	80.19	10.67	26.0	5.82E-08	0.869	5.06E-08	*
05/30/12	9	50	600	1.15	80.89	10.76	26.0	5.82E-08	0.869	5.06E-08	*
05/30/12	10	0	600	1.15	80.89	10.76	26.0	5.79E-08	0.869	5.04E-08	*

Reported Average Hydraulic Conductivity* 5.1E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

TIMELY ENGINEERING SOIL TESTS, LLC

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Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/20/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-1-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.875	in	7.30	cm
Diameter	3.013	in	7.65	cm
Area	7.13	in^2	46.00	cm^2
Volume	335.91	cm^3	0.0119	ft^3
Mass	644.80	g	1.42	lb
Specific Gravity	2.700	(Assumed)		
Dry Density	95.7	pcf		

Moisture Content

Mass of wet sample & tare	644.80	g
Mass of dry sample & tare	515.40	g
Mass of tare	0.00	g
% Moisture	25.1	

Test Data

Speed	14	
Board Number	1	
Cell Number	9	
Flow Pump Number	1B	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	61.90	cm
Min Head	61.20	cm
Maximum Gradient	8.49	
Minimum Gradient	8.39	

Final Data (After Test)

Average Height of Sample	2.870	in	7.29	cm
Average Diameter of Sample	3.010	in	7.65	cm
Area	7.12	in^2	45.91	cm^2
Volume	334.66	cm^3	0.0118	ft^3
Mass	652.60	g	1.44	lb

Dry Density	96.2	pcf
Vol. of Voids	143.63	cm^3
Vol. of Solids	191.04	cm^3
Void Ratio	0.75	
Saturation	95.3	%

Moisture Content

Mass of wet sample & tare	721.90	g
Mass of dry sample & tare	585.20	g
Mass of tare	69.80	g
% Moisture	26.5	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
06/20/12	6	30	-	0.88	61.90	8.49	25.0	-	-	-	
06/20/12	6	40	600	0.87	61.20	8.39	25.0	3.61E-08	0.889	3.21E-08	
06/20/12	6	50	600	0.88	61.90	8.49	25.0	3.61E-08	0.889	3.21E-08	
06/20/12	7	0	600	0.87	61.20	8.39	25.0	3.61E-08	0.889	3.21E-08	*
06/20/12	7	10	600	0.88	61.90	8.49	25.0	3.61E-08	0.889	3.21E-08	*
06/20/12	7	20	600	0.87	61.20	8.39	25.0	3.61E-08	0.889	3.21E-08	*
06/20/12	7	30	600	0.88	61.90	8.49	25.0	3.61E-08	0.889	3.21E-08	*

Reported Average Hydraulic Conductivity* 3.2E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	141			Pore Pressure Transducer ID #	26/27

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Web: www.test-llc.com

Tested By	RI
Date	05/30/12
Checked By	*(initials)*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-1-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.799
Initial Diameter, in	3.002
Height-to-Diameter Ratio	1.93
Area, in^2	7.08
Volume, in^3	41.05
Mass of Sample, g	1304.10
Wet Density, pcf	121.0
Dry Density, pcf	96.0
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1507.70
Mass of Dry Sample and Tare, g	1238.70
Mass of Tare, g	205.10
Moisture, %	26.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

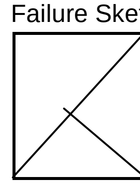
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	1369
Specimen Cross-sectional Area, in^2	7.08
Compressive Strength at Failure, psi	193
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**193**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/06/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-1-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.786
Initial Diameter, in	2.998
Height-to-Diameter Ratio	1.93
Area, in^2	7.06
Volume, in^3	40.84
Mass of Sample, g	1299.50
Wet Density, pcf	121.2
Dry Density, pcf	96.4
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1502.50
Mass of Dry Sample and Tare, g	1237.90
Mass of Tare, g	206.60
Moisture, %	25.7

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

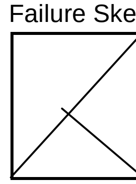
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	2366
Specimen Cross-sectional Area, in^2	7.06
Compressive Strength at Failure, psi	335
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**335**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Web: www.test-llc.com

Tested By	EB
Date	06/20/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-1-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.889
Initial Diameter, in	3.009
Height-to-Diameter Ratio	1.96
Area, in^2	7.11
Volume, in^3	41.88
Mass of Sample, g	1321.80
Wet Density, pcf	120.2
Dry Density, pcf	95.6
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1654.90
Mass of Dry Sample and Tare, g	1385.10
Mass of Tare, g	333.90
Moisture, %	25.7

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

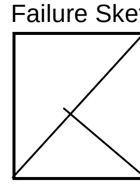
Maximum Load at Failure, lbf	3054
Specimen Cross-sectional Area, in^2	7.11
Compressive Strength at Failure, psi	429
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**429**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

Failure Sketch



Failure Type: Cone and Shear

USCS (ASTM D2487: D2488)

REMARKS

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Web: www.test-llc.com

Tested By	EB
Date	05/30/12
Checked By	[signature]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-2-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.876	in	7.31	cm
Diameter	3.009	in	7.64	cm
Area	7.11	in^2	45.88	cm^2
Volume	335.14	cm^3	0.0118	ft^3
Mass	637.70	g	1.41	lb
Specific Gravity	2.650	(Assumed)		
Dry Density	94.2	pcf		

Moisture Content

Mass of wet sample & tare	637.70	g
Mass of dry sample & tare	506.00	g
Mass of tare	0.00	g
% Moisture	26.0	

Test Data

Speed	13	
Board Number	4	
Cell Number	2	
Flow Pump Number	1B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	101.29	cm
Min Head	100.59	cm
Maximum Gradient	13.89	
Minimum Gradient	13.79	

Final Data (After Test)

Average Height of Sample			2.872	in	7.29	cm
Average Diameter of Sample			3.008	in	7.64	cm
Area	7.11	in^2	45.85	cm^2		
Volume	334.45	cm^3	0.0118	ft^3		
Mass	648.00	g	1.43	lb		

Dry Density	94.5	pcf
Vol. of Voids	143.33	cm^3
Vol. of Solids	191.12	cm^3
Void Ratio	0.75	
Saturation	98.7	%

Moisture Content

Mass of wet sample & tare	788.00	g
Mass of dry sample & tare	646.60	g
Mass of tare	140.60	g
% Moisture	27.9	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(^oC)	@ T_x	R_T	@ 20 ^oC	
05/30/12	9	0	-	1.44	101.29	13.89	26.0	-	-	-	
05/30/12	9	10	600	1.43	100.59	13.79	26.0	4.41E-08	0.869	3.84E-08	
05/30/12	9	20	600	1.43	100.59	13.79	26.0	4.43E-08	0.869	3.85E-08	
05/30/12	9	30	600	1.44	101.29	13.89	26.0	4.41E-08	0.869	3.84E-08	*
05/30/12	9	40	600	1.44	101.29	13.89	26.0	4.40E-08	0.869	3.82E-08	*
05/30/12	9	50	600	1.43	100.59	13.79	26.0	4.41E-08	0.869	3.84E-08	*
05/30/12	10	0	600	1.44	101.29	13.89	26.0	4.41E-08	0.869	3.84E-08	*

Reported Average Hydraulic Conductivity* 3.8E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS (ASTM D2487;2488)

NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	141			Pore Pressure Transducer ID #	26/27

T.E. S.T.
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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/20/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-2-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.725 in		6.92	cm
Diameter	3.023 in		7.68	cm
Area	7.18	in^2	46.31	cm^2
Volume	320.50	cm^3	0.0113	ft^3
Mass	605.60	g	1.34	lb
Specific Gravity	2.650	(Assumed)		
Dry Density	93.8	pcf		

Moisture Content

Mass of wet sample & tare	605.60	g
Mass of dry sample & tare	481.60	g
Mass of tare	0.00	g
% Moisture	25.7	

Test Data

Speed	13	
Board Number	3	
Cell Number	12	
Flow Pump Number	1A	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	172.33	cm
Min Head	171.63	cm
Maximum Gradient	24.83	
Minimum Gradient	24.72	

Final Data (After Test)

Average Height of Sample			2.733	in	6.94	cm
Average Diameter of Sample			3.010	in	7.65	cm
Area	7.12	in^2	45.91	cm^2		
Volume	318.69	cm^3	0.0113	ft^3		
Mass	612.10	g	1.35	lb		

Dry Density	94.4	pcf
Vol. of Voids	136.80	cm^3
Vol. of Solids	181.88	cm^3
Void Ratio	0.75	
Saturation	95.1	%

Moisture Content

Mass of wet sample & tare	690.90	g
Mass of dry sample & tare	560.90	g
Mass of tare	79.30	g
% Moisture	27.0	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
06/20/12	8	30	-	2.45	172.33	24.83	25.0	-	-	-	
06/20/12	8	40	600	2.44	171.63	24.72	25.0	2.46E-08	0.889	2.19E-08	
06/20/12	8	50	600	2.45	172.33	24.83	25.0	2.46E-08	0.889	2.19E-08	
06/20/12	9	0	600	2.44	171.63	24.72	25.0	2.46E-08	0.889	2.19E-08	*
06/20/12	9	10	600	2.45	172.33	24.83	25.0	2.46E-08	0.889	2.19E-08	*
06/20/12	9	20	600	2.44	171.63	24.72	25.0	2.46E-08	0.889	2.19E-08	*
06/20/12	9	30	600	2.45	172.33	24.83	25.0	2.46E-08	0.889	2.19E-08	*

Reported Average Hydraulic Conductivity* 2.2E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS:

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	29
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

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Web: www.test-llc.com

Tested By	RI
Date	05/30/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-2-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD **B**

SAMPLE DATA

Initial Height, in	5.806
Initial Diameter, in	3.008
Height-to-Diameter Ratio	1.93
Area, in^2	7.11
Volume, in^3	41.26
Mass of Sample, g	1297.80
Wet Density, pcf	119.8
Dry Density, pcf	94.3
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1500.30
Mass of Dry Sample and Tare, g	1224.80
Mass of Tare, g	203.70
Moisture, %	27.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

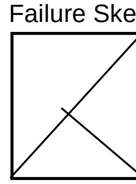
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	2452
Specimen Cross-sectional Area, in^2	7.11
Compressive Strength at Failure, psi	345
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**345**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Web: www.test-llc.com

Tested By	RI
Date	06/06/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-2-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.822
Initial Diameter, in	2.996
Height-to-Diameter Ratio	1.94
Area, in^2	7.05
Volume, in^3	41.04
Mass of Sample, g	1301.10
Wet Density, pcf	120.8
Dry Density, pcf	95.5
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1502.40
Mass of Dry Sample and Tare, g	1231.50
Mass of Tare, g	204.90
Moisture, %	26.4

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

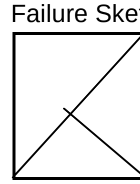
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3287
Specimen Cross-sectional Area, in^2	7.05
Compressive Strength at Failure, psi	466
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**466**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/20/12
Checked By	*(initials)*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-2-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.939
Initial Diameter, in	3.017
Height-to-Diameter Ratio	1.97
Area, in^2	7.15
Volume, in^3	42.46
Mass of Sample, g	1320.80
Wet Density, pcf	118.5
Dry Density, pcf	93.7
Machine Speed, in/min	0.050
Strain rate, % / min	0.84

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1581.80
Mass of Dry Sample and Tare, g	1305.80
Mass of Tare, g	261.30
Moisture, %	26.4

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

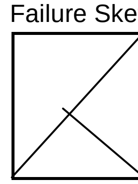
Maximum Load at Failure, lbf	3768
Specimen Cross-sectional Area, in^2	7.15
Compressive Strength at Failure, psi	527
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**527**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

DESCRIPTION

Failure Sketch



Failure Type: Cone and Shear

USCS (ASTM D2487: D2488)

REMARKS

T.E. S.T.
TIMELY ENGINEERING SOIL TESTS, LLC
1874 Forge Street Tucker, GA 30084
Phone: 770-938-8233
Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	05/30/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-3-1	Depth/Elev.	-
Subsample	4	Add. Info	Curing Age: 7 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.891	in	7.34	cm
Diameter	3.000	in	7.62	cm
Area	7.07	in^2	45.60	cm^2
Volume	334.87	cm^3	0.0118	ft^3
Mass	644.60	g	1.42	lb
Specific Gravity	2.650	(Assumed)		
Dry Density	96.0	pcf		

Moisture Content

Mass of wet sample & tare	644.60	g
Mass of dry sample & tare	515.00	g
Mass of tare	0.00	g
% Moisture	25.2	

Test Data

Speed	13	
Board Number	11	
Cell Number	4	
Flow Pump Number	1B	
Flow Pump Rate	2.80E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	161.08	cm
Min Head	160.38	cm
Maximum Gradient	21.96	
Minimum Gradient	21.86	

Final Data (After Test)

Average Height of Sample			2.888	in	7.34	cm
Average Diameter of Sample			2.999	in	7.62	cm
Area	7.06	in^2	45.57	cm^2		
Volume	334.30	cm^3	0.0118	ft^3		
Mass	652.10	g	1.44	lb		

Dry Density	96.3	pcf
Vol. of Voids	139.67	cm^3
Vol. of Solids	194.64	cm^3
Void Ratio	0.72	
Saturation	97.6	%

Moisture Content

Mass of wet sample & tare	736.50	g
Mass of dry sample & tare	600.40	g
Mass of tare	85.40	g
% Moisture	26.4	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x(°C)	@ T_x	R_T	@ 20 °C	
05/30/12	10	30	-	2.29	161.08	21.96	26.0	-	-	-	
05/30/12	10	40	600	2.28	160.38	21.86	26.0	2.80E-08	0.869	2.44E-08	
05/30/12	10	50	600	2.28	160.38	21.86	26.0	2.81E-08	0.869	2.44E-08	
05/30/12	11	0	600	2.29	161.08	21.96	26.0	2.80E-08	0.869	2.44E-08	*
05/30/12	11	10	600	2.28	160.38	21.86	26.0	2.80E-08	0.869	2.44E-08	*
05/30/12	11	20	600	2.29	161.08	21.96	26.0	2.80E-08	0.869	2.44E-08	*
05/30/12	11	30	600	2.29	161.08	21.96	26.0	2.80E-08	0.869	2.43E-08	*

Reported Average Hydraulic Conductivity* 2.4E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION

NA

USCS
(ASTM D2487;2488)
NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	70/68
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	216
Syringe ID #	141			Pore Pressure Transducer ID #	28

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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	EB
Date	06/20/12
Checked By	[handwritten initials]

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-3-1	Depth/Elev.	-
Subsample	5	Add. Info	Curing Age: 28 Days

ASTM D 5084; Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method D, Constant Rate of Flow)

Initial Sample Data (Before Test)

Height	2.797	in	7.10	cm
Diameter	3.022	in	7.68	cm
Area	7.17	in^2	46.27	cm^2
Volume	328.75	cm^3	0.0116	ft^3
Mass	621.00	g	1.37	lb
Specific Gravity	2.650	(Assumed)		
Dry Density	94.2	pcf		

Moisture Content

Mass of wet sample & tare	621.00	g
Mass of dry sample & tare	496.40	g
Mass of tare	0.00	g
% Moisture	25.1	

Test Data

Speed	14	
Board Number	2	
Cell Number	15	
Flow Pump Number	1A	
Flow Pump Rate	1.40E-05	cm^3/sec
B - Value	0.95	
Cell Pressure	100.0	psi
Back Pressure	90.0	psi
Confining (Effective) Pressure	10.0	psi
Max Head	128.72	cm
Min Head	128.02	cm
Maximum Gradient	18.18	
Minimum Gradient	18.08	

Final Data (After Test)

Average Height of Sample			2.787	in	7.08	cm
Average Diameter of Sample			3.008	in	7.64	cm
Area	7.11	in^2	45.85	cm^2		
Volume	324.55	cm^3	0.0115	ft^3		
Mass	627.80	g	1.38	lb		

Dry Density	95.5	pcf
Vol. of Voids	137.02	cm^3
Vol. of Solids	187.53	cm^3
Void Ratio	0.73	
Saturation	95.5	%

Moisture Content

Mass of wet sample & tare	709.80	g
Mass of dry sample & tare	579.10	g
Mass of tare	82.70	g
% Moisture	26.3	

TIME FUNCTION			Δ t	READING	Head	Gradient	Temp.	PERMEABILITY (cm/sec)			
DATE	HOUR	MIN	(sec)	(psi)	(cm)		T_x (°C)	@ T_x	R_T	@ 20 °C	
06/20/12	6	30	-	1.83	128.72	18.18	25.0	-	-	-	
06/20/12	6	40	600	1.82	128.02	18.08	25.0	1.68E-08	0.889	1.50E-08	
06/20/12	6	50	600	1.83	128.72	18.18	25.0	1.68E-08	0.889	1.50E-08	
06/20/12	7	0	600	1.82	128.02	18.08	25.0	1.68E-08	0.889	1.50E-08	*
06/20/12	7	10	600	1.82	128.02	18.08	25.0	1.69E-08	0.889	1.50E-08	*
06/20/12	7	20	600	1.83	128.72	18.18	25.0	1.68E-08	0.889	1.50E-08	*
06/20/12	7	30	600	1.83	128.72	18.18	25.0	1.68E-08	0.889	1.49E-08	*

Reported Average Hydraulic Conductivity* 1.5E-08 cm/sec

Note: Deaired Water Used for Permeability Test.

DESCRIPTION: NA

USCS (ASTM D2487;2488): NA

REMARKS

Flow pump ID #	22	Balance ID #	1/6/7	Differential Pressure Transducer ID #	24/25
Thermometer ID #	377	Oven ID #	14/15	Board Pressure Transducer ID #	64
Syringe ID #	140			Pore Pressure Transducer ID #	26/27

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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	05/30/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-3-1	Depth/Elev.	-
Subsample	1	Add. Info	Curing Age: 7 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.832
Initial Diameter, in	2.999
Height-to-Diameter Ratio	1.94
Area, in^2	7.06
Volume, in^3	41.20
Mass of Sample, g	1308.00
Wet Density, pcf	121.0
Dry Density, pcf	95.9
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1514.10
Mass of Dry Sample and Tare, g	1244.10
Mass of Tare, g	207.10
Moisture, %	26.0

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

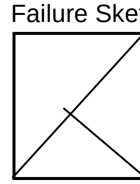
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	3870
Specimen Cross-sectional Area, in^2	7.06
Compressive Strength at Failure, psi	548
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**548**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

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Fax: 770-923-8973
Web: www.test-llc.com

Tested By	RI
Date	06/06/12
Checked By	LB

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-3-1	Depth/Elev.	-
Subsample	2	Add. Info	Curing Age: 14 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.832
Initial Diameter, in	2.999
Height-to-Diameter Ratio	1.94
Area, in^2	7.06
Volume, in^3	41.20
Mass of Sample, g	1306.20
Wet Density, pcf	120.8
Dry Density, pcf	96.0
Machine Speed, in/min	0.050
Strain rate, % / min	0.86

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1636.30
Mass of Dry Sample and Tare, g	1369.00
Mass of Tare, g	333.40
Moisture, %	25.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

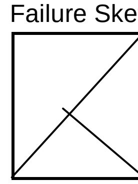
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	4600
Specimen Cross-sectional Area, in^2	7.06
Compressive Strength at Failure, psi	651
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**651**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

TIMELY ENGINEERING SOIL TESTS, LLC	1874 Forge Street Tucker, GA 30084 Phone: 770-938-8233 Fax: 770-923-8973 Web: www.test-llc.com	Tested By	EB
		Date	06/20/12
		Checked By	*LB*

Client Pr. #	-	Lab. PR. #	1210-01-1
Pr. Name	Williamsburg Works Former MGP Site	S. Type	Mold
Sample ID	13553/(Soil 3)-3-1	Depth/Elev.	-
Subsample	3	Add. Info	Curing Age: 28 Days

ASTM D 1633: Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders

METHOD B

SAMPLE DATA

Initial Height, in	5.874
Initial Diameter, in	3.013
Height-to-Diameter Ratio	1.95
Area, in^2	7.13
Volume, in^3	41.88
Mass of Sample, g	1318.00
Wet Density, pcf	119.9
Dry Density, pcf	95.2
Machine Speed, in/min	0.050
Strain rate, % / min	0.85

WATER CONTENT DETERMINATION

Mass of Wet Sample and Tare, g	1575.80
Mass of Dry Sample and Tare, g	1305.30
Mass of Tare, g	258.00
Moisture, %	25.8

Note 1: Water content was obtained after shear from partial sample.

TEST DATA

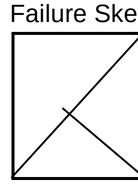
Load Cell ID #	11	Digital Caliper ID #	16
Compression Device ID #	10	Readout Device ID #	10
Balance ID #	1/7	Oven ID #	12/13/14

Maximum Load at Failure, lbf	5068
Specimen Cross-sectional Area, in^2	7.13
Compressive Strength at Failure, psi	711
Conversion Factor for Height to Diameter Ratio	1.00
Reported Compressive Strength at Failure, psi	**711**

Failure Code: 3

*Note 2: * - A conversion factor based on H/D=1.15 (C.F.-.908 as 100% and add. correction per ASTM C42)*

Failure Sketch



Failure Type: Cone and Shear

DESCRIPTION

USCS (ASTM D2487: D2488)

REMARKS

APPENDIX J

SLUG TEST RESULTS

Williamsburg Works Former MGP- Slug Tests
Well Construction Details

Well ID	Formation	Screen Length		Radii			Aquifer Thickness	Depth from Aquifer Top	
		Total	Submerged	Screen (*)	Casing			to Top of Screen	to Bottom of Screen
					Actual	Equivalent			
		L_e	$L_{e\text{-}sub}$	r_w	r_c	$r_{c\text{-}eq}$ (**)	H	d	L_w
		[ft]	[ft]	[in]	[in]	[in]	[ft]	[ft]	[ft]
WW-MW-02	Overburden	10.0	5.7	3.00	1.00	1.84	7.65	-4.35	5.65
WW-MW-03	Overburden	10.0	6.5	3.00	1.00	1.84	8.52	-3.48	6.52
WW-MW-04	Overburden	10.0	10.0	3.00	1.00	1.00	16.10	4.10	14.10
WW-MW-05	Overburden	10.0	9.2	3.00	1.00	1.84	11.15	-0.85	9.15
WW-MW-06	Overburden	10.0	N/A	3.00	1.00	N/A	NM	NM	NM
WW-MW-07	Overburden	10.0	7.9	3.00	1.00	1.84	9.85	-2.15	7.85
WW-MW-08	Overburden	10.0	6.5	3.00	1.00	1.84	8.50	-3.50	6.50
WW-MW-10	Overburden	10.0	9.6	3.00	1.00	1.84	11.64	-0.36	9.64
WW-MW-11	Overburden	10.0	7.7	3.00	1.00	1.84	9.73	-2.27	7.73
WW-MW-12	Overburden	10.0	9.9	3.00	1.00	1.84	11.90	-0.10	9.90
WW-MW-13	Overburden	10.0	9.2	3.00	1.00	1.84	11.15	-0.85	9.15
WW-MW-16	Overburden	10.0	9.7	3.00	1.00	1.84	11.71	-0.29	9.71
WW-MW-17	Overburden	10.0	9.3	3.00	1.00	1.84	11.30	-0.70	9.30
WW-MW-100I	Overburden	10.0	10.0	4.00	1.00	1.00	50.45	38.45	48.45
WW-MW-102D	Overburden	10.0	10.0	4.00	1.00	1.00	93.50	81.50	91.50
WW-MW-102I	Overburden	10.0	10.0	4.00	1.00	1.00	54.10	42.10	52.10

Notes:

(*) - sand pack (overburden wells)

(**) - $r_{c\text{-}eq} = [(1 - n)\, r_c^2 + n\, r_w^2]^{1/2}$ if $L_{e\text{-}sub} < L_e$

$r_{c\text{-}eq} = r_c$ if $L_{e\text{-}sub} = L_e$

NM - not measured

N/A - not applicable

<u>Assumptions:</u>

(1) AQTESOLV ver. 3.50 was used for slug test analyses.
(2) Sandpack porosity of 0.3 was used for wells that were not fully submerged during testing.
(3) Bouwer and Rice (1976) solution was used for unconfined aquifers.
(4) Formulas and parameters used for this slug test analysis can be found in:
Bouwer, H., 1989. The Bouwer and Rice slug test--an update, Ground Water, vol. 27, no. 3, pp. 304-309.

Table 3-3
Summary of Results
Williamsburg Works Former MGP Slug Tests

Well ID	8/28/2012 Hydraulic Conductivity [cm/sec]				Formation Mean K (cm/sec)
	FH	RH	N(**)	Mean (***)	
WW-MW-04	1.57E-04	3.11E-04	2	2.21E-04	4.34E-04
WW-MW-05	2.38E-04	1.63E-04	2	1.97E-04	
WW-MW-07	2.06E-03	1.95E-03	2	2.00E-03	
WW-MW-08	5.78E-04	2.47E-04	2	3.78E-04	
WW-MW-17	4.30E-04	5.01E-04	2	4.64E-04	
WW-MW-100I	4.61E-06	6.33E-05	2	1.71E-05	7.11E-05
WW-MW-102I	3.44E-04	2.54E-04	2	2.96E-04	
WW-MW-102D	5.26E-04	6.56E-04	2	5.87E-04	5.87E-04

(**) - number of vlid tests
(***) - geometric mean

FH - Falling Head test
RH - Rising Head test

<u>Note:</u>
-For all graphs, normalized head is defined as H(t)/Ho, where H(t) is the displacement measured at time t and Ho is the initial displacement at time t=0.

-Results that are bold and italicized are considered invalid (see Data Useability sheet).

-While the geometric mean for both the falling and rising head tests are given, it is understood that the rising head tests more accurately describe the overall hydraulic characteristics of the aquifer.
(See attached reference, *The Bouwer and Rice Slug Test - An Update*)

Williamsburg Works Former MGP Slug Tests
Useability of Data

Well ID	Remarks FH	RH
	8/28/2012	
WW-MW-02		
WW-MW-03		
WW-MW-04	OK	OK
WW-MW-05	***4***	***4***
WW-MW-06		
WW-MW-07	OK	***3***
WW-MW-08	OK	OK
WW-MW-10		
WW-MW-11		
WW-MW-12		
WW-MW-13		
WW-MW-16		
WW-MW-17	OK	OK
WW-MW-100I	OK	OK
WW-MW-102D	OK	OK
WW-MW-102I	OK	OK

Notes:

1: Water level was not allowed to fully recover to static level. Tests were analyzed, but are considered invalid.

2: A constant static level was not established prior to the start of test. Tests were analyzed, but are considered invalid.

3: A constant static level was not established prior to the start of test. Noise in data. Test analyzed.

4: Water level was not allowed to fully recover to static level. Tests analyzed,

APPENDIX K

GROUNDWATER FLOW MODELING REPORT

Appendix K

Groundwater Modeling

To Support Dewatering Design for Soil Excavation

at Williamsburg Former MGP Site

1. Site Hydrogeological Conditions

The Williamsburg Works former MGP site (the "MGP Site") is located in the Williamsburg neighborhood of Brooklyn, New York (Figures 5 and 6 of GEI (2011) (Attachment). The site consists of four parcels located along North 12th and North 11th Streets, Kent Avenue, and the East River. The 50 Kent Avenue parcel, the IRM Site, also labeled as 22 North 12th Street, is at Block 2287, Lot 1 and was the location for purifying operations, condensers and three gas holders. The 50 Kent Avenue parcel is bordered by North 12th Street to the northeast, Kent Avenue to the southeast, North 11th Street to the southwest, and Block 2287, Lot 16 to the northwest. The 50 Kent Avenue parcel is herein referred to as the "Site".

In order to evaluate potential dewatering scenarios for soil excavation, the site conditions that may affect dewatering were reviewed based on the previous site investigation results and summarized below.

1.1. Hydrology

The surrounding area of the Site is an industrial area (Figures 5 and 6 of GEI (2010). The East River is to the west and Bushwick Inlet is to the north.

The annual precipitation in New York averages to 47.25 inches or 1,200 mm per year. The seasonal variation of precipitation appears minor as shown in the following table.

Average Precipitation													
	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
in.	47.25	3.42	3.27	4.08	4.2	4.42	3.67	4.35	4.01	3.89	3.56	4.47	3.91
mm	1200	86	83	103	106	112	93	110	101	98	90	113	99

As the ground surface in the industrial area is paved by either concrete or asphalt (although with numerous cracks) surface water runoff is expected to be high. Groundwater recharge as result of direct precipitation is expected to be relatively low.

1.2. Geology

As shown on geological cross-sections on Plates 1 and 2 and Figure 1 of GEI (2010) and further defined in the IRM Pre-Design Investigation (PDI), the subsurface geological materials underlying the Site consist of fill material and glacial deposits. The artificial fill material consists of sand and silty sand with crushed stone, wood, concrete, ash, cinders, coal, and brick. The fill material thickness ranges from 0 to 42 feet, with thicknesses increasing to the north and west beneath the Site. Below the fill material the lithology predominantly consists of poorly sorted sand with layers of silty sand and silt (i.e., glacial material). A clay layer (i.e., glacial material) is present beneath the site and is encountered at a depth ranging from 32 to 90 feet bgs, with a thickness ranging from 10 to 31 feet. Beneath the Site this clay layer is continuous based on GEI (2010) and URS boring logs from the IDI. The glacial materials underlying this area are stratified drift and till materials with variable fractions of clay, silt, sand, and gravel that are usually poorly sorted with relatively impermeable zones (i.e., the clay and silt zones).

1.3. Hydrogeology

The groundwater level contour lines are represented on Figures 5 and 6 of GEI (2010) and Figure 3-5 of the PDI report. Groundwater flows to the west and northwest towards East River and Bushwick Inlet. The upgradient groundwater levels were at 6.37 to 6.40 ft amsl (WW-MW-01). The downgradient groundwater levels were around sea level at the East River.

Groundwater elevations measured at high tide (Figure 5, GEI, 2010) and at low tide (Figure 6, GEI, 2010) are not significantly different at the Site. The tidal influence on groundwater levels appears extended approximately 300 feet away from East River (near WW-MW-08 on Figures 5 and 6 of GEI (2010)), and is not in the vicinity of the Site.

At the site, groundwater has been encountered between 1 to 16 feet below the ground surface (bgs) historically. As shown in Figures 5 and 6 of GEI (2010) and Figure 3-5 of the IDI report, groundwater mounding has been observed near the three gas holder tanks at the Site.

Based on the preliminary results from the URS slug tests, the hydraulic conductivity of saturated geological materials ranges from 0.181 to 2.68 feet per day (feet/day) at the Site. These slug tests are currently being repeated to obtain more accurate values.

1.4. Gas Holder Foundations

There are three foundations of former gas holders on the Site. These foundations remain underground. The bottom of the gas holder foundations are assumed to be concrete, and are approximately 28 feet below ground surface. The walls of the foundations are brick and in some cases contain rings of metal that were part of the former tanks. These foundations are filled with saturated soils.

Groundwater mounding is observed in the vicinity of the gas holder foundations at WW-MW-05, WW-MW-06, WW-MW-01, and WW-MW-07 (7.34 to 9.58 feet amsl, Figures 5 and 6 of GEI, 2010), which were elevated about 1 to 3 feet higher than the upgradient water levels (WW-MW-01 (6.37 – 6.40 feet amsl In addition, the observed groundwater elevations at wells screened in the lower portion of the soil but above the clay layer (WW-MW-100I,2.23 feet amsl and WW-MW-102I,3.84 feet amsl) are substantially lower than the groundwater elevations in the upper portion. These observations indicate that the foundation floor and walls act as a vertical barrier and as a horizontal barrier to the groundwater flow.

2. Groundwater Flow Model Development

A groundwater flow model was developed based on the available data at the Site, for the purpose of evaluating potential dewatering scenarios for soil excavation. The USGS three-dimensional groundwater flow model code MODFLOW (McDonald and Harbaugh, 1988) is used and Groundwater Vistas Version 5 is used as graphic processing utility (Rumbaugh and Rumbaugh, 1996 – 2007).

2.1. Model Domain

The model domain covers a large area (1,550 feet by 2,100 feet) as shown in Figure K-1. The model domain includes much larger area than the Site, to avoid any potential boundary effect to proposed dewatering.

The model origin is at x = 640,600 feet and y = 688,850 feet with rotation of -39 degrees in state plane coordinates.

The model domain includes 150 rows and 210 columns. Model cell is 10 feet by 10 feet uniformly over the entire model domain.

2.2. Model Layers

The hydrostratigraphy beneath the Site includes three layers: fill/glacial deposits, clay, and native glacial deposits. Due to presence of the three gas holders and their impact to groundwater flow as well as their impact to dewatering/soil excavation, the layer above the clay is further divided into two layers: the top one includes gas holders and the lower one includes the portion above clay and beneath the gas holders.

The model includes four layers (Figure K-2):

- Layer 1 – Filled materials and/or glacial deposits as well as gas holders
- Layer 2 – Silty sand and silt
- Layer 3 – Clay
- Layer 4 – Sandy silt, silt, and silty sand

The top of Layer 3, the clay layer, is specified following the clay contour map (Figure 4 of GEI, 2010) with limited modification based on URS boring logs in the IDI report. Outside of the area where clay contours are not available, the top of Layer 3 was specified based on extrapolation.

The bottom elevations of layer 1 were specified to be 20 feet higher than top of Layer 3, which leaves the gas holders to be completely in Layer 1. The thickness of Layer 3 (clay layer) is assumed to be five feet. The bottom of Layer 4 was assumed to be at – 90 feet amsl uniformly for entire model domain.

2.3. External Boundary Conditions

As shown in Figure K-1, the East River and Bushwick Inlet were specified as MODFLOW River Boundary condition; the east, south, and northeast boundaries were specified as General Head Boundary condition, for model Layer 1. The river stage was assumed to be at the average level of high tide and low tide (Figures 5 and 6 of GEI, 2010) to be 1.42 feet amsl. The hydraulic heads along the General Head Boundaries were extrapolated following the interpreted groundwater contour lines on Figures 5 and 6 of GEI (2010).

No-flow boundary was assumed for model Layer 3 (clay layer), as it is considered as an aquitard. The general head boundaries were specified for model Layers 2 and 4, similar to Layer 1.

2.4. Gas Holder Foundation Effect

The gas holder foundations were simulated for their hydrogeological effects to the groundwater flow in the model calibration (Section 3). As shown in Figure K-1, the wall of each gas holder is simulated as horizontal hydraulic barrier using MODFLOW horizontal flow barrier package or "wall" in the model. The depth of the wall is set at bottom of Layer 1 (Figure K-2). The thickness of the wall is assumed to be one foot and the hydraulic conductivity of the wall was estimated to be 0.0001 feet/day during model calibration (Section 3).

The hydraulic effect of the gas holder bottom (concrete) was estimated using a very small leakance value (Section 3) in each of the gas holders between model Layers 1 and 2.

2.5. Groundwater Recharge

Groundwater recharge was estimated to be 3 inches/year, which is approximately 6.5% of the long-term annual precipitation (Section 1.1). This recharge rate is considered reasonable based on the paved ground surface condition (concrete or asphalt with cracks) in this area.

3. Groundwater Flow Model Calibration

Quasi-steady state flow model was conducted to adjust the hydraulic parameters for the geologic materials at the Site and in the area. The slug test results (Appendix J) were used as general guidance for estimation of hydraulic conductivity values.

The model calibrated groundwater level contour lines are presented in Figure K-3. The calibration residuals between simulated and observed hydraulic heads are posted on Figure K-3 and shown in Table K-1.

The calibration statistics are shown in the lower portion of Table K-1. The residual mean = -0.02 feet and the scaled root mean square (RMS) = 4.3%. The calibration statistics are considered very good for the objective of modeling, and in comparison to the general rule of thumb that calibration statistics should have the RMS within 10% to 15%.

The hydraulic conductivity of the filled material within the gas holders is estimated to be 5 feet/day. The hydraulic conductivity of Layer 1 is estimated to be 0.12 feet/day within Williamsburg and to be 1.9 feet/day in the rest of the model domain (geometric mean of slug tests in the shallow zone = 1.25

feet/day). The hydraulic conductivity of Layer 2 is estimated to be 0.44 feet/day (average of slug tests of 0.048 feet/day at MW-100I and = 0.84 feet/day at MW-102I) beneath the gas holders. The hydraulic conductivity of Layer 2 for the rest of model domain was assumed to be 1.9 ft/day. The clay layer hydraulic conductivity is assumed to be 0.001 feet/day (3.5E-07 cm/s) for the entire model domain assuming unweathered marine clay ranging from 1.0E-10 cm/s to 1.0E-07 cm/s (Freeze and Cherry, 1979). The hydraulic conductivity of Layer 4 is assumed to be 1.6 feet/day (slug test = 1.66 feet/day at MW-102D) for the entire model domain.

The vertical anisotropic ratios of horizontal and vertical hydraulic conductivities were estimated to be 10:1 for most layers in most areas. The vertical ratios were modified to be 100:1 in the vicinity of the Site in Layer 1, and to be 10,000:1 in the gas holders of Layer 1. The very high vertical anisotropy ratio in the gas holder significantly limits the leakage from the gas holder to the soil below.

4. Dewatering Scenario Evaluation

Transient flow model simulations were conducted based on the calibrated steady state flow model to test and simulate several proposed dewatering scenarios. It was assumed the specific yield is 0.05 and the storage coefficient is 0.001, to be relatively conservative for estimation of dewatering rate.

4.1. Scenario 1 - Single Well Pumping

One single well pumping was initially proposed to support dewatering for soil excavation within an L-shaped area encompassing the holder foundations.

Model Assumptions for Scenario 1

- Sheet pile or slurry wall is installed to top of clay through model layers 1 and 2, surrounding the L-shaped area (Figure K-4).
- The walls of the gas holder foundations and the concrete bottom of the gas holders remained in subsurface (Figure K-4).
- The sheet pile wall was simulated with a thickness of 0.01 feet and hydraulic conductivity of 2.8E-06 feet/day (1.0E-09 cm/s).
- A single pumping well is screened in the middle of the block in model Layer 2 (Figure K-5) and is continuously pumped for 11 days.

Model Results of Scenario 1

- The pumping rate at the single well was tested and estimated to be 1 gpm to be sustainable for 11 days. After 11 days of pumping, the water level in the model cell with the extraction well drops to – 27 feet amsl , and the water level drops to – 14 feet amsl at monitoring well MW-100I. ,
- The simulated groundwater levels in Layer 2 by end of 11 days beneath the gas holders range from -- 27 feet amsl in the vicinity of the pumping well to - 9 feet amsl near the sheet pile wall (Figure K-5). The simulated groundwater level drawdown within the sheet pile wall range from

14 feet to 32 feet. The simulated groundwater level drawdown outside of the sheet pile wall by end of 11 days is less than 1.5 feet.

- However, the dewatering beneath the gas holders has limited impact to the groundwater levels in Layer 1. By end of 11 days the water levels in the gas holder foundations do not change. The only change of water level is in the northeast corner within the L-shape sheet-pile wall (Figure K-4). The limited effect of deep well pumping to the upper portion within the block is due to the presence of the concrete bottom of the gas holder foundations and the gas holder wall.

- There are uncertainties in the model results, in terms of dewatering rate and duration. The actual dewatering rate and duration are dependent on the field hydraulic conductivity distribution and aquifer storativity within the dewatering block.

4.2 Scenario 2 – Multiple Sumps

Dewatering scenario using multiple sumps was tested and simulated using the transient flow model.

Model Assumptions for Scenario 2:

- Sheet pile wall is installed to clay layer through Layers 1 and 2 around one of the gas holder foundations (100 feet by 100 feet) before dewatering (Figure K-6). The sheet pile is simulated as a wall with thickness of 0.01 feet and hydraulic conductivity of 2.8E-06 feet/day (1.0E-09 cm/s).
- Nine sumps (trenches) are simulated using MODFLOW Drain cells located within the block as shown in Figure K-6.
- The soil excavation process is assumed to proceed at a vertical rate of 2.7 feet/day for 9 days until reaching the bottom of the foundation and then continue for 2 more days to reach 30 feet deep.
- The bottom elevation of each sump is lowered daily at the same rate as soil excavation (approximately 2.7 feet/day).
- During soil excavation, it is assumed the wall of the gas holder foundation is removed along with excavation, thus, in model simulation of the wall for the foundation is removed.

Modeling Results of Scenario 2

The simulated groundwater elevations in Layer 1 inside and outside of the sheet pile wall by end of nine days before excavation of the concrete bottom of gas holder is presented in Figure K-6. Inside of the sheet pile the groundwater level drops to – 16 feet amsl. Outside of the sheet pile the change of water level is less than 0.5 feet.

The simulated dewatering rate of nine sumps ranges from 4 gpm to 16 gpm. For each day, the sump dewatering rate is relatively high at the beginning of each step-down of 2.7 feet, and then gradually decreases to a relatively stable rate of 4 gpm.

The simulated total volume of dewatering in nine days is 11,300 ft^3. The average dewatering rate over nine days is approximately 6.5 gpm.

Sensitivity Analysis for Scenario 2

- Assume the hydraulic conductivity of sheet pile is increased by one order of magnitude to 2.8E-05 feet/day (1.0E-08 cm/s) to represent the potential leakage through the sheet pile.
- The simulated dewatering rate of the nine sumps increases to range from 5 gpm to 16 gpm, and water level drawdown outside of the sheet pile wall increases to approximately 2 feet.
- Total volume of dewatering over nine days is 12,166 $feet^3$, which is increased by approximately by 8% in comparison to the base case of Scenario 2. The average dewatering rate is approximately 7.4 gpm.
- There are uncertainties in the model results, in terms of dewater rate and dewatering duration. The actual dewatering rate and duration are dependent on the field hydraulic conductivity distribution and aquifer storativity within the dewatering block.

5. References

Freeze, R. Allan and John A. Cherry, 1979, Groundwater, 604 pages, Prentice Hall, Inc. Englewood Cliffs, New Jersey 07632.

GEI, 2010, Draft Remedial Investigation Interim Data Summary, Williamsburg Works Former Manufactured Gas Plant (MGP) Site, Brooklyn, New York 11211, Index No. A2-055-0606, Site No. 224055, August.

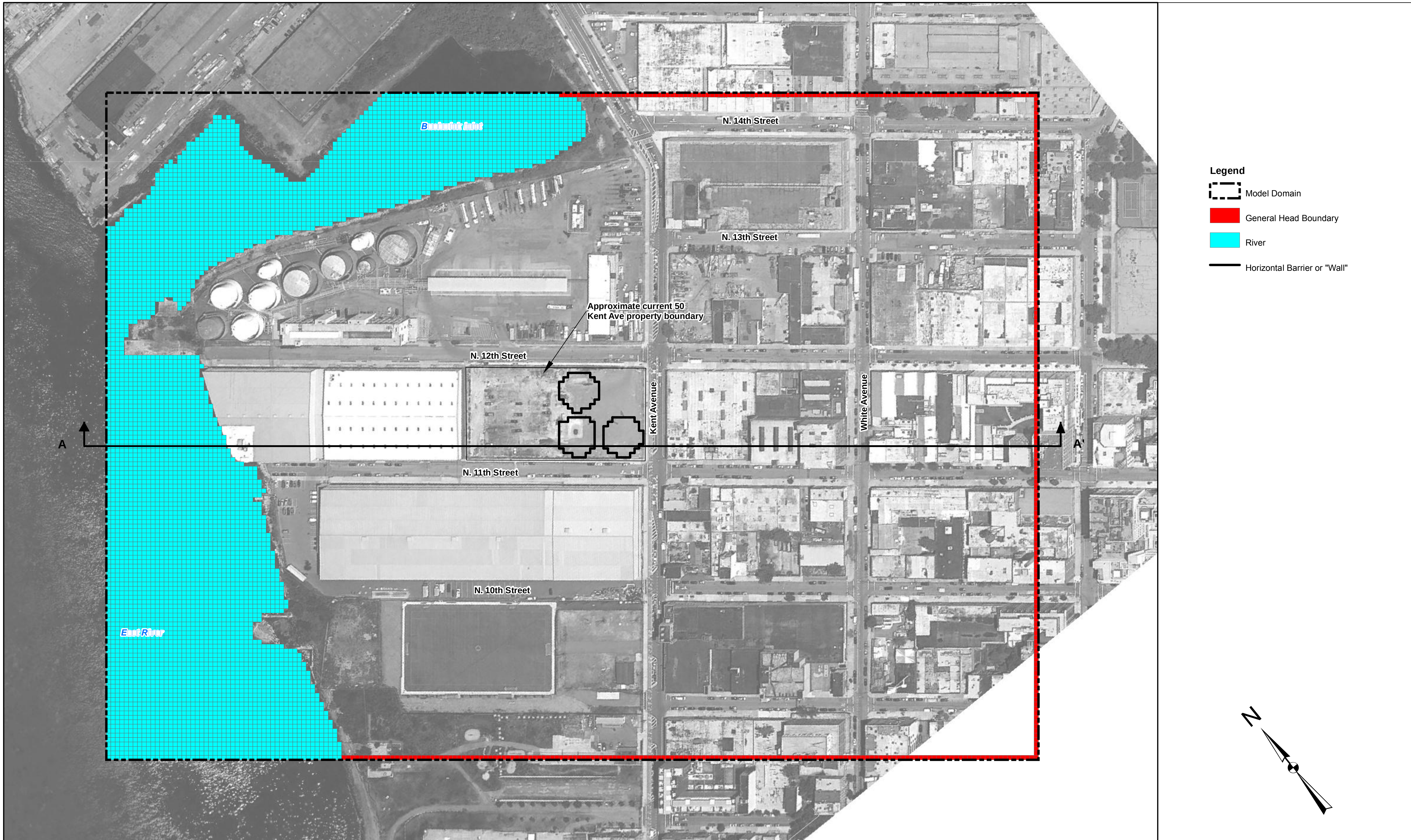
McDonald, M.G. and A.W. Harbaugh, 1988, A Modular Three-Dimensional Finite Difference Groundwater Flow Model, Techniques of Water Resources Investigations of the United States Geological Survey, Washington, D.C.

Table K-1. Comparison of Simulated and Observed Hydraulic Heads

Name	X (feet)	Y (feet)	Model Layer	Observed Head (feet)	Computed Head (feet)	Residual (feet)
WW-MW-01	642403.22	688410.81	1	6.39	6.84	-0.46
WW-MW-02	642121.16	688485.59	1	6.92	6.62	0.30
WW-MW-03	642204.01	688696.09	1	6.16	6.61	-0.45
WW-MW-04	642026.31	688738.93	1	7.35	7.02	0.33
WW-MW-05	641946.37	688775.73	1	7.49	7.97	-0.48
WW-MW-06	641815.59	688725.95	1	7.78	7.59	0.18
WW-MW-07	641955.10	688876.98	1	9.56	9.38	0.18
WW-MW-08	641665.21	688848.45	1	5.86	5.82	0.03
WW-MW-10	641681.77	689122.16	1	3.78	3.89	-0.11
WW-MW-11	641529.95	688957.02	1	2.86	3.18	-0.32
WW-MW-12	641395.18	689010.95	1	2.74	2.57	0.17
WW-MW-13	641554.99	689219.44	1	1.93	2.39	-0.47
WW-MW-14	641312.56	689120.85	1	2.40	1.94	0.45
WW-MW-15	641364.63	689376.89	1	2.04	1.72	0.32
WW-MW-16	642258.45	688966.97	1	6.72	6.35	0.37
WW-MW-17	641747.92	688894.20	1	6.75	6.74	0.01
WW-MW-102D	642019.18	688710.05	4	3.74	4.11	-0.37

Model Calibration Statistics

Residual Mean (feet)	-0.02
Abs. Res. Mean (feet)	0.29
Res. Std. Dev. (feet)	0.33
Sum of Squares	1.85
RMS Error	0.33
Min. Residual (feet)	-0.48
Max. Residual (feet)	0.45
Number of Observations	17.00
Range in Observations (feet)	7.64
Scaled Std. Dev.	0.04
Scaled Abs. Mean	0.04
Scaled RMS	0.04



PHOTOGRAPH OBTAINED FROM GOOGLE EARTH TM ©2009, IMAGE ©2010 DIGITAL GLOBE, ACCESSED ON 10/20/10.

0 200 400 Feet

IRM PREDESIGN INVESTIGATION
50 KENT AVENUE PARCEL OF THE
WILLIAMSBURG WORKS FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

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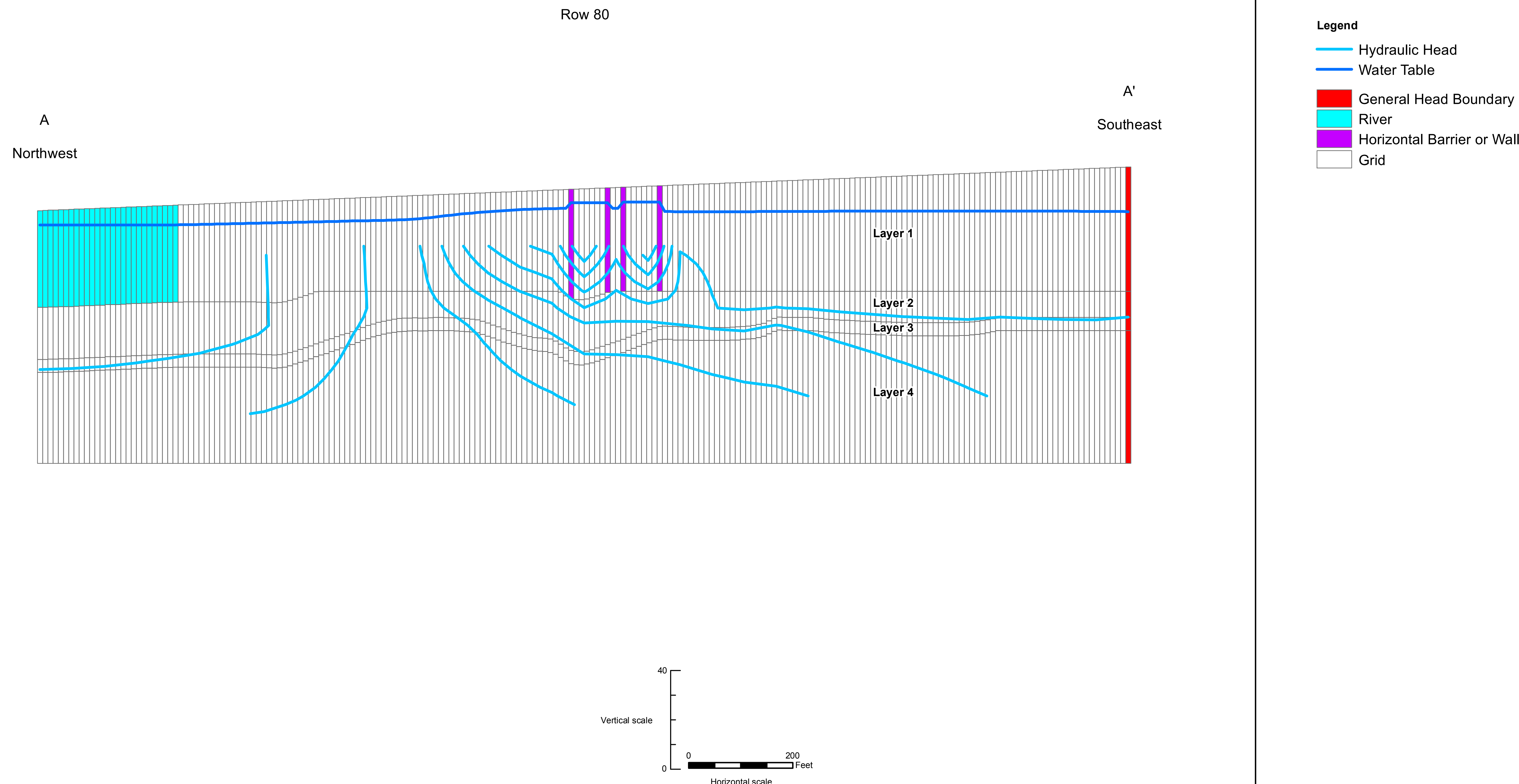
Model Domain with Boundary Conditions

August, 2012

Figure K-1

Path: W:\General\Williamsburg\GIS\Figures2012\FigJ-1 Model Domain.mxd



Path: W:\General\Williamsburg\GIS\Figures2012\FigJ-2 Model XSection.mxd

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Model Domain with Boundary Conditions

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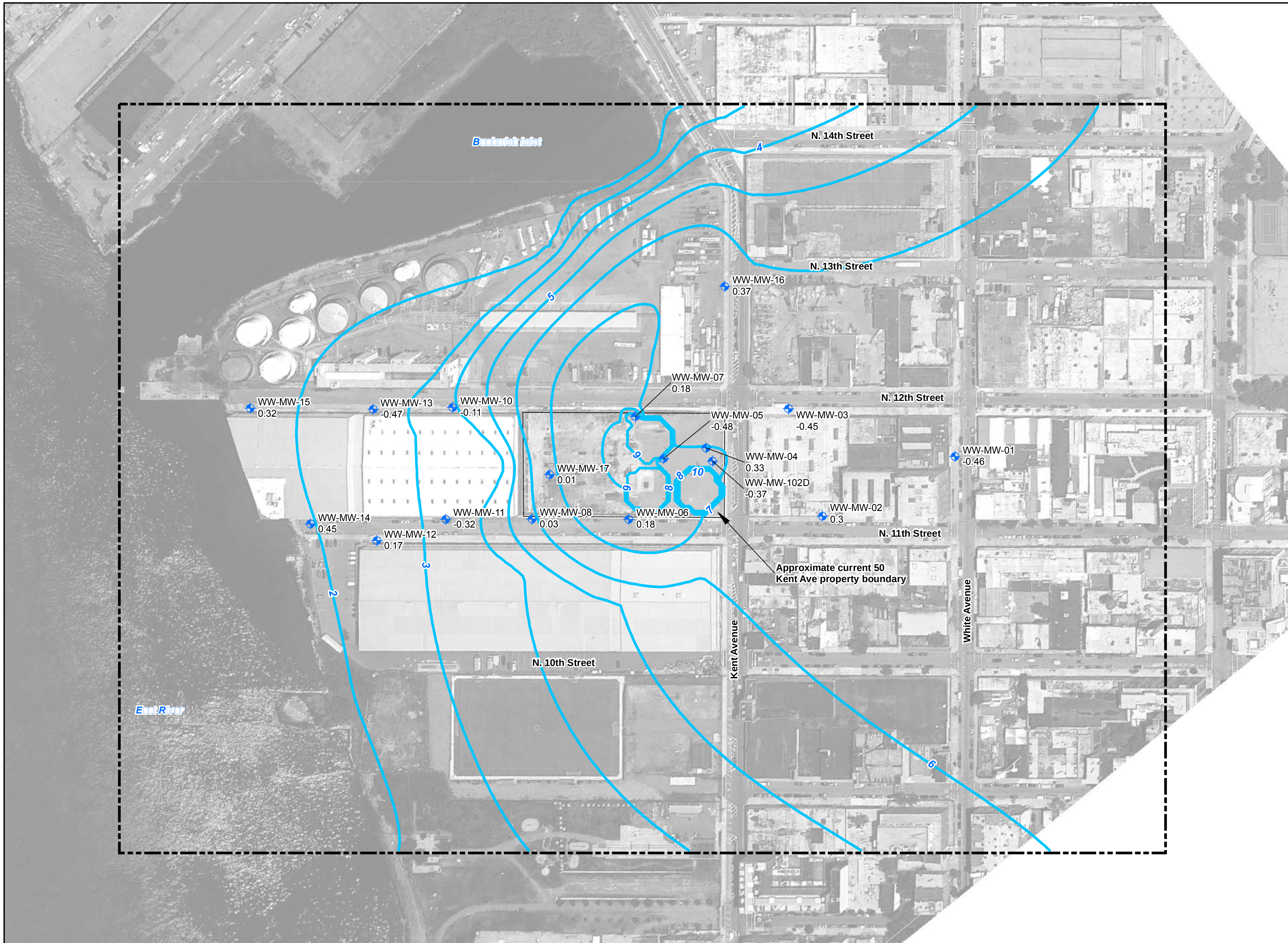
Figure K-2



Legend

Monitoring Well

WW-MW-06 0.18 — Monitoring Well ID, Calculated Residual

Simulate Quasi-Steady State Potentiometric Surface

Model Domain

N

PHOTOGRAPH OBTAINED FROM GOOGLE EARTH TM ©2009, IMAGE ©2010 DIGITAL GLOBE, ACCESSED ON 10/20/10.

0 200 400 Feet

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Quasi-Steady State Calibrated Groundwater Level Contours and Calibration Residuals

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Figure K-3

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Simulated Groundwater Levels by 11 days in Layer 1 for Senario 1

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Figure K-4

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Simulated Groundwater Levels by 11 days in Layer 2 for Senario 1

Project 11176638

February, 2013

Figure K-5

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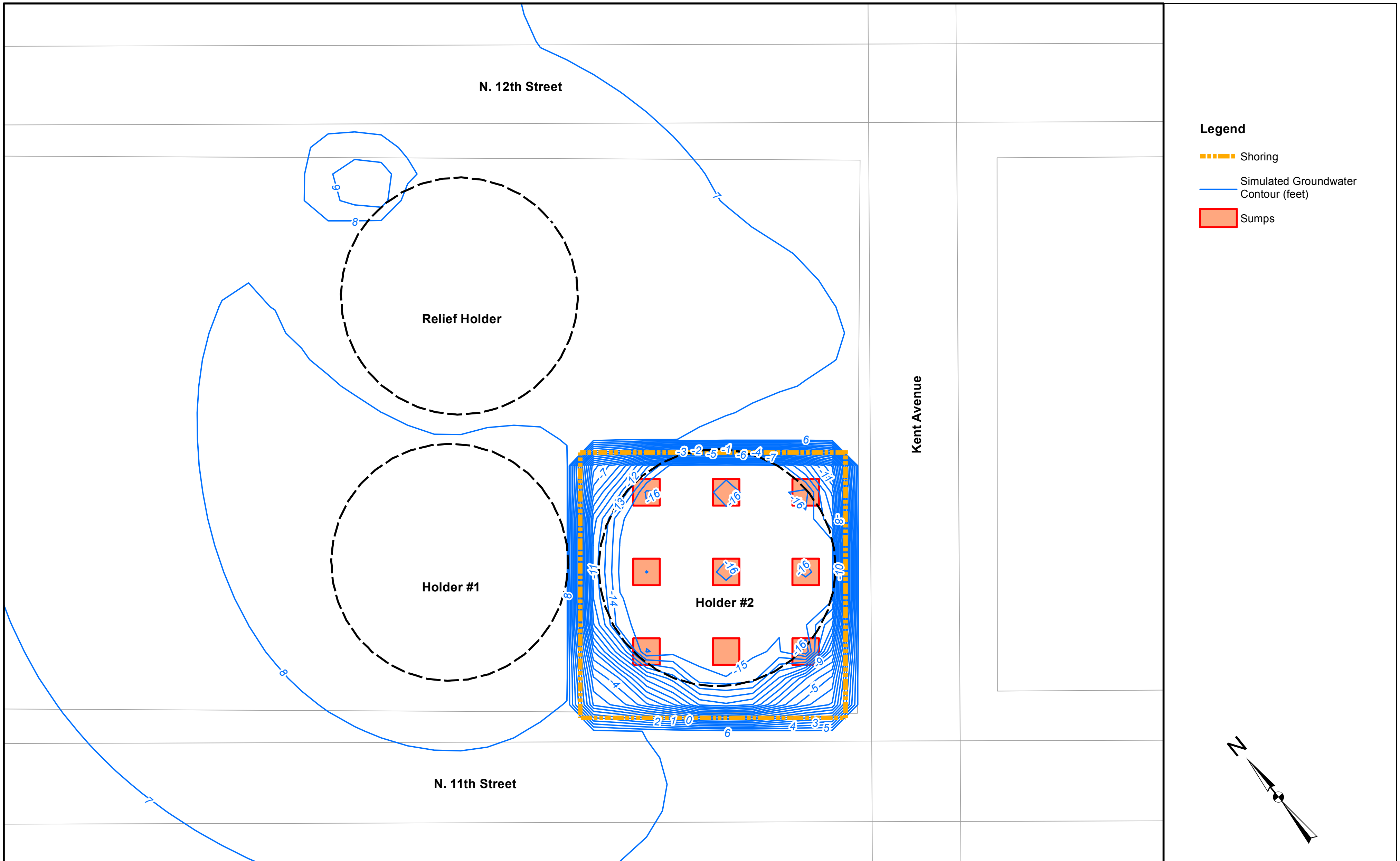

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Simulated Groundwater Levels by 9 days in Layer 1 for Senario 2

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February, 2013

Figure K-6

APPENDIX L

AMBIENT SOUND AND VIBRATION STUDIES

Ambient Sound Level Study
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

Prepared for:

Mr. Colin Wasteneys
URS Corporation
77 Goodell Street
Buffalo, New York 14203

Prepared by:

Vibra-Tech Engineers, Inc.
109 E. First Street
Hazleton, Pennsylvania 18201
(800) 233-6181

May 10, 2012

Ambient Sound Level Study
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

May 10, 2012

Introduction

An ambient sound level study was carried out by Vibra-Tech Engineers, Inc. in the area surrounding the former MGP site at 50 Kent Avenue, Brooklyn, New York. The study was authorized by Mr. Colin Wasteneys of URS Corporation for the purpose of measuring ambient sound levels around the perimeter of the 50 Kent Avenue Parcel prior to the start of the project. Sound measurements were taken from April 23 to April 29, 2012.

Scope and Conditions of Study

Instrumentation

Six (6) Larson Davis System 820 sound level monitoring systems were used to conduct unattended monitoring during this ambient study. In addition, two Larson Davis 824 Systems were used to conduct spot check - attended monitoring at each location. The data collected by all systems contains various sound level quantities, including Exceedance Levels, L_{eq}, and other noise measurements, all measured simultaneously. The sound level systems were laboratory calibrated by the manufacturer prior to the study. The systems were also field calibrated immediately after installation and removal. All sound level system calibration information for all six unattended systems is located in Appendix A.

Field Procedure

For the study conducted from April 23 to April 29, 2012, a total of 6 unattended sound level stations were deployed at locations surrounding the project site. The table below provides the location number, sound level meter serial number, a brief description, and GPS coordinate for each location. A map showing monitoring locations is located in Appendix B.

Table 1. Monitoring locations for the sound study conducted from April 23-29, 2012

Location	SLM Serial Number	Description	GPS
1	1816	20 N. 12th Street Block 2287 - South Corner	N 40° 43’ 24.02” W 73° 57’ 38.02”
2	1817	Block 2294 Lot 1 - North Side of Building	N 40° 43’ 22.24” W 73° 57’ 36.30”
3	1861	51 Kent Avenue - North Corner	N 40° 43’ 20.67” W 73° 57’ 33.76”
4	1821	35 Kent Avenue Block 2288 Lot 1 - North Corner	N 40° 43’ 22.62” W 73° 57’ 31.43”
5	1862	Block 2277 Lot 1 - South of Building	N 40° 43’ 24.27” W 73° 57’ 33.02
6	1855	20 N. 12th Street Block 2287 - Northeast Corner	N 40° 43’ 25.49” W 73° 57’ 36.07”

In addition to the six stations deployed, two Larson Davis 824 Systems were used to conduct 1 hour spot checks at each of the six monitoring locations. The sound level system was mounted on a tripod approximately five feet above the ground and the microphone was equipped with a wind screen. During these spot check tests, specific information regarding singular events which occurred near the monitoring location or were evident during each sound level test period were noted. Weather conditions during the testing are also recorded. A copy of all field notes for each of the six spot checks is included in Appendix C.

Sound Level Measurements

The measurement of noise involves quantifying both its rate (frequency in Hz) and intensity (pressure) relative to normal atmospheric pressure. People do not perceive all frequencies with equal sensitivity, rather they respond to higher frequencies more than lower frequencies. The following discussion of sound levels measurements describes the types of measurements collected for these studies.

dBA

A dBA sound level measurement weighs the various frequency components of a sound as perceived by the human ear in order to yield a single number indicator of its relative loudness. All measurements used in this study are dBA.

Ln – Exceedance Levels

Exceedance Level measurements are taken for a pre-determined period of time, which is variable. The results of these measurements are expressed as a dBA value and the percentage of time of the total measurement period that the level was exceeded. For example, if L_{10} = 50 dBA, for 10 percent of the test period, the sound level present was 50 dBA or above.

L_{eq} – Equivalent Sound Level

L_{eq} is a measurement over a period of time and is the steady state sound level, which contains the same acoustic energy as the measured time varying sound level for the time period of the measurement.

The sound level meters used for this project directly calculate and output a L_{eq} value in dB. The sound level meters use the following equation to calculate the L_{eq} values:

$$L_{eq} = 10\log\left[\frac{1}{t_2 - t_1}\int_{t_1}^{t_2}\frac{p_A^2}{p_0^2}dt\right]$$

- *Leq* = equivalent continuous sound pressure level [dB]
- *p0* = reference pressure level = 20µPa
- *pA*= acquired sound pressure in Pa
- *t1* = start time of measurement
- *t2* = end time of measurement

Results of the Study

Daily Summary for Each Location

The tables below contain the daily measurement summary for each site including maximum, minimum, and Leq levels recorded at each location. Please note that this summary is for data collection from April 23 at 00:00 to April 29 at 23:59. A copy of all sound level data for the six monitoring locations is included on the CD attached to this report titled "Ambient Sound Monitoring - Williamsburg Works - 04-23-2012." During the study, the microphone element was stolen from location five on April 25. Sound level meters at locations 3 and 4 failed to save data from April 25 to to April 29 due to corrupted memory.

Monitoring Location 1

Date	4/23/12	4/24/12	4/25/12	4/26/12	4/27/12	4/28/12	4/29/12
Daily Maximum dBA	83.5	82.9	88.2	85.9	85.5	81.3	77.3
Daily Minimum dBA	43.1	40.1	39.8	42.7	43.0	42.0	41.7
Daily L_{eq} dBA	56.7	57.3	55.7	57.9	56.9	51.3	50.5

Monitoring Location 2

Date	4/23/12	4/24/12	4/25/12	4/26/12	4/27/12	4/28/12	4/29/12
Daily Maximum dBA	91.8	92.5	91.5	92.1	92.9	91.9	83.4
Daily Minimum dBA	43.7	40.2	41.2	44.1	43.9	42.3	42.1
Daily L_{eq} dBA	63.8	57.4	58.6	62.3	59.5	55.2	53.9

Monitoring Location 3

Date	4/23/12	4/24/12	4/25/12	4/26/12	4/27/12	4/28/12	4/29/12
Daily Maximum dBA	102	97.6	92.8	-	-	-	-
Daily Minimum dBA	47.6	43.8	50.9	-	-	-	-
Daily L_{eq} dBA	70.2	69.8	73.2	-	-	-	-

Monitoring Location 4

Date	4/23/12	4/24/12	4/25/12	4/26/12	4/27/12	4/28/12	4/29/12
Daily Maximum dBA	115.8	94.6	88.8	-	-	-	-
Daily Minimum dBA	47.2	43.5	46.5	-	-	-	-
Daily L_{eq} dBA	72.3	67.7	65.8	-	-	-	-

Monitoring Location 5

Date	4/23/12	4/24/12	4/25/12	4/26/12	4/27/12	4/28/12	4/29/12
Daily Maximum dBA	107.9	89.4	-	-	-	-	-
Daily Minimum dBA	48.4	45	-	-	-	-	-
Daily L_{eq} dBA	69.6	62.4	-	-	-	-	-

Monitoring Location 6

Date	4/23/12	4/24/12	4/25/12	4/26/12	4/27/12	4/28/12	4/29/12
Daily Maximum dBA	97.2	94.7	95.3	97.3	96.3	88.5	91.9
Daily Minimum dBA	45	42.1	39.4	41.3	43.8	42.1	41
Daily L_{eq} dBA	66.5	61.1	61.1	61.9	62.3	58.7	58.6

Overall Summary for each Location

The tables below contain the overall noise level summary including overall maximum, minimum, Leq , and LN Exceedance levels recorded at each location. Please note that this data included readings from date and time of installation (April 22) to time of removal on April 30.

Location	*1*	*2*	*3*	*4*	**5*	*6*
Overall Maximum dBA	88.2	92.9	124.1	115.8	107	103.9
Overall Minimum dBA	39.6	40.2	41.7	42.6	40.5	39.3
Overall Leq	56.4	60.4	71.8	69.4	63.5	63.4
Ln 10	58.7	63.2	72.4	71.8	64.2	61.6
Ln 20	55.9	59.7	68.9	68.8	61.3	57.9
Ln 30	50.5	57.0	65.9	66.3	59.6	55.5
Ln 50	50.5	53.4	60.6	61.6	57.1	52.1
Ln 90	45.2	47.2	49.1	51.2	53.1	45.5
Ln 95	44.2	45.8	47.4	49.2	52.4	44.2

* Data up to time of microphone theft.

On Site Readings

The tables below contain the noise level summary including overall maximum, minimum, Leq, and LN Exceedance levels recorded for the one hour spot checks conducted at each location. Please note that this data was collected on April 23, 2012. A copy of all sound level data for these spot checks is included in Appendix D along with the calibration certificates for the two sound level meters used to collect the on site data.

Location	*1*	*2*	*3*	*4*	*5*	*6*
Time	***08:21:18***	***08:21:33***	***09:40:35***	***09:40:49***	***11:08:06***	***11:08:19***
Spot Check Maximum dBA	72.7	75.9	93.6	95.4	84.1	83.2
Spot Check Minimum dBA	47.5	47.7	53.9	52.3	51.9	49.2
Spot Check Leq	55.3	58.0	72.6	73.2	61.9	59.1
Ln 10	57.5	61.1	75.1	74.6	63.9	60.5
Ln 20	55.1	58.5	71.7	71.5	61.4	57.2
Ln 30	53.9	56.8	69.4	69.2	59.8	55.6
Ln 50	52.2	54.3	65.5	65.1	57.7	53.8
Ln 90	49.7	50.5	56.8	57.2	53.8	51.4
Ln 95	49.2	50.0	56.0	56.1	53.2	51.0

Comparison of one hour spot check and sound level station

Location	Time	Leq dBA	Lmax dBA	Lmin dBA
Location 1	09:00:00	55.3	72.7	47.5
Spot check	08:21:18	55.7	74.6	47.7
Location 2	09:00:00	58.0	75.9	47.7
Spot check	08:21:33	58.7	77.3	48.5
Location 3	10:00:00	72.6	93.6	53.9
Spot check	09:40:35	72.5	92.7	53.9
Location 4	10:00:00	74.1	95.5	54.9
Spot check	09:40:49	73.2	95.4	52.3
Location 5	11:00:00	62.7	84.9	53.4
Spot check	11:08:06	61.9	84.1	51.9
Location 6	11:00:00	61.2	87.8	46.3
Spot check	11:08:19	59.1	83.2	49.2

If you have any questions or comments regarding the ambient sound monitoring at the Williamsburg Works Former MGP site please contact our office.

Respectfully submitted,
VIBRA-TECH ENGINEERS, INC.

Mark Edwards
Vibration and Sound Analyst

Jonathan A. Ferdinand
Vibration and Noise Specialist

APPENDIX A

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154935

Instrument Model 820, Serial Number 1816, was calibrated on 09FEB2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 09FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0589 / 0103	12 Months	08DEC2012	2011-152462

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.
Tested with PRM828 S/N 2806.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154980

Microphone Model 377B20, Serial Number 127516, was calibrated on 10FEB2012. The microphone meets factory specifications per Test Procedure D0001.8167.

New Instrument
Date Calibrated: 10FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Abraham Ortega
Technician: Abraham Ortega

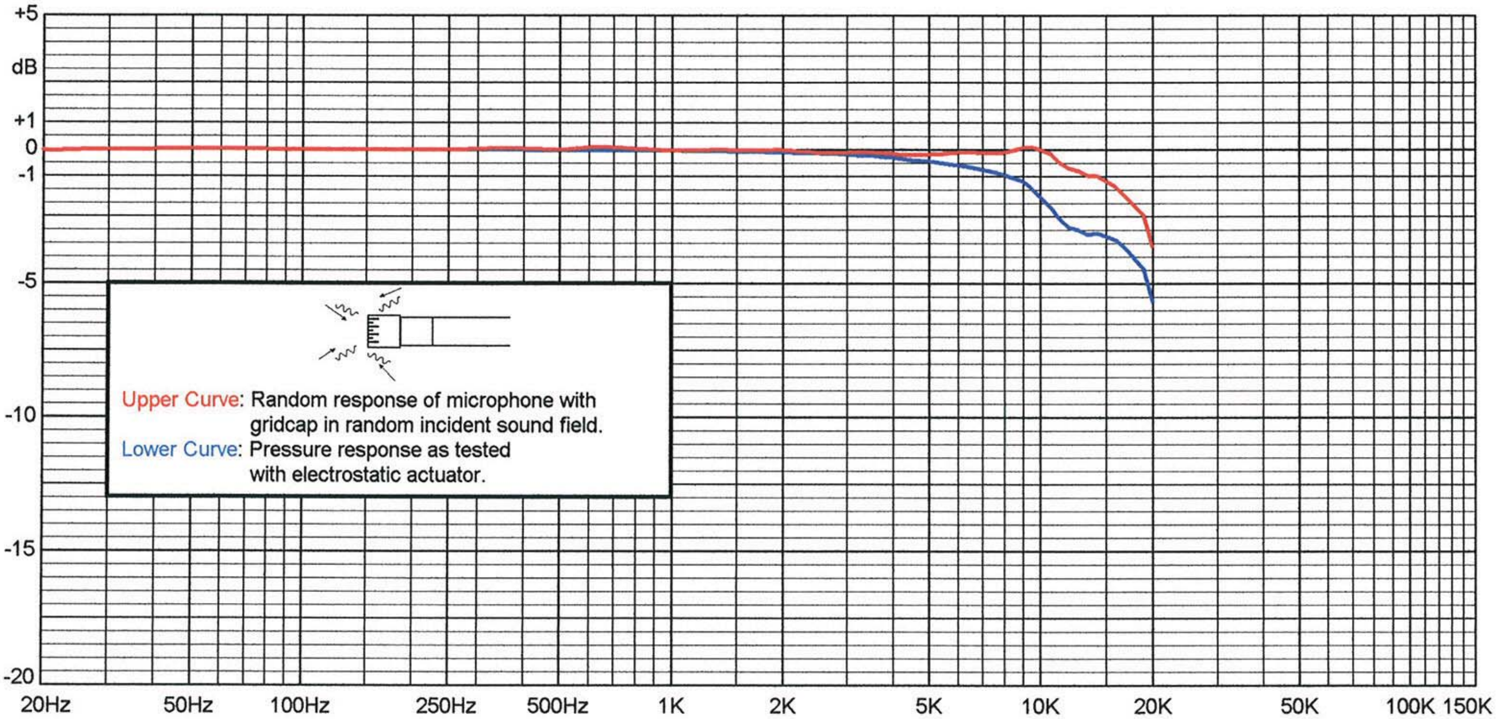
Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Larson Davis

PCB 1/2" Microphone Calibration Chart
Model: 377B20 Serial Number: 127516

Open Circuit Sensitivity @ 1014.8 mbar & 251.19 Hz
-26.61 dB re 1V/Pascal
46.74 mV/Pascal
+0.59 K_0(-dB re 50 mV/Pascal)
Expanded Uncertainty @ ~95% confidence level
0.19 dB

Capacitance @ 251.2 Hz
10.0 pF
Lower Limiting Frequency
-3 dB @ **1.41** Hz
Test Conditions:
Polarization Voltage **0** V
Ambient Pressure **1014.8** mbar
Temperature **23.6** °C
Relative Humidity **35.2** %



Frequency Response (0 dB @ 251.19 Hz)
Random and actuator response with reference to level at 251.19 Hz

Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)
19.95	-0.04	-0.04	501.19	0.01	-0.01	1883.65	0.00	-0.08	4216.97	-0.20	-0.34	9440.61	0.09	-1.42
25.12	-0.01	-0.01	630.96	0.12	-0.02	1995.26	0.00	-0.09	4466.84	-0.20	-0.37	10000.00	-0.01	-1.78
31.62	0.01	0.01	794.33	0.05	-0.02	2113.49	-0.03	-0.11	4731.51	-0.19	-0.40	10592.54	-0.14	-2.12
39.81	0.02	0.02	1000.00	-0.01	-0.03	2238.72	-0.06	-0.11	5011.87	-0.18	-0.44	11220.19	-0.47	-2.60
50.12	0.02	0.02	1059.25	-0.04	-0.04	2371.37	-0.08	-0.10	5308.84	-0.16	-0.48	11885.02	-0.69	-2.90
63.10	0.02	0.02	1122.02	-0.03	-0.04	2511.89	-0.12	-0.12	5623.41	-0.13	-0.52	12589.25	-0.77	-3.00
79.43	0.01	0.01	1188.50	-0.02	-0.04	2660.73	-0.12	-0.13	5956.62	-0.09	-0.56	13335.21	-0.95	-3.16
100.00	0.01	0.01	1258.93	-0.01	-0.05	2818.38	-0.12	-0.15	6309.57	-0.09	-0.62	14125.38	-0.98	-3.13
125.89	0.01	0.01	1333.52	0.00	-0.05	2985.38	-0.11	-0.18	6683.44	-0.10	-0.69	14962.36	-1.18	-3.25
158.49	0.01	0.01	1412.54	0.00	-0.05	3162.28	-0.09	-0.19	7079.46	-0.11	-0.75	15848.93	-1.39	-3.39
199.53	0.00	0.00	1496.24	-0.02	-0.06	3349.65	-0.08	-0.21	7498.94	-0.12	-0.83	16788.04	-1.71	-3.68
251.19	0.00	0.00	1584.89	-0.02	-0.06	3548.13	-0.10	-0.23	7943.28	-0.10	-0.93	17782.80	-2.07	-4.04
316.23	0.06	-0.00	1678.80	-0.02	-0.07	3758.37	-0.13	-0.26	8413.95	-0.03	-1.04	18836.49	-2.46	-4.46
398.11	0.05	-0.01	1778.28	-0.02	-0.08	3981.07	-0.15	-0.28	8912.51	0.08	-1.16	19952.62	-3.62	-5.67

Abraham Ortega 10FEB2012
Larson-Davis Model 9700 ES Microphone Calibration System

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154936

Instrument Model 820, Serial Number 1817, was calibrated on 09FEB2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 09FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0445 / 0111	12 Months	15NOV2012	2011-151712

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.
Tested with PRM828 S/N 2807.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154807

Microphone Model 377B20, Serial Number 122748, was calibrated on 07FEB2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 07FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154939

Instrument Model PRM828, Serial Number 2807, was calibrated on 09FEB2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 09FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47030867	12 Months	03MAY2012	5194985
Larson Davis	LDSigGn/2209	0612 / 0102	12 Months	06JAN2013	2012-153446

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade　　Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222　Telephone: 716.926.8243　Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154365

Instrument Model 820, Serial Number 1861, was calibrated on 31JAN2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

New Instrument
Date Calibrated: 31JAN2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn / 2209	0666 / 0123	12 Months	08DEC2012	2011-152463

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 26 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM828-2874

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

~ Certificate of Calibration and Compliance ~

Microphone Model: 377B20   Serial Number: 128363   Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
Larson Davis	GPRM902	4163	CA-1089	4/12/11	4/12/12
Hewlett Packard	34401A	MY41045214	LD-001	3/14/11	3/14/12
Bruel & Kjaer	4192	2657834	LD-028	9/23/11	9/21/12
Newport	BTH-W/N	8410668	CA1187	not required	not required
Larson Davis	PRM915	131	CA-1205	4/22/11	4/20/12
Larson Davis	PRM902	4186	CA-1083	2/3/11	2/3/12
Larson Davis	2559LF	3216	CA-883	not required	not required
Larson Davis	ADP005	1	LD-017	not required	not required
Larson Davis	PRM916	128	CA-1553	6/23/11	6/22/12
Larson Davis	CAL250	4118	TA-463	4/11/11	4/11/12
Larson Davis	2201	140	CA890	8/18/11	8/17/12
Larson Davis	2900	1079	CA-521A	6/10/11	6/10/12
Larson Davis	PRA951-4	241	CA1449	9/16/11	9/14/12
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: N/A

As Left: New unit in tolerance

Notes

1. Calibration of reference microphone is traceable through PTB.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open circuit sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Lenard Lukasik   Date: December 27, 2011

ACCREDITED
CALIBRATION CERT #1862.01

PCB PIEZOTRONICS™
VIBRATION DIVISION
3425 Walden Avenue, Depew, New York, 14043
TEL: 888-684-0013   FAX: 716-685-3886   www.pcb.com

ID:CAL60-3407657086 275

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154123

Instrument Model PRM828, Serial Number 2874, was calibrated on 23JAN2012. The instrument meets factory specifications per Procedure D0001.8135.

New Instrument
Date Calibrated: 23JAN2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	MY41044529	12 Months	26JAN2012	5056765
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	21MAR2012	2011-141059

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 26 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Ron Harris
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154937

Instrument Model 820, Serial Number 1821, was calibrated on 09FEB2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 09FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0612 / 0102	12 Months	06JAN2013	2012-153446

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.
Tested with PRM828 S/N 2811.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154806

Microphone Model 377B20, Serial Number 119015, was calibrated on 07FEB2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 07FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-154940

Instrument Model PRM828, Serial Number 2811, was calibrated on 09FEB2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 09FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47030867	12 Months	03MAY2012	5194985
Larson Davis	LDSigGn/2209	0612 / 0102	12 Months	06JAN2013	2012-153446

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-156796

Instrument Model 820, Serial Number 1862, was calibrated on 22MAR2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

New Instrument
Date Calibrated: 22MAR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn / 2209	0249 / 0124	12 Months	02JUN2012	2011-144386

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 30 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM828-2889

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-156810

Microphone Model 377B20, Serial Number 123393, was calibrated on 22MAR2012. The microphone meets factory specifications per Test Procedure D0001.8167.

New Instrument
Date Calibrated: 22MAR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155241

Instrument Model PRM828, Serial Number 2889, was calibrated on 17FEB2012. The instrument meets factory specifications per Procedure D0001.8135.

New Instrument
Date Calibrated: 17FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47030867	12 Months	03MAY2012	5194985
Larson Davis	LDSigGn/2209	0248 / 0107	12 Months	06JAN2013	2012-153445

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed:

Technician: Kimball Olson

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-156983

Instrument Model 820, Serial Number 1855, was calibrated on 27MAR2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: NO
Date Calibrated: 27MAR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn / 2209	0249 / 0124	12 Months	02JUN2012	2011-144386

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 30 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

See "As Received" data.
Tested with PRM828 S/N 2867

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-156968

Microphone Model 377B20, Serial Number 127829, was calibrated on 27MAR2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 27MAR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-156967

Instrument Model PRM828, Serial Number 2867, was calibrated on 27MAR2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 27MAR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	MY41044529	12 Months	26JAN2013	5522640
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	20MAR2013	2012-156690

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 30 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Ron Harris
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

APPENDIX B


Location #6
Location #5
Location #1
N 11th St
Kent Ave
Location #4
Location #2
N 10th St
Location #3

APPENDIX C

SOUND LEVEL MEASUREMENTS

Client Name	URS Corporation	Date	04/23/12
Project Name	Williamsburg Works Former MGP Site	Start Time	8:21:00
		Stop Time	9:21:00
Work Location	Monitoring Locations 1 and 2	Weather	Overcast
	Brooklyn, NY	Wind Speed/Direction	0-2 mph NW
		Temperature	53F
Sound Level Meter	Larson Davis Model 824 S/N 1595 (Loc 1), 1515 (Loc 2)	Calibrated Prior to Test	YES
Acoustic Calibrator	Larson Davis CAL200 S/N 3208		

8:22:37	Pedestrian
8:23:45	Construction activity occurring at another site, backhoe hitting ground occasionally near monitoring location # 4
8:27:05	Backup alarm at other construction site
8:27:05	Truck on 11th Street
	Hammering near monitoring location # 3 (removing plywood)
8:30:15	Car on 11th Street
8:30:31	Car on 11th Street
8:30:07	Seagulls
8:31:37	Truck on Kent Avenue
8:31:50	2 cars on 11th Street
8:32:52	Truck on Kent Avenue near monitoring location # 4
8:34:37	Truck at Premier Tank and Truck
8:34:55	Horn
8:35:39	Truck and horn at Premier Tank and Truck
8:37:09	Car on 11th Street
8:37:55	"Storage" personnel cleaning up outside (broom & pan)
8:40:00	Car door slamming near location # 2
8:41:00	Car on 11th Street
8:42:29	Car on 11th Street
8:44:00	Car on 11th Street and siren at a distance
8:44:37	3 car horns
8:44:53	Car on 11th Street
8:45:12	Truck on Kent Avenue
8:45:56	Truck horn and airbrake
8:48:25	Truck brakes, Truck on Kent Avenue, car on 11th Street

8:49:10	Truck brakes and a car starting
8:49:35	Van on 11th St. and truck on Kent Ave.
8:50:08	Car on 11th St.
8:51:11	Pedestrian near location # 2 and trucks on Kent Ave.
8:51:40	Van on 11th St.
8:52:05	Van on 11th St. and truck on Kent Ave.
8:52:38	Garbage truck near locations # 5 and # 6
8:53:03	Car on 11th St.
8:54:50	2 trucks on Kent Ave.
8:56:15	Truck on Kent Ave.
8:56:39	Truck on Kent Ave.
8:56:54	Car on 11th St. and horn on Kent Ave.
8:57:30	Car on 11th St. pulled over near location # 2
8:58:08	Car on 11th St. stopped near location # 2
8:58:50	Door slam and pedestrian talking
8:59:19	Car alarm
9:01:10	Car on 11th St. and truck on Kent Ave.
9:01:35	Pedestrian near location # 2 .
9:02:05	Pedestrian near location # 1
9:02:44	Pedestrians talking near location # 1
9:03:15	Forklift near Location # 1
9:03:50	Car on 11th St.
9:05:10	Truck and car on 11th St.
9:06:45	Car on 11th St.
9:07:20	Truck on Kent Ave.
9:08:35	Car on 11th St.
9:10:15	Truck on Kent Ave.
9:11:00	2 trucks on Kent Ave.
9:12:14	Dog barking
9:12:40	Truck near locations # 5 and # 6
9:13:09	Car on 11th St. and a horn
9:13:30	2 pedestrians
9:14:41	Truck on Kent Ave.
9:18:00	Truck on Kent Ave.
9:18:35	Truck on Kent Ave.
9:19:25	Car on 11th St.
9:20:00	Intercom at storage facility

SOUND LEVEL MEASUREMENTS

Client Name	URS Corporation	Date	04/23/12
Project Name	Williamsburg Works Former MGP Site	Start Time	9:40:00
		Stop Time	10:40:00
Work Location	Monitoring Locations 3 and 4	Weather	Overcast
	Brooklyn, NY	Wind Speed/Direction	0-2 mph NW
		Temperature	51F
Sound Level Meter	Larson Davis Model 824 S/N 1595 (Loc 3), 1515 (Loc 4)	Calibrated Prior to Test	YES
Acoustic Calibrator	Larson Davis CAL200 S/N 3208		
		Car Count	170
		Truck Count	53

9:53:13 - 9:53:40	2 trucks and 5 cars
9:55:20 - 9:56:03	4 cars and a truck
9:56:25	Truck
9:57:28	4 cars
9:57:58	Tractor trailer
9:59:50	Truck idling at location # 3 until 10:04:06
10:00:00	Truck on Kent Ave.
10:02:30	Horns
10:03:42	Pedestrians talking, 6 cars, 2 trucks
10:09:17	Motorcycle
10:10:12	Backup alarm near location # 3
10:14:00	Truck at location # 4 (read 82 db)
10:17:35	Horn
10:21:30 - 10:24:50	Truck idling near location # 4
10:22:00 - 10:24:50	Sirens at a distance getting closer
10:26:15	18 wheeled truck and a car
10:27:55	Firetruck (no siren)
10:28:51	Airplane
10:31:00	18 wheeled truck

SOUND LEVEL MEASUREMENTS

Client Name	URS Corporation	Date	04/23/12
Project Name	Williamsburg Works Former MGP Site	Start Time	11:08:00
		Stop Time	12:08:00
Work Location	Monitoring Locations 1 and 2	Weather	Overcast
	Brooklyn, NY	Wind Speed/Direction	1-2 mph NW
		Temperature	50F
Sound Level Meter	Larson Davis Model 824 S/N 1595 (Loc 5), 1515 (Loc 6)	Calibrated Prior to Test	YES
Acoustic Calibrator	Larson Davis CAL200 S/N 3208		

	Traffic on Kent Ave. thruoghout
11:08:10	Truck on "Premier" property
11:11:08	Car on 12th Street
11:14:10	Large bang near location 3
11:15:57	Truck on Kent Avenue
11:16:33	18 wheeler starting - driving away
11:17:00	Airplane overhead
11:07:14	Car on 12th Street
11:17:45	Truck starting on Premier property - driving
11:17:58	Car on 12th Street
11:18:20	Car on 12th Street
11:20:36	Hammering near location 4 - Sher Del Transfer
11:21:14	Truck on 12th Street
11:21:35	Pedestrians talking near location 4
11:22:37	Backup alarm on Premier property
11:23:09	Car on 12th Street
11:25:50	Car on 12th Street
11:27:58	Car on 12th Street
11:28:22	Crash sound near storage facility
11:29:30	Car on 12th Street
11:31:15	Car on 12th Street
11:35:46	Crash sound - ladder - near location 3
11:37:12	Car on 12th Street
11:41:05	Horn

11:44:48	Car on 12th Street
11:45:30	Car on 12th Street
11:47:08	Car on 12th Street
11:51:55	Truck on 12th Street
11:54:30	Truck entering Premier
11:55:20	Truck on 12th Street
11:55:55	Truck on Premier property
11:59:18	Sirens at a distance
11:09:57	Bang near storage facility
12:01:09	Airplane overhead
12:02:15	Car on 12th Street
12:04:20	Car on 12th Street
12:05:08	Horn
12:06:03	18 wheel truck on 12th Street

APPENDIX D

File Translated:	R:\URS - Williamsburg\23Apr08s.slmdl
Model/Serial Number:	824 / A1595
Firmware/Software Revs:	4.290 / 3.120
Name:	VIBRA-TECH, INC.
Descr1:	109 East First Street
Descr2:	Hazleton, PA 18201
Setup/Setup Descr:	urs-ssa.ssa / URS-Williamsburg MGP
Location:	URS-Williamsburg_Location 1
Note1:	Ambient
Note2:	

Overall Any Data

Start Time:	23-Apr-2012 08:21:18
Elapsed Time:	01:00:00

	A Weight	C Weight	Flat
Leq:	55.3 dBA	69.7 dBC	71.5 dBF
SEL:	90.8 dBA	105.3 dBC	107.1 dBF
Peak:	85.9 dBA	97.2 dBC	97.5 dBF
	23-Apr-2012 09:17:31	23-Apr-2012 08:52:02	23-Apr-2012 08:52:01
Lmax (slow):	72.7 dBA	87.3 dBC	87.5 dBF
	23-Apr-2012 08:52:03	23-Apr-2012 08:52:03	23-Apr-2012 08:52:03
Lmin (slow):	47.5 dBA	63.6 dBC	65.1 dBF
	23-Apr-2012 08:53:44	23-Apr-2012 09:04:27	23-Apr-2012 08:53:35
Lmax (fast):	74.7 dBA	90.5 dBC	90.7 dBF
	23-Apr-2012 09:03:41	23-Apr-2012 08:52:01	23-Apr-2012 08:52:01
Lmin (fast):	47.1 dBA	61.9 dBC	63.5 dBF
	23-Apr-2012 08:53:54	23-Apr-2012 08:53:45	23-Apr-2012 09:13:46
Lmax (impulse):	75.7 dBA	91.5 dBC	91.7 dBF
	23-Apr-2012 09:03:41	23-Apr-2012 08:52:01	23-Apr-2012 08:52:01
Lmin (impulse):	47.3 dBA	64.2 dBC	65.8 dBF
	23-Apr-2012 08:50:33	23-Apr-2012 09:04:27	23-Apr-2012 08:23:20

Spectra

Date	Time	Run Time
23-Apr-2012	08:21:18	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	63.1		60.6		39.7		630	44.8		59.6		35.7	
16.0	62.0	66.6	64.7	67.4	39.8	44.9	800	45.6		60.4		36.9	
20.0	59.7		61.5		40.8		1000	45.6	50.1	59.4	64.7	37.1	41.4
25.0	58.1		66.0		41.9		1250	44.8		59.8		35.6	
31.5	61.7	66.3	65.8	71.8	45.0	50.5	1600	43.5		58.3		34.3	
40.0	63.3		68.6		48.2		2000	42.6	47.3	55.9	61.2	31.7	36.9
50.0	64.1		77.6		51.5		2500	41.2		54.0		28.8	
63.0	60.6	67.0	72.3	82.2	46.8	53.8	3150	40.1		54.0		26.1	
80.0	61.0		79.7		47.2		4000	39.2	43.7	52.8	57.6	23.6	28.7
100	60.9		87.6		46.6		5000	37.0		51.3		20.4	
125	55.9	62.7	73.1	87.8	43.1	49.3	6300	35.0		49.7		18.7	
160	53.6		69.6		42.6		8000	33.2	37.8	48.9	53.4	18.8	23.6
200	51.6		76.4		40.5		10000	29.2		46.6		19.1	
250	49.9	54.9	68.1	78.4	39.8	44.2	12500	24.6		40.9		19.3	
315	48.2		72.9		37.4		16000	22.8	28.3	34.0	41.9	20.9	25.7
400	46.3		65.5		35.7		20000	23.0		27.5		22.1	
500	45.3	50.3	63.1	68.1	35.3	40.3							

Ln Start Level: 15 dB

L10.00	57.6 dBA	L30.00	53.8 dBA	L90.00	49.7 dBA
L20.00	55.1 dBA	L50.00	52.2 dBA	L95.00	49.3 dBA

Detector: Slow
Weighting: A

SPL Exceedance Level 1:	85.0 dB	Exceeded:	0 times
SPL Exceedance level 2:	120 dB	Exceeded:	0 times
Peak-1 Exceedance Level:	105 dB	Exceeded:	0 times
Peak-2 Exceedance Level:	100 dB	Exceeded:	0 times

Hysteresis: 2
Overloaded: 0 time(s)
Paused: 0 times for 00:00:00.0

File Translated: R:\URS - Williamsburg\23Apr08s.slmdl
Model/Serial Number: 824 / A1595

Current Any Data
Start Time: 23-Apr-2012 08:21:18
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	55.3 dBA	69.7 dBC	71.5 dBF
SEL:	90.8 dBA	105.3 dBC	107.1 dBF
Peak:	85.9 dBA	97.2 dBC	97.5 dBF
	23-Apr-2012 09:17:31	23-Apr-2012 08:52:02	23-Apr-2012 08:52:01
Lmax (slow):	72.7 dBA	87.3 dBC	87.5 dBF
	23-Apr-2012 08:52:03	23-Apr-2012 08:52:03	23-Apr-2012 08:52:03
Lmin (slow):	47.5 dBA	63.6 dBC	65.1 dBF
	23-Apr-2012 08:53:44	23-Apr-2012 09:04:27	23-Apr-2012 08:53:35
Lmax (fast):	74.7 dBA	90.5 dBC	90.7 dBF
	23-Apr-2012 09:03:41	23-Apr-2012 08:52:01	23-Apr-2012 08:52:01
Lmin (fast):	47.1 dBA	61.9 dBC	63.5 dBF
	23-Apr-2012 08:53:54	23-Apr-2012 08:53:45	23-Apr-2012 09:13:46
Lmax (impulse):	75.7 dBA	91.5 dBC	91.7 dBF
	23-Apr-2012 09:03:41	23-Apr-2012 08:52:01	23-Apr-2012 08:52:01
Lmin (impulse):	47.3 dBA	64.2 dBC	65.8 dBF
	23-Apr-2012 08:50:33	23-Apr-2012 09:04:27	23-Apr-2012 08:23:20

Calibrated:	06-Mar-2012 13:12:44	Offset:	-46.7 dB
Checked:	23-Apr-2012 11:06:32	Level:	114.0 dB
Calibrator	3208	Level:	114.0 dB
Cal Records Count:	0		

Interval Records:	Enabled	Number Interval Records:	1
History Records:	Disabled	Number History Records:	0
Run/Stop Records:		Number Run/Stop Records:	2

File Translated:	R:\URS - Williamsburg\23Apr14s.slmdl
Model/Serial Number:	824 / A1515
Firmware/Software Revs:	4.290 / 3.120
Name:	Vibra-Tech Engineers, Inc.
Descr1:	109 East First Street
Descr2:	Hazleton, PA 18201
Setup/Setup Descr:	urs-ssa.ssa / URS-Williamsburg MGP
Location:	URS-Williamsburg_Location 2
Note1:	Ambient
Note2:	

Overall Any Data

Start Time:	23-Apr-2012 08:21:33
Elapsed Time:	01:00:00

	A Weight	C Weight	Flat
Leq:	58.0 dBA	72.2 dBC	73.5 dBF
SEL:	93.6 dBA	107.8 dBC	109.1 dBF
Peak:	95.8 dBA	101.1 dBC	103.4 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 08:58:49	23-Apr-2012 08:58:49
Lmax (slow):	75.9 dBA	88.9 dBC	89.5 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 09:05:56	23-Apr-2012 09:05:56
Lmin (slow):	47.7 dBA	63.9 dBC	65.4 dBF
	23-Apr-2012 09:02:29	23-Apr-2012 08:22:26	23-Apr-2012 08:22:26
Lmax (fast):	82.7 dBA	90.9 dBC	92.1 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 09:05:56	23-Apr-2012 08:58:49
Lmin (fast):	47.2 dBA	61.6 dBC	63.1 dBF
	23-Apr-2012 09:02:29	23-Apr-2012 08:22:25	23-Apr-2012 08:22:25
Lmax (impulse):	85.8 dBA	93.5 dBC	96.1 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 08:58:49	23-Apr-2012 08:58:49
Lmin (impulse):	47.7 dBA	65.4 dBC	66.8 dBF
	23-Apr-2012 09:02:27	23-Apr-2012 08:22:26	23-Apr-2012 08:22:23

Spectra

Date	Time	Run Time
23-Apr-2012	08:21:33	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	59.7		64.5		39.4	
16.0	60.9	64.8	67.8	71.6	44.5	47.0
20.0	59.2		67.4		41.2	
25.0	59.6		66.4		44.5	
31.5	65.3	69.5	65.7	81.3	46.9	51.2
40.0	66.6		81.0		47.4	
50.0	66.4		84.3		52.4	
63.0	65.2	70.2	79.3	86.3	48.0	54.4
80.0	64.5		78.4		45.6	
100	60.4		68.1		44.6	
125	58.1	63.2	60.5	69.4	45.1	48.7
160	55.4		60.8		41.0	
200	53.4		57.4		39.7	
250	51.2	56.9	65.5	68.5	39.7	44.3
315	51.3		64.8		39.1	
400	50.2		71.4		38.2	
500	48.7	53.7	79.7	80.4	36.5	41.9

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
630	47.3		62.5		36.5	
800	48.4		68.5		37.0	
1000	48.7	52.9	79.3	79.7	36.7	41.1
1250	47.2		62.8		35.2	
1600	46.4		72.3		34.9	
2000	46.9	50.8	69.7	74.7	32.2	37.5
2500	44.2		65.2		29.7	
3150	42.3		58.8		26.6	
4000	40.8	45.7	58.6	62.4	23.8	29.1
5000	39.0		54.0		20.8	
6300	37.2		48.7		19.3	
8000	34.5	39.6	48.0	51.9	18.8	23.8
10000	30.1		42.6		19.1	
12500	24.8		35.3		19.2	
16000	25.2	29.3	30.4	36.8	20.6	25.6
20000	23.5		25.1		22.1	

Ln Start Level: 15 dB

L10.00	61.0 dBA	L30.00	56.8 dBA	L90.00	50.5 dBA
L20.00	58.4 dBA	L50.00	54.3 dBA	L95.00	49.9 dBA

Detector:	Slow		
Weighting:	A		
SPL Exceedance Level 1:	85.0 dB	Exceeded:	0 times
SPL Exceedance level 2:	120 dB	Exceeded:	0 times
Peak-1 Exceedance Level:	105 dB	Exceeded:	0 times
Peak-2 Exceedance Level:	100 dB	Exceeded:	0 times
Hysteresis:	2		
Overloaded:	0 time(s)		
Paused:	0 times for 00:00:00.0		

File Translated: R:\URS - Williamsburg\23Apr14s.slmdl
Model/Serial Number: 824 / A1515

Current Any Data
Start Time: 23-Apr-2012 08:21:33
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	58.0 dBA	72.2 dBC	73.5 dBF
SEL:	93.6 dBA	107.8 dBC	109.1 dBF
Peak:	95.8 dBA	101.1 dBC	103.4 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 08:58:49	23-Apr-2012 08:58:49
Lmax (slow):	75.9 dBA	88.9 dBC	89.5 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 09:05:56	23-Apr-2012 09:05:56
Lmin (slow):	47.7 dBA	63.9 dBC	65.4 dBF
	23-Apr-2012 09:02:29	23-Apr-2012 08:22:26	23-Apr-2012 08:22:26
Lmax (fast):	82.7 dBA	90.9 dBC	92.1 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 09:05:56	23-Apr-2012 08:58:49
Lmin (fast):	47.2 dBA	61.6 dBC	63.1 dBF
	23-Apr-2012 09:02:29	23-Apr-2012 08:22:25	23-Apr-2012 08:22:25
Lmax (impulse):	85.8 dBA	93.5 dBC	96.1 dBF
	23-Apr-2012 09:13:13	23-Apr-2012 08:58:49	23-Apr-2012 08:58:49
Lmin (impulse):	47.7 dBA	65.4 dBC	66.8 dBF
	23-Apr-2012 09:02:27	23-Apr-2012 08:22:26	23-Apr-2012 08:22:23

Calibrated:	01-Jan-2000 00:02:09	Offset:	-46.2 dB
Checked:	23-Apr-2012 11:06:03	Level:	113.9 dB
Calibrator	not set	Level:	114.0 dB
Cal Records Count:	0		

Interval Records:	Enabled	Number Interval Records:	1
History Records:	Disabled	Number History Records:	0
Run/Stop Records:		Number Run/Stop Records:	2

File Translated:	R:\URS - Williamsburg\23Apr09s.slmdl
Model/Serial Number:	824 / A1595
Firmware/Software Revs:	4.290 / 3.120
Name:	VIBRA-TECH, INC.
Descr1:	109 East First Street
Descr2:	Hazleton, PA 18201
Setup/Setup Descr:	urs-ssa.ssa / URS-Williamsburg MGP
Location:	URS-Williamsburg_Location 3
Note1:	Ambient
Note2:	

Overall Any Data
Start Time: 23-Apr-2012 09:40:35
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	72.6 dBA	81.5 dBC	82.5 dBF
SEL:	108.2 dBA	117.1 dBC	118.1 dBF
Peak:	112.7 dBA	114.0 dBC	114.2 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 10:13:47	23-Apr-2012 10:13:47
Lmax (slow):	93.6 dBA	103.6 dBC	104.3 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 09:59:46	23-Apr-2012 09:59:46
Lmin (slow):	53.9 dBA	68.4 dBC	70.6 dBF
	23-Apr-2012 09:41:01	23-Apr-2012 09:46:11	23-Apr-2012 10:05:48
Lmax (fast):	100.0 dBA	106.5 dBC	106.8 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 10:13:47	23-Apr-2012 09:59:46
Lmin (fast):	52.9 dBA	66.5 dBC	68.8 dBF
	23-Apr-2012 09:40:49	23-Apr-2012 09:55:03	23-Apr-2012 09:55:00
Lmax (impulse):	101.9 dBA	107.5 dBC	107.8 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 10:13:47	23-Apr-2012 10:13:47
Lmin (impulse):	53.7 dBA	69.0 dBC	71.2 dBF
	23-Apr-2012 09:41:00	23-Apr-2012 09:46:10	23-Apr-2012 10:05:48

Spectra

Date	Time	Run Time
23-Apr-2012	09:40:35	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	69.1		71.4		43.4		630	63.7		77.8		44.4	
16.0	69.8	73.5	73.3	76.5	55.5	56.5	800	63.0		74.7		43.0	
20.0	66.6		70.0		48.2		1000	62.9	67.6	75.4	80.5	42.9	47.4
25.0	66.2		67.7		47.3		1250	62.6		76.7		41.8	
31.5	71.5	74.9	72.4	75.7	51.6	55.8	1600	61.6		81.8		39.3	
40.0	71.0		71.3		52.5		2000	60.3	65.4	80.8	86.2	36.2	41.7
50.0	72.7		75.4		54.4		2500	59.6		81.7		33.3	
63.0	76.8	79.5	80.4	82.3	54.8	58.8	3150	59.0		87.2		30.9	
80.0	73.7		74.2		52.5		4000	58.2	63.2	87.9	92.9	29.0	33.5
100	70.8		70.7		50.8		5000	58.1		89.1		23.7	
125	67.9	73.8	73.1	80.3	50.4	54.5	6300	57.7		89.7		20.9	
160	67.7		78.7		47.1		8000	56.9	61.3	89.0	93.4	19.5	24.8
200	66.4		78.8		44.3		10000	54.4		86.4		19.4	
250	64.1	69.4	69.5	79.9	43.7	48.1	12500	49.8		82.9		19.3	
315	62.3		70.8		41.4		16000	43.4	50.8	77.7	84.2	20.9	25.7
400	61.6		72.2		42.2		20000	36.1		70.7		22.1	
500	62.9	67.6	76.8	81.0	43.1	48.1							

Ln Start Level: 15 dB

L10.00	75.0 dBA	L30.00	69.4 dBA	L90.00	56.8 dBA
L20.00	71.7 dBA	L50.00	65.5 dBA	L95.00	56.0 dBA

Detector: Slow
Weighting: A

SPL Exceedance Level 1:	85.0 dB	Exceeded:	13 times
SPL Exceedance level 2:	120 dB	Exceeded:	0 times
Peak-1 Exceedance Level:	105 dB	Exceeded:	24 times
Peak-2 Exceedance Level:	100 dB	Exceeded:	17 times

Hysteresis: 2
Overloaded: 0 time(s)
Paused: 0 times for 00:00:00.0

File Translated: R:\URS - Williamsburg\23Apr09s.slmdl
Model/Serial Number: 824 / A1595

Current Any Data
Start Time: 23-Apr-2012 09:40:35
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	72.6 dBA	81.5 dBC	82.5 dBF
SEL:	108.2 dBA	117.1 dBC	118.1 dBF
Peak:	112.7 dBA	114.0 dBC	114.2 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 10:13:47	23-Apr-2012 10:13:47
Lmax (slow):	93.6 dBA	103.6 dBC	104.3 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 09:59:46	23-Apr-2012 09:59:46
Lmin (slow):	53.9 dBA	68.4 dBC	70.6 dBF
	23-Apr-2012 09:41:01	23-Apr-2012 09:46:11	23-Apr-2012 10:05:48
Lmax (fast):	100.0 dBA	106.5 dBC	106.8 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 10:13:47	23-Apr-2012 09:59:46
Lmin (fast):	52.9 dBA	66.5 dBC	68.8 dBF
	23-Apr-2012 09:40:49	23-Apr-2012 09:55:03	23-Apr-2012 09:55:00
Lmax (impulse):	101.9 dBA	107.5 dBC	107.8 dBF
	23-Apr-2012 10:36:16	23-Apr-2012 10:13:47	23-Apr-2012 10:13:47
Lmin (impulse):	53.7 dBA	69.0 dBC	71.2 dBF
	23-Apr-2012 09:41:00	23-Apr-2012 09:46:10	23-Apr-2012 10:05:48

Calibrated: 06-Mar-2012 13:12:44 Offset: -46.7 dB
Checked: 23-Apr-2012 11:06:32 Level: 114.0 dB
Calibrator 3208 Level: 114.0 dB
Cal Records Count: 0

Interval Records: Enabled Number Interval Records: 1
History Records: Disabled Number History Records: 0
Run/Stop Records: Number Run/Stop Records: 2

File Translated:	R:\URS - Williamsburg\23Apr16s.slmdl
Model/Serial Number:	824 / A1515
Firmware/Software Revs:	4.290 / 3.120
Name:	Vibra-Tech Engineers, Inc.
Descr1:	109 East First Street
Descr2:	Hazleton, PA 18201
Setup/Setup Descr:	urs-ssa.ssa / URS-Williamsburg MGP
Location:	URS-Williamsburg_Location 4
Note1:	Ambient
Note2:	

Overall Any Data

Start Time:	23-Apr-2012 09:40:49
Elapsed Time:	01:00:00

	A Weight	C Weight	Flat
Leq:	73.2 dBA	81.0 dBC	82.2 dBF
SEL:	108.8 dBA	116.6 dBC	117.8 dBF
Peak:	108.3 dBA	110.8 dBC	111.4 dBF
	23-Apr-2012 10:34:15	23-Apr-2012 10:06:48	23-Apr-2012 10:06:48
Lmax (slow):	95.4 dBA	103.2 dBC	104.5 dBF
	23-Apr-2012 10:05:05	23-Apr-2012 09:52:13	23-Apr-2012 09:52:13
Lmin (slow):	52.3 dBA	65.4 dBC	66.8 dBF
	23-Apr-2012 10:18:33	23-Apr-2012 10:18:02	23-Apr-2012 10:18:02
Lmax (fast):	99.5 dBA	104.9 dBC	106.2 dBF
	23-Apr-2012 10:05:05	23-Apr-2012 09:52:13	23-Apr-2012 09:52:13
Lmin (fast):	51.3 dBA	63.9 dBC	65.2 dBF
	23-Apr-2012 10:18:31	23-Apr-2012 10:18:30	23-Apr-2012 10:18:01
Lmax (impulse):	100.9 dBA	105.3 dBC	106.5 dBF
	23-Apr-2012 10:05:05	23-Apr-2012 09:52:13	23-Apr-2012 09:52:13
Lmin (impulse):	52.0 dBA	66.5 dBC	67.9 dBF
	23-Apr-2012 10:18:31	23-Apr-2012 10:18:29	23-Apr-2012 10:18:02

Spectra

Date	Time	Run Time
23-Apr-2012	09:40:49	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	68.8		70.0		40.2		630	60.0		68.5		41.4	
16.0	67.0	72.1	66.4	72.0	45.1	48.0	800	61.5		70.9		42.3	
20.0	65.4		61.7		43.2		1000	67.9	70.5	95.8	96.9	42.5	46.4
25.0	65.0		64.6		46.5		1250	65.7		90.3		39.7	
31.5	70.8	78.4	80.3	81.1	46.9	53.3	1600	59.6		70.6		38.9	
40.0	77.3		72.7		50.8		2000	63.2	66.0	88.3	89.4	35.6	41.3
50.0	74.5		71.2		52.5		2500	59.9		82.7		33.0	
63.0	72.7	77.6	79.0	79.9	51.1	56.0	3150	55.4		66.1		29.4	
80.0	70.5		67.1		49.4		4000	53.9	58.9	60.9	68.6	26.8	32.1
100	68.2		73.1		48.5		5000	52.8		62.9		24.1	
125	64.9	71.0	75.1	77.7	46.6	52.0	6300	53.9		56.5		21.8	
160	64.5		68.2		46.3		8000	55.0	58.0	50.9	57.9	19.8	25.3
200	63.0		66.7		44.5		10000	48.4		46.5		19.5	
250	62.8	67.5	68.9	72.3	43.5	48.3	12500	45.4		39.1		19.3	
315	62.2		66.7		42.3		16000	41.6	47.3	31.8	40.1	20.9	25.7
400	60.9		70.5		41.0		20000	36.1		28.3		22.2	
500	60.0	65.1	67.8	73.9	41.3	46.0							

Ln Start Level: 15 dB

L10.00	74.6 dBA	L30.00	69.1 dBA	L90.00	57.2 dBA
L20.00	71.5 dBA	L50.00	65.1 dBA	L95.00	56.0 dBA

Detector: Slow
Weighting: A

SPL Exceedance Level 1:	85.0 dB	Exceeded:	3 times
SPL Exceedance level 2:	120 dB	Exceeded:	0 times
Peak-1 Exceedance Level:	105 dB	Exceeded:	11 times
Peak-2 Exceedance Level:	100 dB	Exceeded:	28 times

Hysteresis: 2
Overloaded: 0 time(s)
Paused: 0 times for 00:00:00.0

File Translated: R:\URS - Williamsburg\23Apr16s.slmdl
Model/Serial Number: 824 / A1515

Current Any Data
Start Time: 23-Apr-2012 09:40:49
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	73.2 dBA	81.0 dBC	82.2 dBF
SEL:	108.8 dBA	116.6 dBC	117.8 dBF
Peak:	108.3 dBA	110.8 dBC	111.4 dBF
	23-Apr-2012 10:34:15	23-Apr-2012 10:06:48	23-Apr-2012 10:06:48
Lmax (slow):	95.4 dBA	103.2 dBC	104.5 dBF
	23-Apr-2012 10:05:05	23-Apr-2012 09:52:13	23-Apr-2012 09:52:13
Lmin (slow):	52.3 dBA	65.4 dBC	66.8 dBF
	23-Apr-2012 10:18:33	23-Apr-2012 10:18:02	23-Apr-2012 10:18:02
Lmax (fast):	99.5 dBA	104.9 dBC	106.2 dBF
	23-Apr-2012 10:05:05	23-Apr-2012 09:52:13	23-Apr-2012 09:52:13
Lmin (fast):	51.3 dBA	63.9 dBC	65.2 dBF
	23-Apr-2012 10:18:31	23-Apr-2012 10:18:30	23-Apr-2012 10:18:01
Lmax (impulse):	100.9 dBA	105.3 dBC	106.5 dBF
	23-Apr-2012 10:05:05	23-Apr-2012 09:52:13	23-Apr-2012 09:52:13
Lmin (impulse):	52.0 dBA	66.5 dBC	67.9 dBF
	23-Apr-2012 10:18:31	23-Apr-2012 10:18:29	23-Apr-2012 10:18:02

Calibrated:	01-Jan-2000 00:02:09	Offset:	-46.2 dB
Checked:	23-Apr-2012 11:06:03	Level:	113.9 dB
Calibrator	not set	Level:	114.0 dB
Cal Records Count:	0		

Interval Records:	Enabled	Number Interval Records:	1
History Records:	Disabled	Number History Records:	0
Run/Stop Records:		Number Run/Stop Records:	2

File Translated: R:\URS - Williamsburg\23Apr11s.slmdl
Model/Serial Number: 824 / A1595
Firmware/Software Revs: 4.290 / 3.120
Name: VIBRA-TECH, INC.
Descr1: 109 East First Street
Descr2: Hazleton, PA 18201
Setup/Setup Descr: urs-ssa.ssa / URS-Williamsburg MGP
Location: URS-Williamsburg_Location 5
Note1: Ambient
Note2:

Overall Any Data
Start Time: 23-Apr-2012 11:08:06
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	61.9 dBA	72.4 dBC	74.2 dBF
SEL:	97.5 dBA	108.0 dBC	109.8 dBF
Peak:	98.5 dBA	103.2 dBC	104.4 dBF
	23-Apr-2012 12:05:58	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmax (slow):	84.1 dBA	93.0 dBC	93.8 dBF
	23-Apr-2012 12:05:58	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmin (slow):	51.9 dBA	63.7 dBC	65.2 dBF
	23-Apr-2012 11:13:51	23-Apr-2012 11:39:06	23-Apr-2012 11:51:33
Lmax (fast):	86.2 dBA	96.2 dBC	96.9 dBF
	23-Apr-2012 12:05:57	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmin (fast):	51.0 dBA	62.1 dBC	63.5 dBF
	23-Apr-2012 11:16:06	23-Apr-2012 11:50:54	23-Apr-2012 11:50:54
Lmax (impulse):	86.7 dBA	97.2 dBC	97.9 dBF
	23-Apr-2012 12:05:57	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmin (impulse):	51.8 dBA	64.3 dBC	66.0 dBF
	23-Apr-2012 11:14:19	23-Apr-2012 11:51:33	23-Apr-2012 11:51:33

Spectra

Date	Time	Run Time
23-Apr-2012	11:08:06	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	64.7		69.9		40.3		630	52.7		72.2		42.4	
16.0	62.9	68.1	71.3	75.9	41.3	46.1	800	52.9		72.8		42.3	
20.0	61.9		71.9		42.3		1000	52.6	57.2	73.1	77.3	42.0	46.4
25.0	61.7		73.1		43.5		1250	51.8		71.5		40.2	
31.5	63.7	67.8	74.5	87.3	46.5	51.1	1600	50.5		70.6		37.3	
40.0	63.3		86.9		47.9		2000	48.9	53.9	72.1	76.0	33.3	39.3
50.0	65.4		82.2		47.9		2500	47.5		70.9		30.0	
63.0	65.9	70.0	74.8	90.7	48.2	52.7	3150	47.5		72.5		25.9	
80.0	64.3		89.9		47.6		4000	46.7	51.2	76.0	79.1	23.2	28.5
100	60.9		82.3		47.6		5000	44.8		73.7		20.3	
125	58.8	63.9	77.6	84.0	45.0	50.1	6300	43.5		71.3		18.9	
160	56.9		74.1		41.5		8000	43.0	47.0	71.8	76.1	19.1	23.8
200	56.3		74.8		42.7		10000	38.8		70.7		19.2	
250	55.4	60.5	79.4	82.3	41.4	46.3	12500	30.1		60.1		19.2	
315	55.5		77.1		40.0		16000	24.4	31.8	47.1	60.3	20.9	25.6
400	53.3		73.2		41.3		20000	23.1		35.6		22.0	
500	53.2	57.8	71.9	77.2	41.9	46.7							

Ln Start Level: 15 dB

L10.00	63.8 dBA	L30.00	59.8 dBA	L90.00	53.8 dBA
L20.00	61.3 dBA	L50.00	57.7 dBA	L95.00	53.3 dBA

Detector: Slow
Weighting: A
SPL Exceedance Level 1: 85.0 dB Exceeded: 0 times
SPL Exceedance level 2: 120 dB Exceeded: 0 times
Peak-1 Exceedance Level: 105 dB Exceeded: 0 times
Peak-2 Exceedance Level: 100 dB Exceeded: 0 times
Hysteresis: 2
Overloaded: 0 time(s)
Paused: 0 times for 00:00:00.0

File Translated: R:\URS - Williamsburg\23Apr11s.slmdl
Model/Serial Number: 824 / A1595

Current Any Data
Start Time: 23-Apr-2012 11:08:06
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	61.9 dBA	72.4 dBC	74.2 dBF
SEL:	97.5 dBA	108.0 dBC	109.8 dBF
Peak:	98.5 dBA	103.2 dBC	104.4 dBF
	23-Apr-2012 12:05:58	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmax (slow):	84.1 dBA	93.0 dBC	93.8 dBF
	23-Apr-2012 12:05:58	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmin (slow):	51.9 dBA	63.7 dBC	65.2 dBF
	23-Apr-2012 11:13:51	23-Apr-2012 11:39:06	23-Apr-2012 11:51:33
Lmax (fast):	86.2 dBA	96.2 dBC	96.9 dBF
	23-Apr-2012 12:05:57	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmin (fast):	51.0 dBA	62.1 dBC	63.5 dBF
	23-Apr-2012 11:16:06	23-Apr-2012 11:50:54	23-Apr-2012 11:50:54
Lmax (impulse):	86.7 dBA	97.2 dBC	97.9 dBF
	23-Apr-2012 12:05:57	23-Apr-2012 11:55:08	23-Apr-2012 11:55:08
Lmin (impulse):	51.8 dBA	64.3 dBC	66.0 dBF
	23-Apr-2012 11:14:19	23-Apr-2012 11:51:33	23-Apr-2012 11:51:33

Calibrated:	06-Mar-2012 13:12:44	Offset:	-46.7 dB
Checked:	23-Apr-2012 11:06:32	Level:	114.0 dB
Calibrator	3208	Level:	114.0 dB
Cal Records Count:	2		

Interval Records:	Enabled	Number Interval Records:	1
History Records:	Disabled	Number History Records:	0
Run/Stop Records:		Number Run/Stop Records:	2

File Translated:	R:\URS - Williamsburg\23Apr18s.slmdl
Model/Serial Number:	824 / A1515
Firmware/Software Revs:	4.290 / 3.120
Name:	Vibra-Tech Engineers, Inc.
Descr1:	109 East First Street
Descr2:	Hazleton, PA 18201
Setup/Setup Descr:	urs-ssa.ssa / URS-Williamsburg MGP
Location:	URS-Williamsburg_Location 6
Note1:	Ambient
Note2:	

Overall Any Data
Start Time: 23-Apr-2012 11:08:19
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	59.1 dBA	71.0 dBC	74.4 dBF
SEL:	94.7 dBA	106.6 dBC	109.9 dBF
Peak:	97.2 dBA	100.0 dBC	99.9 dBF
	23-Apr-2012 11:21:20	23-Apr-2012 11:21:20	23-Apr-2012 11:33:06
Lmax (slow):	83.2 dBA	89.3 dBC	89.6 dBF
	23-Apr-2012 11:21:21	23-Apr-2012 11:21:23	23-Apr-2012 11:21:23
Lmin (slow):	49.2 dBA	61.8 dBC	63.6 dBF
	23-Apr-2012 11:49:53	23-Apr-2012 11:39:14	23-Apr-2012 11:39:14
Lmax (fast):	84.1 dBA	91.7 dBC	93.3 dBF
	23-Apr-2012 11:21:20	23-Apr-2012 11:21:23	23-Apr-2012 11:33:06
Lmin (fast):	48.8 dBA	60.3 dBC	62.0 dBF
	23-Apr-2012 11:49:52	23-Apr-2012 11:39:13	23-Apr-2012 11:37:57
Lmax (impulse):	84.4 dBA	92.3 dBC	95.9 dBF
	23-Apr-2012 11:21:20	23-Apr-2012 11:21:23	23-Apr-2012 11:33:06
Lmin (impulse):	49.2 dBA	62.4 dBC	64.2 dBF
	23-Apr-2012 11:49:53	23-Apr-2012 11:39:26	23-Apr-2012 11:39:26

Spectra

Date	Time	Run Time
23-Apr-2012	11:08:19	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	68.7		63.7		39.3	
16.0	66.9	71.9	61.9	67.7	44.1	48.1
20.0	65.2		63.0		44.9	
25.0	63.7		70.5		46.5	
31.5	63.5	68.1	71.3	75.2	46.1	51.3
40.0	62.6		69.1		47.0	
50.0	62.7		67.2		48.2	
63.0	62.5	67.0	69.9	89.0	47.9	52.6
80.0	61.5		88.9		47.3	
100	59.8		89.3		46.0	
125	56.2	62.2	73.0	89.7	44.6	49.1
160	54.8		77.7		41.2	
200	53.6		75.7		40.2	
250	52.5	57.2	71.9	78.1	39.4	44.0
315	50.7		70.7		37.7	
400	50.4		70.9		39.3	
500	49.9	54.7	72.4	77.0	39.8	44.2

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
630	49.5		73.0		39.3	
800	50.0		73.0		39.9	
1000	50.0	54.6	73.5	77.6	39.4	44.0
1250	49.3		71.8		38.1	
1600	48.6		74.8		35.5	
2000	47.2	52.2	74.2	79.0	32.0	37.8
2500	46.2		73.5		29.2	
3150	43.6		70.6		24.9	
4000	41.6	46.6	68.0	73.5	22.4	27.5
5000	39.3		66.7		19.3	
6300	37.9		66.3		18.4	
8000	34.4	40.0	64.1	68.8	18.7	23.5
10000	29.9		58.7		19.1	
12500	25.5		52.1		19.3	
16000	22.9	28.7	48.8	53.9	20.5	25.6
20000	23.0		37.6		22.1	

Ln Start Level: 15 dB

L10.00	60.5 dBA	L30.00	55.5 dBA	L90.00	51.5 dBA
L20.00	57.2 dBA	L50.00	53.8 dBA	L95.00	51.0 dBA

Detector: Slow
Weighting: A

SPL Exceedance Level 1:	85.0 dB	Exceeded:	0 times
SPL Exceedance level 2:	120 dB	Exceeded:	0 times
Peak-1 Exceedance Level:	105 dB	Exceeded:	0 times
Peak-2 Exceedance Level:	100 dB	Exceeded:	0 times

Hysteresis: 2
Overloaded: 0 time(s)
Paused: 0 times for 00:00:00.0

File Translated: R:\URS - Williamsburg\23Apr18s.slmdl
Model/Serial Number: 824 / A1515

Current Any Data
Start Time: 23-Apr-2012 11:08:19
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	59.1 dBA	71.0 dBC	74.4 dBF
SEL:	94.7 dBA	106.6 dBC	109.9 dBF
Peak:	97.2 dBA	100.0 dBC	99.9 dBF
	23-Apr-2012 11:21:20	23-Apr-2012 11:21:20	23-Apr-2012 11:33:06
Lmax (slow):	83.2 dBA	89.3 dBC	89.6 dBF
	23-Apr-2012 11:21:21	23-Apr-2012 11:21:23	23-Apr-2012 11:21:23
Lmin (slow):	49.2 dBA	61.8 dBC	63.6 dBF
	23-Apr-2012 11:49:53	23-Apr-2012 11:39:14	23-Apr-2012 11:39:14
Lmax (fast):	84.1 dBA	91.7 dBC	93.3 dBF
	23-Apr-2012 11:21:20	23-Apr-2012 11:21:23	23-Apr-2012 11:33:06
Lmin (fast):	48.8 dBA	60.3 dBC	62.0 dBF
	23-Apr-2012 11:49:52	23-Apr-2012 11:39:13	23-Apr-2012 11:37:57
Lmax (impulse):	84.4 dBA	92.3 dBC	95.9 dBF
	23-Apr-2012 11:21:20	23-Apr-2012 11:21:23	23-Apr-2012 11:33:06
Lmin (impulse):	49.2 dBA	62.4 dBC	64.2 dBF
	23-Apr-2012 11:49:53	23-Apr-2012 11:39:26	23-Apr-2012 11:39:26

Calibrated:	01-Jan-2000 00:02:09	Offset:	-46.2 dB
Checked:	23-Apr-2012 11:06:03	Level:	113.9 dB
Calibrator	not set	Level:	114.0 dB
Cal Records Count:	0		

Interval Records:	Enabled	Number Interval Records:	1
History Records:	Disabled	Number History Records:	0
Run/Stop Records:		Number Run/Stop Records:	2

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155615

Instrument Model 824, Serial Number A1595, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 2100

Signed:
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155644

Microphone Model 2560, Serial Number 3231, was calibrated on 28FEB2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	2559	3034LF	12 Months	15AUG2012	2011-147516
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	PRM902	0529	12 Months	07SEP2012	2011-148677
Larson Davis	PRM902	0528	12 Months	07SEP2012	2011-148679
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155609

Instrument Model PRM902, Serial Number 2100, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8126.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	US36033460	12 Months	20JUN2012	5254394
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.

Signed:

Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155617

Instrument Model CAL200, Serial Number 3208, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155614

Instrument Model 824, Serial Number A1515, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 2334

Signed: [signature]
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155643

Microphone Model 2560, Serial Number 3200, was calibrated on 28FEB2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	2559	3034LF	12 Months	15AUG2012	2011-147516
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	PRM902	0529	12 Months	07SEP2012	2011-148677
Larson Davis	PRM902	0528	12 Months	07SEP2012	2011-148679
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155608

Instrument Model PRM902, Serial Number 2334, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8126.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	US36033460	12 Months	20JUN2012	5254394
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.

Signed: Sean Childs
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155612

Instrument Model CAL200, Serial Number 3106, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Before: 113.90 dB, 93.89 dB, 1000.3 Hz @ sea level.
After: Refer to Certificate of Measured Output.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Ambient Sound Level Study
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

Prepared for:

Mr. Colin Wasteneys
URS Corporation
77 Goodell Street
Buffalo, New York 14203

Prepared by:

Vibra-Tech Engineers, Inc.
109 E. First Street
Hazleton, Pennsylvania 18201
(800) 233-6181

November 30, 2012

Ambient Sound Level Study
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

November 30, 2012

Introduction

An ambient sound level study was carried out by Vibra-Tech Engineers, Inc. in the area surrounding the former MGP site at 50 Kent Avenue, Brooklyn, New York. The study was authorized by Mr. Colin Wasteneys of URS Corporation for the purpose of measuring ambient sound levels around the perimeter of the 50 Kent Avenue Parcel prior to the start of the project. Sound measurements were taken from November 21 to November 27, 2012.

Scope and Conditions of Study

Instrumentation

Six (6) Larson Davis System 820 sound level monitoring systems were used to conduct unattended monitoring during this ambient study. In addition, two Larson Davis 824 Systems were used to conduct spot check - attended monitoring at each location. The data collected by all systems contains various sound level quantities, including Exceedance Levels, L_{eq}, and other noise measurements, all measured simultaneously. The sound level systems were laboratory calibrated by the manufacturer prior to the study. The systems were also field calibrated immediately after installation and removal. All sound level system calibration information for all six unattended systems is located in Appendix A.

Field Procedure

For the study conducted from November 21 to November 27, 2012, a total of 6 unattended sound level stations were deployed at locations along the project site periphery. The table below provides the location number, sound level meter serial number, a brief description, and GPS coordinate for each location. A map showing monitoring locations is located in Appendix B.

Table 1. Monitoring locations for the sound study conducted from November 21 to November 27, 2012

Location	SLM Serial Number	Description	GPS
1	1893	Northwest corner of site, along 11th Street	N 40° 43’ 24.02” W 73° 57’ 37.76”
2	1577	West side of site, along 11th Street	N 40° 43’ 22.79” W 73° 57’ 35.69”
3	1827	South Corner of site - Intersection of Kent Ave. and 11th Street	N 40° 43’ 21.55” W 73° 57’ 33.73”
4	1857	Southeast Corner of site - Intersection of Kent Ave. and 12th Street	N 40° 43’ 23.07” W 73° 57’ 32.13”
5	1532	East side of site, along 12th Street	N 40° 43’ 24.22” W 73° 57’ 33.96”
6	1692	North corner of site, along 12th Street	N 40° 43’ 25.51” W 73° 57’ 36.13”

In addition to the six stations deployed, two Larson Davis 824 Systems were used to conduct 1 hour spot checks at each of the six monitoring locations. The sound level systems were mounted on tripods approximately five feet above the ground and the microphones were equipped with wind screens. During these spot check tests, specific information regarding singular events which occurred near the monitoring location or were evident during each sound level test period were noted. Weather conditions during the testing were also recorded. A copy of the field notes for each of the six spot checks is included in Appendix C.

Sound Level Measurements

The measurement of noise involves quantifying both its rate (frequency in Hz) and intensity (pressure) relative to normal atmospheric pressure. People do not perceive all frequencies with equal sensitivity, rather they respond to higher frequencies more than lower frequencies. The following discussion of sound levels measurements describes the types of measurements collected for these studies.

dBA

A dBA sound level measurement weighs the various frequency components of a sound as perceived by the human ear in order to yield a single number indicator of its relative loudness. All measurements used in this study are dBA.

Ln – Exceedance Levels

Exceedance Level measurements are taken for a pre-determined period of time, which is variable. The results of these measurements are expressed as a dBA value and the percentage of time of the total measurement period that the level was exceeded. For example, if L_{10} = 50 dBA, for 10 percent of the test period, the sound level present was 50 dBA or above.

L_{eq} – Equivalent Sound Level

L_{eq} is a measurement over a period of time and is the steady state sound level, which contains the same acoustic energy as the measured time varying sound level for the time period of the measurement.

The sound level meters used for this project directly calculate and output a L_{eq} value in dB. The sound level meters use the following equation to calculate the L_{eq} values:

$$L_{eq} = 10\log\left[\frac{1}{t_2 - t_1}\int_{t_1}^{t_2}\frac{p_A^2}{p_0^2}dt\right]$$

- *Leq* = equivalent continuous sound pressure level [dB]
- *p0* = reference pressure level = 20µPa
- *pA*= acquired sound pressure in Pa
- *t1* = start time of measurement
- *t2* = end time of measurement

Results of the Study

Daily Summary for Each Location

The tables below contain the daily measurement summary which includes the maximum, minimum, and Leq levels recorded at each location. Please note that this summary is for data collection from November 21 at 00:00 to November 27 at 23:59. The sound level meters located at monitoring location 3 and monitoring location 4 did not record data after November 24, 2012 at 14:00 due to the memory filling up with event files. A copy of all sound level data for the six monitoring locations is included on the CD attached to this report titled "URS Corporation - Williamsburg Works Former MGP Site - November 21-27, 2012 - Ambient Sound Monitoring."

Monitoring Location 1

Date	*11/21/12*	*11/22/12*	*11/23/12*	*11/24/12*	*11/25/12*	*11/26/12*	*11/27/12*
Daily Maximum	87.5	80.8	80.1	79.7	74.9	84.2	102.2
Daily Minimum	43.5	39.6	39.0	39.9	37.6	40.2	39.5
Daily L_{eq} dBA	57.2	53.2	53.4	50.2	48.6	54.8	65.3

Monitoring Location 2

Date	*11/21/12*	*11/22/12*	*11/23/12*	*11/24/12*	*11/25/12*	*11/26/12*	*11/27/12*
Daily Maximum	89.3	77.2	79.1	80.9	76.9	83.2	84.6
Daily Minimum	43.0	40.2	39.2	42.6	39.9	41.6	39.8
Daily L_{eq} dBA	56.8	52.3	53.4	52.1	49.4	55.0	57.5

Monitoring Location 3

Date	*11/21/12*	*11/22/12*	*11/23/12*	*11/24/12*	*11/25/12*	*11/26/12*	*11/27/12*
Daily Maximum	91.3	96.0	97.6	-	-	-	-
Daily Minimum	45.0	42.6	42.0	-	-	-	-
Daily L_{eq} dBA	64.7	60.9	62.6	-	-	-	-

Monitoring Location 4

Date	*11/21/12*	*11/22/12*	*11/23/12*	*11/24/12*	*11/25/12*	*11/26/12*	*11/27/12*
Daily Maximum	90.5	97.3	103.5	-	-	-	-
Daily Minimum	44.3	43.1	43.0	-	-	-	-
Daily L_{eq} dBA	67.4	63.1	69.6	-	-	-	-

Monitoring Location 5

Date	*11/21/12*	*11/22/12*	*11/23/12*	*11/24/12*	*11/25/12*	*11/26/12*	*11/27/12*
Daily Maximum	84.5	84.5	82.0	86.6	82.3	88.2	84.4
Daily Minimum	43.3	40.1	41.6	45.4	43.0	43.5	41.4
Daily L_{eq} dBA	58.4	54.6	57.0	57.1	54.3	58.7	58.7

Monitoring Location 6

Date	*11/21/12*	*11/22/12*	*11/23/12*	*11/24/12*	*11/25/12*	*11/26/12*	*11/27/12*
Daily Maximum	89.7	84.1	83.4	87	81.4	83.8	82.7
Daily Minimum	40.7	38.3	36.9	40.3	37.7	39.2	38.5
Daily L_{eq} dBA	56.2	53.2	54.1	53.3	51.1	54.6	55.7

Overall Summary for Each Location

The tables below contain the overall noise level summary including overall maximum, minimum, Leq , and LN Exceedance levels recorded at each location. Please note that this data includes readings from the date and time of installation (November 20, 2012) to the time of removal on November 28, 2012.

Location	1	2	3	4	5	6
Overall Maximum dBA	102.2	89.3	100.6	103.5	88.2	89.7
Overall Minimum dBA	37.6	39.2	40.9	43.0	40.1	36.9
Overall Leq	58.9	54.8	66.0	67.5	57.4	54.5
Ln 10	60.9	57.3	68.4	72.1	59.5	55.6
Ln 20	56.6	55.2	64.9	67.7	57.5	53.4
Ln 30	54.5	53.6	62.2	64.6	55.3	51.9
Ln 50	51.0	50.8	57.9	58.8	52.3	49.2
Ln 90	43.7	45.1	49.2	49.7	46.4	43.0
Ln 95	42.7	44.1	47.6	47.7	44.9	41.9

On Site Readings

The tables below contain the noise level summary including the maximum, minimum, Leq, and LN Exceedance levels recorded for the one hour spot checks conducted at each location. Please note that this data was collected on November 20, 2012. A copy of all sound level data for these spot checks is included in Appendix D along with the calibration certificates for the two sound level meters used to collect the on site data.

Location	1	2	3	4	5	6
Time	*14:02:05*	*14:04:32*	*15:09:04*	*15:11:14*	*16:16:00*	*16:18:13*
Spot Check Maximum dBA	79.6	80.8	81.5	97.9	82.4	75.4
Spot Check Minimum dBA	50.3	51.5	49.8	51.8	48.2	48.8
Spot Check Leq	58.5	60.0	65.9	68.5	59.6	57.0
Ln 10	58.7	60.7	69.2	70.4	61.3	59.5
Ln 20	57.1	58.8	66.6	68.0	59.0	57.8
Ln 30	56.2	57.6	65.0	66.4	57.4	56.7
Ln 50	54.7	56.0	61.8	63.5	55.2	55.1
Ln 90	52.1	53.2	53.7	55.5	51.2	52.0
Ln 95	51.6	52.8	52.7	54.4	50.4	51.3

Comparison of One Hour Spot Check and Sound Level Station

Location	Time	Leq dBA	Lmax dBA	Lmin dBA
Location 1	14:00	58.9	80.7	50.2
Spot check	14:02	58.5	79.6	50.3
Location 2	14:00	58.3	79.1	49.5
Spot check	14:04	60.0	80.8	51.5
Location 3	15:00	67.1	86.3	51.3
Spot check	15:09	65.9	81.5	49.8
Location 4	15:00	69.2	92.2	51.8
Spot check	15:11	68.5	97.9	51.8
Location 5	16:00	58.9	79.6	48.4
Spot check	16:16	59.6	82.4	48.2
Location 6	16:00	56.4	75.2	46.9
Spot check	16:18	57.0	75.4	48.8

If you have any questions or comments regarding the ambient sound monitoring at the Williamsburg Works Former MGP site please contact our office.

Respectfully submitted,
VIBRA-TECH ENGINEERS, INC.

Mark Edwards
Vibration and Sound Analyst

Jonathan A. Ferdinand
Vibration and Noise Specialist

APPENDIX A

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-162984

Instrument Model 820, Serial Number 1893, was calibrated on 19JUL2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

New Instrument
Date Calibrated: 19JUL2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	20MAR2013	2012-156690

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 31 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM828 S/N 2921

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-162983

Instrument Model PRM828, Serial Number 2921, was calibrated on 17JUL2012. The instrument meets factory specifications per Procedure D0001.8135.

New Instrument
Date Calibrated: 17JUL2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY41044529	12 Months	26JAN2013	5522640
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	20MAR2013	2012-156690

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 37 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163122

Microphone Model 377B20, Serial Number 127776, was calibrated on 27AUG2012. The microphone meets factory specifications per Test Procedure D0001.8167.

New Instrument
Date Calibrated: 27AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336
Larson Davis	2900	0575	12 Months	26JUL2013	2012-162047
Larson Davis	PRM902	0206	12 Months	14AUG2013	2012-162575
Larson Davis	PRM915	0102	12 Months	15AUG2013	2012-162597

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Abraham Ortega

Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-157415

Instrument Model 820, Serial Number 1577, was calibrated on 06APR2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 06APR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0612 / 0102	12 Months	06JAN2013	2012-153446

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.
Tested with PRM828 S/N 2457.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-157416

Instrument Model PRM828, Serial Number 2457, was calibrated on 06APR2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 06APR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47030867	12 Months	03MAY2012	5194985
Larson Davis	LDSigGn/2209	0612 / 0102	12 Months	06JAN2013	2012-153446

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

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"As Received" data is the same as shipped data.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-157529

Microphone Model 377B20, Serial Number 128406, was calibrated on 10APR2012. The microphone meets factory specifications per Test Procedure D0001.8167.

New Instrument
Date Calibrated: 10APR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163132

Instrument Model 820, Serial Number 1827, was calibrated on 27AUG2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 27AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn / 2209	0666 / 0123	12 Months	08DEC2012	2011-152463

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 33 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Tested with PRM828 S/N 2826

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163068

Instrument Model PRM828, Serial Number 2382, was calibrated on 24AUG2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 24AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47024345	12 Months	28SEP2012	5375785
Larson Davis	2900 / 2239	0276 / 0105	12 Months	04NOV2012	2011-151113

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163054

Microphone Model 377B20, Serial Number LW130081, was calibrated on 27AUG2012. The microphone meets factory specifications per Test Procedure D0001.8167.

New Instrument
Date Calibrated: 27AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336
Larson Davis	2900	0575	12 Months	26JUL2013	2012-162047
Larson Davis	PRM902	0206	12 Months	14AUG2013	2012-162575
Larson Davis	PRM915	0102	12 Months	15AUG2013	2012-162597

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163140

Instrument Model 820, Serial Number 1857, was calibrated on 24AUG2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 24AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn / 2209	0666 / 0123	12 Months	08DEC2012	2011-152463

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Tested with PRM828 S/N 2382

Signed: David Jensen

Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163067

Instrument Model PRM828, Serial Number 2827, was calibrated on 24AUG2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 24AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47024345	12 Months	28SEP2012	5375785
Larson Davis	2900 / 2239	0276 / 0105	12 Months	04NOV2012	2011-151113

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

~ *Certificate of Calibration and Compliance* ~

Microphone Model: 377B20 Serial Number: LW130058 Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
Hewlett Packard	34401A	MY41045214	LD-001	3/8/12	3/8/13
Bruel & Kjaer	4192	2657834	LD028	12/30/11	11/30/12
Newport	BTH-W/N	8410668	CA1187	not required	not required
Larson Davis	PRM915	124	CA1024	12/6/11	12/6/12
Larson Davis	PRM902	4709	CA-1453	10/7/11	10/5/12
Larson Davis	2559LF	3216	CA-883	not required	not required
Larson Davis	ADP005	1	LD-017	not required	not required
Larson Davis	PRM916	127	CA-924	4/4/12	4/4/13
Larson Davis	CAL250	4147	LD018	2/29/12	3/1/13
Larson Davis	2201	140	CA890	8/18/11	8/17/12
Larson Davis	2900	1079	CA-521A	6/10/11	6/10/13
Larson Davis	PRA951-4	241	CA1449	9/16/11	9/14/12
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: N/A

As Left: New unit in tolerance

Notes

1. Calibration of reference microphone is traceable through PTB.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open circuit sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Lenard Lukasik LL Date: July 26, 2012

ilac-MRA A2LA ACCREDITED

CALIBRATION CERT #1862.01

PCB PIEZOTRONICS
VIBRATION DIVISION
3425 Walden Avenue, Depew, New York, 14043
TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL60-3426166022.95

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163133

Instrument Model 820, Serial Number 1532, was calibrated on 24AUG2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 24AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	20MAR2013	2012-156690

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Tested with PRM828 S/N 2827

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

~ *Certificate of Calibration and Compliance* ~

Microphone Model: 377B20 Serial Number: LW130086 Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
Hewlett Packard	34401A	MY41045214	LD-001	3/8/12	3/8/13
Bruel & Kjaer	4192	2657834	LD028	12/30/11	11/30/12
Newport	BTH-W/N	8410668	CA1187	not required	not required
Larson Davis	PRM915	124	CA1024	12/6/11	12/6/12
Larson Davis	PRM902	4709	CA-1453	10/7/11	10/5/12
Larson Davis	2559LF	3216	CA-883	not required	not required
Larson Davis	ADP005	1	LD-017	not required	not required
Larson Davis	PRM916	127	CA-924	4/4/12	4/4/13
Larson Davis	CAL250	4147	LD018	2/29/12	3/1/13
Larson Davis	2201	140	CA890	8/18/11	8/17/12
Larson Davis	2900	1079	CA-521A	6/10/11	6/10/13
Larson Davis	PRA951-4	241	CA1449	9/16/11	9/14/12
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: N/A

As Left: New unit in tolerance

Notes

1. Calibration of reference microphone is traceable through PTB.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open circuit sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Lenard Lukasik Date: July 26, 2012

ilac-MRA ACCREDITED

CALIBRATION CERT #1862.01

PCB PIEZOTRONICS VIBRATION DIVISION

3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL60-3426171117.825

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163066

Instrument Model PRM828, Serial Number 2826, was calibrated on 24AUG2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 24AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47024345	12 Months	28SEP2012	5375785
Larson Davis	2900 / 2239	0276 / 0105	12 Months	04NOV2012	2011-151113

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163147

Instrument Model 820, Serial Number 1692, was calibrated on 28AUG2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: NO
Date Calibrated: 28AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn / 2209	0666 / 0123	12 Months	08DEC2012	2011-152463

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data unavailable due to unit failure.

Tested with PRM828 S/N 2869

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163065

Instrument Model PRM828, Serial Number 2869, was calibrated on 24AUG2012. The instrument meets factory specifications per Procedure D0001.8135.

Instrument found to be in calibration as received: YES
Date Calibrated: 24AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Agilent Technologies	34401A	MY47024345	12 Months	28SEP2012	5375785
Larson Davis	2900 / 2239	0276 / 0105	12 Months	04NOV2012	2011-151113

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: David Jensen
Technician: David Jensen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163051

Microphone Model 377B20, Serial Number 127513, was calibrated on 27AUG2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 27AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336
Larson Davis	2900	0575	12 Months	26JUL2013	2012-162047
Larson Davis	PRM902	0206	12 Months	14AUG2013	2012-162575
Larson Davis	PRM915	0102	12 Months	15AUG2013	2012-162597

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

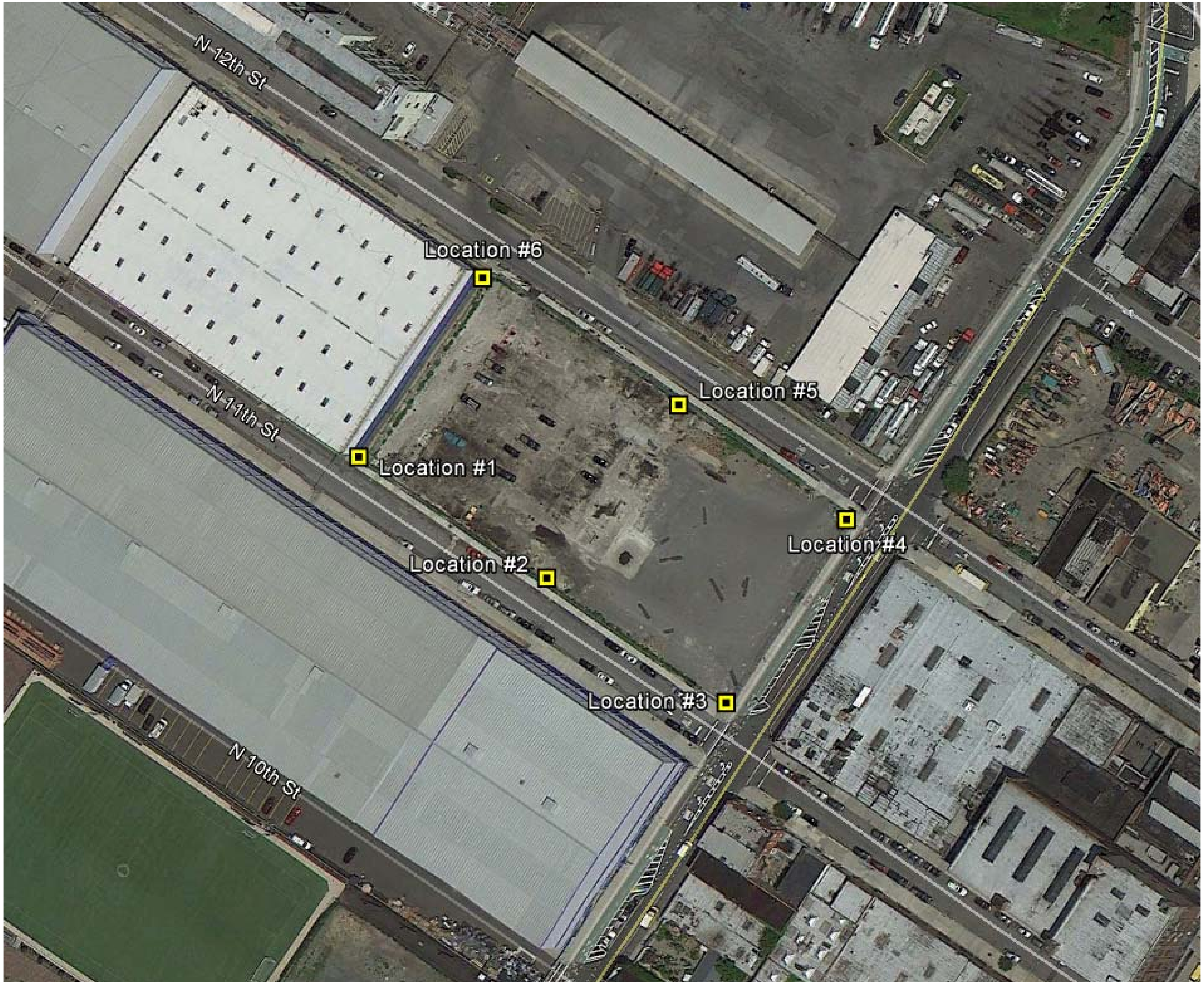
"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

APPENDIX B

Ambient Sound Monitoring Locations



APPENDIX C

Vibra-Tech Engineers, Inc.

Noise Producing Events that Occur During Test:

Time	Source
Location 1 A 1502	14:02:00
Location 2 A 1515	14:04:30
14:03	truck on Kent (3)
14:05	car on 11th Ave.
14:05:37	motorcycle and horn
14:06:32	truck on Kent
14:06:50	3 cars on Kent
14:07:33	truck on Kent
14:09:12	car on 11th Ave, truck on Kent
14:10:40	car on 11th Ave
14:11:07	truck on 11th Ave.
14:11:44	truck on Kent
14:12:47	truck on Kent
14:13:30	horn
14:13:58	horn, 18whl on Kent
14:14:45	2 trucks, horn on Kent, plane
14:15:20	car on 11th Ave, music on Kent
14:15:55	bus on Kent
14:16:53	van on 11th Ave.
14:17:30	backup alarm, truck on Kent
14:18:05	2 cars on 11th Ave.
14:18:45	car on 11th Ave
14:19:40	Jet
14:20:45	car on 11th ave, truck on 12th Ave.
14:21:33	truck on 12th Ave.
14:22:11	car on 11th Ave.
14:23:15	truck on 11th, 2 cars
14:24:30	backup alarms - Airbrakes → Premier
14:27:15	2 trucks on Kent
14:28:22	truck on Kent
14:28:47	truck on Kent
14:29:15	pickup on 12th = muffler
14:31:00	brakes at premier - 18whl on 12th Ave.
14:32:40	truck on 11th Ave.
14:33:05	car on 11th Ave.
14:34:33	car on 11th Ave.
14:35:40	horn - truck
14:36:39	Airhorn - Premier, truck on Kent
14:37:07	2 trucks on Kent
14:37:51	horn - truck on 12th - Premier
14:39:25	Airhorn and car on 11th Ave.
14:41:53	truck on Kent
14:42:26	truck on Kent
to 14:43:08	truck on 12th - Premier
14:43:42	horn (4)
14:44:17	horn
14:44:51	truck on Kent
14:47:40	truck at Premier
14:48:06	horn - car on 11th Ave
14:49:20	Premier truck on 12th, horn, dog barking
14:50:45	truck on Kent

Time	Source
14:51:45	Airbrake at Premier
14:52:37	truck on Kent, pedestrian on 11th Ave. backup alarm - Premier, truck on 12th Ave.
14:53:48	truck on 12th Ave.
14:55:30	truck on Kent, motorcycle on Kent
14:57:12	18whl on Kent
14:59:10	plane
15:00:10	truck on Kent
15:01:19	horn
15:03:40	truck on Kent
15:04:00	truck on Kent
15:04:15	truck on Kent

Data file #1 1502 Location 1 58.5 Leq
Data file #1 1515 Location 2 60.0 Leq

51°F
45% RH
0-3mph NNE

Doc: ADMIN/FORMS/E.020123

Vibra-Tech Engineers, Inc.

Noise Producing Events that Occur During Test:

Time Source

SN 1502 Location 3 Start 15:09:00
SN 1515 Location 4 Start 15:11:10

Traffic on Kent throughout test (car count)
15:12:50 Trucks on Kent
15:14:20 car on 11th Ave

Location 3 SLM Time ?
07:40 Pedestrians on Kent
08:09 helicopter
08:44 Pedestrians on Kent
09:12 Truck on Kent
09:49 Truck / Pedestrians
10:00 - 12:00 Truck traffic / Pedestrians
15:00 Truck on Kent
16:44 small motorcycle
18:09 18 whl truck, 6 cars
18:45 plane
19:30 car with music
19:50 18 whl truck on Kent
20:43 truck on Kent
21:18 truck horn
23:30 2 trucks on Kent
27:38 2 horns
28:01 2 trucks
28:43 truck
29:21 truck
30:45 car starting
31:23 truck, 4 cars, truck
31:50 truck
32:48 truck
33:01 truck
33:20 truck, car on 11th
33:57 backup alarm, airbrake
34:11 2 trucks
37:46 truck
38:09 horn, airbrake
38:27 truck horn
38:49 truck
39:01 dog barking truck
39:41 pedestrians
40:03 dog barking
40:35 truck
43:07 truck
43:25 truck
45:50 hammering near [illegible]
46:32 truck
47:40 car w/ trailer
49:41 pickup on 11th
50:10 pickup on 12th
52:35 truck
53:42 2 trucks
56:30 mo-ped, truck

Doc: ADMIN/FORMS/E.020123

Time Source

58:53 truck on 11th Ave.

C

T

51°F
43% RH
0-3 mph NNE

Location 3 # 2 on 1502 Leq 65.9
Location 4 # 2 on 1515 Leq 68.5

Ambient ≈ 52 dB
trucks ≈ 80 dB
Cars ≈ 70 dB

Vibra-Tech Engineers, Inc.

Noise Producing Events that Occur During Test:

Time	Source
SN 1502 Location #5	16:16
SN 1515 Location #6	16:19
16:22	helicopter, truck on 11th Ave.
16:23	Truck on Kent
16:24	helicopter
16:26	Truck on Kent
16:30	Truck horn
16:33	Truck on 11th Ave.
16:34	Truck on 12th Ave, Truck on Kent
16:36	Truck on 11th Ave.
16:37	helicopter
16:38	police car alarms - at a distance
16:40	Truck on 11th Ave.
16:44	Truck on 11th Ave.
16:46	Car on 12th Ave.
16:48	Truck on 11th Ave.
16:51	Truck on 12th Ave.
16:52	helicopter
16:55	horns
16:57	backup alarms - Premier
17:00	car on 12th
17:01	car alarm
17:04	Truck on 12th Ave.
17:09	Backup alarms, car on 12th Ave.
17:11	helicopter
17:12	backup alarms

Time	Source

49°F
39% RH
0-3 mph NNE

Location #5 on 1502 Leq 59.6
Location #6 on 1515 Leq

Doc: ADMIN/FORMS/E.020123

APPENDIX D

File Translated: C:\Program Files\Larson Davis\824 Utility\20Nov14s_001.slmdl
Model/Serial Number: 824 / A1502
Firmware/Software Revs: 4.290 / 3.080
Name: Vibra-Tech Enigneers, Inc
Descr1: 109 East First Street
Descr2: Hazleton, PA 18201
Setup/Setup Descr: urs.ssa / SLM & Real-Time Analyzer
Location:
Note1:
Note2: **LOCATION 1**

Overall Measurement
Start Time: 20-Nov-2012 14:02:05

Ln Start Level: 15 dB

L10.00	58.7 dBA	L30.00	56.2 dBA	L90.00	52.1 dBA
L20.00	57.1 dBA	L50.00	54.7 dBA	L95.00	51.6 dBA

Interval Records: Enabled — Number Interval Records: 1
History Records: Enabled — Number History Records: 14402

Current Any Data
Start Time: 20-Nov-2012 14:02:05
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	58.5 dBA	70.8 dBC	72.0 dBF
SEL:	94.1 dBA	106.3 dBC	107.6 dBF
Peak:	92.6 dBA	102.1 dBC	102.5 dBF
	20-Nov-2012 14:11:20	20-Nov-2012 14:23:15	20-Nov-2012 14:23:15
Lmax (slow):	79.6 dBA	89.4 dBC	90.6 dBF
	20-Nov-2012 14:11:20	20-Nov-2012 14:23:16	20-Nov-2012 14:23:16
Lmin (slow):	50.3 dBA	62.8 dBC	64.5 dBF
	20-Nov-2012 14:07:31	20-Nov-2012 14:08:43	20-Nov-2012 14:08:43
Lmax (fast):	80.9 dBA	92.0 dBC	93.2 dBF
	20-Nov-2012 14:11:19	20-Nov-2012 14:23:16	20-Nov-2012 14:23:16
Lmin (fast):	49.8 dBA	61.3 dBC	62.9 dBF
	20-Nov-2012 14:08:17	20-Nov-2012 14:09:06	20-Nov-2012 14:08:43
Lmax (impulse):	81.5 dBA	94.1 dBC	95.5 dBF
	20-Nov-2012 14:11:19	20-Nov-2012 14:23:15	20-Nov-2012 14:23:15
Lmin (impulse):	50.3 dBA	63.7 dBC	65.5 dBF
	20-Nov-2012 14:08:34	20-Nov-2012 14:08:55	20-Nov-2012 14:08:30

Spectra

Date	Time	Run Time
20-Nov-2012	14:02:05	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	61.2		78.1		40.6		630	49.6		73.7		38.9	
16.0	60.3	65.1	71.7	80.4	44.1	47.9	800	49.9		72.1		39.1	
20.0	59.2		74.9		43.9		1000	48.8	53.7	71.7	76.3	38.1	43.0
25.0	61.3		71.0		45.6		1250	48.0		70.8		37.2	
31.5	63.3	68.1	72.9	78.1	48.9	52.8	1600	45.6		68.6		34.2	
40.0	64.7		75.1		48.9		2000	43.5	48.7	68.2	72.7	29.8	36.0
50.0	61.7		67.0		44.9		2500	41.7		66.7		25.6	
63.0	61.6	66.7	73.2	76.4	44.6	50.4	3150	39.6		64.7		21.0	
80.0	62.5		72.6		46.9		4000	38.0	42.7	61.7	67.1	18.7	24.3
100	62.2		70.0		47.1		5000	34.9		58.6		18.2	
125	56.6	64.1	75.1	77.2	45.4	50.4	6300	32.0		54.5		17.9	
160	56.4		70.0		43.6		8000	30.0	35.2	49.6	56.1	18.6	23.3
200	57.2		76.0		44.9		10000	28.4		45.5		19.1	
250	55.3	60.3	73.9	79.8	45.5	49.4	12500	23.3		45.3		19.4	
315	53.4		74.9		43.2		16000	22.6	27.9	36.5	46.0	20.7	25.8
400	52.2		73.6		41.4		20000	23.5		32.2		22.4	
500	50.7	55.7	72.6	78.1	40.4	45.1							

Overall Spectral Ln's

Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00	Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00
12.5	62.0	59.5	58.5	56.0	51.0	49.5	630	49.5	47.5	46.5	45.0	42.0	41.5
16.0	62.5	61.0	60.0	58.0	53.0	51.5	800	49.0	47.5	46.5	45.0	42.0	41.5
20.0	61.5	59.5	58.5	56.5	52.0	51.0	1000	49.0	47.5	46.0	44.5	41.5	41.0
25.0	63.5	62.0	61.0	59.0	55.0	53.5	1250	48.5	46.5	45.5	44.0	41.0	40.0
31.5	66.0	63.5	62.0	60.0	56.0	55.0	1600	45.5	44.0	43.0	41.0	38.0	37.0
40.0	66.5	64.0	62.5	61.0	57.0	56.0	2000	43.0	41.5	40.0	38.0	33.5	33.0
50.0	62.5	60.0	58.5	56.5	52.5	51.5	2500	40.0	38.5	37.0	34.5	29.5	28.5
63.0	63.0	61.0	59.5	57.0	52.0	50.5	3150	36.5	34.5	32.5	30.0	25.0	24.0
80.0	64.0	62.0	60.5	58.0	54.0	53.0	4000	32.0	29.0	27.5	25.0	20.5	20.0
100	62.0	60.0	59.0	57.0	52.5	51.5	5000	27.0	24.0	22.5	20.5	19.0	19.0
125	57.5	55.5	54.5	53.0	50.0	49.5	6300	23.0	21.0	20.0	19.0	18.5	18.5
160	57.0	54.5	53.0	51.5	48.5	47.5	8000	20.5	19.5	19.5	19.5	19.0	19.0
200	56.5	54.0	53.0	51.5	48.5	48.0	10000	20.0	20.0	20.0	19.5	19.5	19.5
250	56.0	54.0	53.0	52.0	49.0	48.5	12500	20.5	20.0	20.0	20.0	19.5	19.5
315	54.0	52.5	51.0	49.0	46.5	45.5	16000	21.5	21.5	21.5	21.0	21.0	21.0
400	52.5	51.0	50.0	48.5	45.5	45.0	20000	23.0	23.0	23.0	23.0	22.5	22.5
500	51.0	49.0	48.0	46.5	44.0	43.5							

File Translated:	C:\Program Files\Larson Davis\824 Utility\20Nov14s_001.slmdl
Model/Serial Number:	824 / A1515
Firmware/Software Revs:	4.290 / 3.080
Name:	Vibra-Tech Engineers, Inc.
Descr1:	109 East First Street
Descr2:	Hazleton, PA 18201
Setup/Setup Descr:	urs.ssa / SLM & Real-Time Analyzer
Location:	
Note1:	LOCATION 2
Note2:	

Overall Measurement
Start Time: 20-Nov-2012 14:04:32

Ln Start Level: 15 dB

L10.00	60.7 dBA	L30.00	57.6 dBA	L90.00	53.2 dBA
L20.00	58.8 dBA	L50.00	56.0 dBA	L95.00	52.8 dBA

Interval Records:	Enabled	Number Interval Records:	1
History Records:	Enabled	Number History Records:	14402

Current Any Data
Start Time: 20-Nov-2012 14:04:32
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	60.0 dBA	71.5 dBC	72.4 dBF
SEL:	95.6 dBA	107.1 dBC	108.0 dBF
Peak:	95.0 dBA	100.5 dBC	102.0 dBF
	20-Nov-2012 14:23:23	20-Nov-2012 14:23:22	20-Nov-2012 14:23:22
Lmax (slow):	80.8 dBA	88.6 dBC	88.6 dBF
	20-Nov-2012 14:23:23	20-Nov-2012 14:55:51	20-Nov-2012 14:55:51
Lmin (slow):	51.5 dBA	63.8 dBC	65.0 dBF
	20-Nov-2012 14:18:31	20-Nov-2012 14:08:19	20-Nov-2012 14:08:19
Lmax (fast):	82.3 dBA	90.6 dBC	91.4 dBF
	20-Nov-2012 14:55:51	20-Nov-2012 14:55:51	20-Nov-2012 14:23:22
Lmin (fast):	51.1 dBA	62.5 dBC	63.5 dBF
	20-Nov-2012 14:18:31	20-Nov-2012 14:54:40	20-Nov-2012 14:54:40
Lmax (impulse):	83.0 dBA	92.3 dBC	93.2 dBF
	20-Nov-2012 14:55:51	20-Nov-2012 14:23:22	20-Nov-2012 14:23:22
Lmin (impulse):	51.5 dBA	64.4 dBC	65.7 dBF
	20-Nov-2012 14:18:31	20-Nov-2012 14:09:06	20-Nov-2012 14:07:30

Spectra

Date	Time	Run Time
20-Nov-2012	14:04:32	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	59.1		65.4		36.3		630	51.0		73.3		39.1	
16.0	58.0	63.3	69.9	78.7	40.8	44.8	800	50.8		73.1		40.2	
20.0	58.3		77.8		41.4		1000	50.2	54.9	72.4	77.8	40.2	44.4
25.0	59.0		77.0		42.9		1250	49.4		73.4		38.2	
31.5	60.6	65.3	78.3	85.3	46.1	50.4	1600	47.4		70.9		35.2	
40.0	61.6		83.4		47.0		2000	45.7	50.7	69.0	74.0	31.3	37.1
50.0	63.6		79.9		49.3		2500	44.0		66.8		27.1	
63.0	65.0	68.7	77.8	83.5	49.5	53.9	3150	41.5		65.8		22.6	
80.0	63.1		78.3		48.5		4000	38.6	44.1	64.4	69.8	19.1	25.1
100	62.6		82.3		47.0		5000	36.6		64.9		18.0	
125	59.8	65.6	75.2	83.6	48.2	51.6	6300	34.3		63.1		17.7	
160	59.4		74.1		44.5		8000	31.5	37.0	60.1	65.8	18.2	23.1
200	58.3		79.6		45.9		10000	29.6		58.9		19.0	
250	57.2	61.8	71.4	80.7	47.3	50.5	12500	22.9		48.0		19.2	
315	55.1		71.2		42.9		16000	21.8	27.4	39.6	48.7	20.5	25.5
400	53.4		71.6		40.2		20000	23.0		31.9		22.1	
500	52.0	57.0	72.0	77.1	38.8	44.2							

Overall Spectral Ln's

Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00	Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00
12.5	60.5	58.0	56.5	54.0	49.0	47.5	630	51.5	49.5	48.5	46.5	43.5	42.5
16.0	60.5	58.5	57.5	55.5	50.5	49.0	800	51.5	49.5	48.5	47.0	44.0	43.5
20.0	61.0	58.5	57.5	55.5	51.0	49.5	1000	51.0	49.5	48.0	46.5	43.5	43.0
25.0	61.0	59.0	58.0	56.0	52.0	51.0	1250	50.0	48.5	47.0	45.5	42.0	41.5
31.5	63.5	61.5	60.0	58.0	53.5	52.5	1600	47.5	45.5	44.5	42.5	38.5	38.0
40.0	64.0	62.0	60.5	58.5	54.5	53.5	2000	45.5	43.5	42.0	40.0	35.5	34.5
50.0	66.0	63.0	61.5	59.5	55.5	54.5	2500	43.5	41.0	39.0	36.5	31.5	30.5
63.0	67.5	65.0	63.0	60.5	56.0	55.0	3150	40.0	37.0	35.0	31.5	26.5	25.5
80.0	65.0	62.5	61.0	59.0	55.0	54.5	4000	36.0	32.5	30.0	26.5	21.5	21.0
100	64.0	61.5	60.0	58.0	53.5	52.5	5000	31.5	28.0	25.5	22.0	19.5	19.0
125	61.5	59.0	58.0	56.5	53.5	52.5	6300	27.5	24.0	22.0	19.5	18.5	18.0
160	59.5	57.0	55.5	53.5	50.0	49.0	8000	23.0	20.5	20.0	19.5	18.5	18.5
200	58.0	55.5	54.5	52.5	50.0	49.5	10000	20.5	20.0	20.0	19.5	19.5	19.5
250	57.0	55.5	54.5	53.0	50.5	50.0	12500	20.0	20.0	20.0	20.0	19.5	19.5
315	54.5	52.5	51.0	49.5	47.0	46.0	16000	21.5	21.0	21.0	21.0	20.5	20.5
400	53.0	51.0	50.0	48.0	45.0	44.5	20000	23.0	22.5	22.5	22.5	22.5	22.0
500	52.0	50.0	48.5	47.0	43.5	42.5							

File Translated: C:\Program Files\Larson Davis\824 Utility\20Nov15s_002.slmdl
Model/Serial Number: 824 / A1502
Firmware/Software Revs: 4.290 / 3.080
Name: Vibra-Tech Enigneers, Inc
Descr1: 109 East First Street
Descr2: Hazleton, PA 18201
Setup/Setup Descr: urs.ssa / SLM & Real-Time Analyzer
Location:
Note1:
Note2:

LOCATION 3

Overall Measurement
Start Time: 20-Nov-2012 15:09:04

Ln Start Level: 15 dB

L10.00	69.2 dBA	L30.00	65.0 dBA	L90.00	53.7 dBA
L20.00	66.6 dBA	L50.00	61.8 dBA	L95.00	52.7 dBA

Interval Records: Enabled — Number Interval Records: 1
History Records: Enabled — Number History Records: 14402

Current Any Data
Start Time: 20-Nov-2012 15:09:04
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	65.9 dBA	75.9 dBC	76.7 dBF
SEL:	101.5 dBA	111.5 dBC	112.3 dBF
Peak:	102.7 dBA	104.8 dBC	106.1 dBF
	20-Nov-2012 15:52:36	20-Nov-2012 15:20:45	20-Nov-2012 16:02:52
Lmax (slow):	81.5 dBA	96.2 dBC	96.9 dBF
	20-Nov-2012 15:12:03	20-Nov-2012 15:20:46	20-Nov-2012 15:20:46
Lmin (slow):	49.8 dBA	64.2 dBC	65.3 dBF
	20-Nov-2012 15:26:16	20-Nov-2012 15:26:29	20-Nov-2012 15:26:29
Lmax (fast):	86.1 dBA	99.0 dBC	99.8 dBF
	20-Nov-2012 15:52:36	20-Nov-2012 15:20:45	20-Nov-2012 15:20:45
Lmin (fast):	49.3 dBA	62.5 dBC	63.6 dBF
	20-Nov-2012 15:26:18	20-Nov-2012 15:26:18	20-Nov-2012 15:26:26
Lmax (impulse):	88.6 dBA	99.8 dBC	100.5 dBF
	20-Nov-2012 15:52:36	20-Nov-2012 15:20:45	20-Nov-2012 15:20:45
Lmin (impulse):	49.8 dBA	65.0 dBC	66.3 dBF
	20-Nov-2012 15:26:14	20-Nov-2012 15:27:05	20-Nov-2012 15:26:16

Spectra

Date	Time	Run Time
20-Nov-2012	15:09:04	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	62.4		77.9		38.5		630	56.7		72.9		38.9	
16.0	62.1	67.3	80.5	83.8	41.0	45.5	800	57.1		74.6		39.5	
20.0	63.0		78.1		41.9		1000	57.1	61.6	73.5	78.2	38.2	43.1
25.0	63.5		80.2		44.0		1250	56.1		71.5		36.9	
31.5	64.6	69.1	79.3	83.8	46.5	50.4	1600	54.8		70.4		33.9	
40.0	64.8		77.1		46.0		2000	52.6	57.8	70.2	74.9	30.1	36.0
50.0	66.8		85.7		50.7		2500	50.7		69.6		27.3	
63.0	70.3	73.4	81.3	87.8	49.5	54.7	3150	48.2		69.0		23.9	
80.0	67.9		80.1		49.6		4000	45.9	51.0	69.7	73.5	20.7	26.5
100	66.6		78.6		49.8		5000	43.4		67.3		19.1	
125	63.8	69.4	75.7	81.8	48.2	53.3	6300	41.7		68.7		18.5	
160	62.5		76.2		47.0		8000	38.6	44.1	64.3	70.6	18.8	23.6
200	61.9		79.8		44.7		10000	35.9		61.3		19.2	
250	61.3	65.9	75.3	82.0	45.2	49.2	12500	32.1		57.6		19.6	
315	60.0		74.4		43.0		16000	30.4	35.1	54.6	59.6	20.8	25.8
400	58.5		73.3		41.0		20000	27.3		46.7		22.3	
500	57.1	62.3	72.6	77.7	39.8	44.8							

Overall Spectral Ln's

Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00	Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00
12.5	62.5	59.0	57.0	54.5	49.0	47.5	630	60.0	57.0	55.0	51.5	44.0	43.0
16.0	63.0	59.5	58.0	55.5	50.0	48.5	800	60.5	58.0	56.5	53.0	44.0	43.0
20.0	64.5	61.5	59.5	57.0	52.0	51.0	1000	60.5	58.0	56.0	52.5	43.0	42.0
25.0	64.5	62.0	60.5	58.0	53.5	52.0	1250	59.5	57.0	55.0	51.5	41.5	40.0
31.5	66.0	63.5	62.0	59.5	55.0	53.5	1600	58.0	55.5	54.0	49.5	39.5	38.5
40.0	67.0	64.0	62.5	60.0	55.5	54.0	2000	55.5	52.5	51.0	46.5	36.0	34.5
50.0	68.0	65.5	64.0	61.5	57.5	56.5	2500	53.0	50.0	48.0	43.5	33.0	31.5
63.0	70.0	66.0	64.0	61.5	56.5	55.0	3150	50.5	46.5	44.5	40.0	29.0	27.5
80.0	69.0	65.5	63.5	61.0	56.5	55.0	4000	47.5	43.5	41.0	36.5	24.5	23.0
100	67.0	63.5	61.5	59.0	55.0	54.0	5000	44.5	40.0	37.5	32.5	21.5	20.5
125	66.0	62.5	60.5	57.5	53.0	52.0	6300	41.5	37.0	34.5	29.0	20.0	19.5
160	64.5	61.0	59.0	56.0	51.0	50.5	8000	37.5	33.0	30.5	26.0	19.5	19.5
200	64.5	61.0	58.5	55.5	49.5	49.0	10000	33.5	29.0	27.0	23.0	20.0	19.5
250	63.0	60.0	58.0	55.0	49.5	48.5	12500	29.5	26.0	24.0	21.5	20.0	20.0
315	61.5	58.0	56.0	53.0	47.5	46.5	16000	27.0	24.0	23.0	21.5	21.0	21.0
400	60.5	57.5	55.5	52.0	46.0	45.0	20000	25.0	23.5	23.5	23.0	22.5	22.5
500	59.5	56.5	55.0	51.5	45.0	43.5							

File Translated: C:\Program Files\Larson Davis\824 Utility\20Nov15s_002.slmdl
Model/Serial Number: 824 / A1515
Firmware/Software Revs: 4.290 / 3.080
Name: Vibra-Tech Engineers, Inc.
Descr1: 109 East First Street
Descr2: Hazleton, PA 18201
Setup/Setup Descr: urs.ssa / SLM & Real-Time Analyzer
Location:
Note1: LOCATION 4
Note2:

Overall Measurement
Start Time: 20-Nov-2012 15:11:14

Ln Start Level: 15 dB

L10.00	70.4 dBA	L30.00	66.4 dBA	L90.00	55.5 dBA
L20.00	68.0 dBA	L50.00	63.5 dBA	L95.00	54.4 dBA

Interval Records: Enabled — Number Interval Records: 1
History Records: Enabled — Number History Records: 14402

Current Any Data
Start Time: 20-Nov-2012 15:11:14
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	68.5 dBA	76.2 dBC	77.1 dBF
SEL:	104.0 dBA	111.8 dBC	112.6 dBF
Peak:	119.1 dBA	118.0 dBC	118.4 dBF
	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29
Lmax (slow):	97.9 dBA	97.1 dBC	97.4 dBF
	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29
Lmin (slow):	51.8 dBA	65.8 dBC	66.9 dBF
	20-Nov-2012 15:56:07	20-Nov-2012 15:26:41	20-Nov-2012 15:26:42
Lmax (fast):	103.8 dBA	103.0 dBC	103.2 dBF
	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29
Lmin (fast):	50.9 dBA	64.1 dBC	64.9 dBF
	20-Nov-2012 15:56:06	20-Nov-2012 16:09:58	20-Nov-2012 16:09:58
Lmax (impulse):	104.9 dBA	104.0 dBC	104.3 dBF
	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29	20-Nov-2012 15:47:29
Lmin (impulse):	51.8 dBA	66.4 dBC	67.9 dBF
	20-Nov-2012 15:32:05	20-Nov-2012 15:39:45	20-Nov-2012 15:23:20

Spectra

Date	Time	Run Time
20-Nov-2012	15:11:14	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	62.0		62.2		39.8		630	58.6		87.6		41.9	
16.0	62.2	67.1	60.8	67.5	40.0	46.2	800	58.8		83.0		41.5	
20.0	62.8		64.4		43.4		1000	58.9	63.8	90.5	96.2	40.2	44.9
25.0	64.2		75.7		46.1		1250	59.4		94.6		37.8	
31.5	65.8	70.4	77.4	80.7	48.0	51.9	1600	58.1		91.5		37.3	
40.0	66.6		74.1		47.0		2000	59.0	62.5	96.5	98.6	34.4	39.8
50.0	68.9		83.7		54.8		2500	55.2		91.4		31.3	
63.0	69.3	73.3	79.2	85.2	50.3	57.0	3150	53.5		90.2		26.3	
80.0	67.0		70.6		49.9		4000	51.2	56.3	88.3	92.9	24.3	29.2
100	66.1		69.7		49.4		5000	48.3		83.7		21.5	
125	63.9	69.2	66.3	71.8	48.5	52.9	6300	49.3		81.8		19.3	
160	62.4		62.3		45.8		8000	44.3	51.1	80.2	85.3	18.8	23.9
200	61.7		61.3		45.9		10000	42.0		79.0		19.3	
250	61.0	65.9	78.4	86.7	45.0	49.5	12500	37.3		72.6		19.4	
315	60.5		86.0		42.5		16000	32.6	38.8	63.1	73.1	20.6	25.7
400	58.1		64.5		41.1		20000	25.7		56.1		22.2	
500	58.0	63.0	88.7	91.2	40.9	46.1							

Overall Spectral Ln's

Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00	Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00
12.5	61.5	58.5	57.0	54.5	49.0	47.5	630	61.5	58.5	56.5	53.0	46.0	45.0
16.0	62.5	59.0	57.5	55.0	50.0	48.5	800	62.0	60.0	58.0	54.5	46.5	45.0
20.0	63.5	60.5	59.0	56.5	51.5	50.5	1000	61.5	59.5	58.0	54.5	45.5	44.0
25.0	65.0	62.5	61.0	59.0	54.5	53.5	1250	61.0	58.5	57.0	53.5	44.0	42.5
31.5	67.5	64.0	62.5	60.0	55.5	54.5	1600	59.5	57.0	55.5	52.0	42.5	41.0
40.0	68.0	65.0	63.0	60.5	55.5	54.5	2000	57.5	55.0	53.0	49.5	40.0	38.5
50.0	70.0	67.5	66.0	64.0	61.5	60.5	2500	55.5	52.0	50.0	46.5	36.5	35.5
63.0	70.0	66.5	64.0	61.5	56.5	55.5	3150	52.5	48.5	46.5	42.5	32.5	31.0
80.0	68.5	65.5	63.5	61.0	56.5	55.5	4000	49.5	45.0	42.5	39.0	28.5	27.5
100	67.0	64.0	62.0	59.5	55.0	54.0	5000	46.5	42.0	39.5	36.0	25.0	23.5
125	66.0	62.5	61.0	58.0	53.5	52.5	6300	43.5	39.0	36.5	32.5	21.5	20.5
160	64.5	61.5	59.5	56.5	51.5	51.0	8000	40.0	35.5	33.0	29.0	20.0	19.5
200	64.0	61.0	58.5	55.5	50.0	49.5	10000	35.5	31.0	28.5	25.0	20.0	19.5
250	63.0	60.0	58.0	55.0	50.0	49.0	12500	29.5	25.5	23.5	21.5	20.0	19.5
315	62.0	58.5	56.5	53.5	47.5	46.5	16000	24.5	22.5	22.0	21.5	21.0	21.0
400	61.0	57.5	55.5	52.5	46.0	45.0	20000	23.5	23.0	23.0	23.0	22.5	22.5
500	60.5	57.5	55.5	52.5	45.5	44.5							

File Translated: C:\Program Files\Larson Davis\824 Utility\20Nov16s_003.slmdl
Model/Serial Number: 824 / A1502
Firmware/Software Revs: 4.290 / 3.080
Name: Vibra-Tech Enigneers, Inc
Descr1: 109 East First Street
Descr2: Hazleton, PA 18201
Setup/Setup Descr: urs.ssa / SLM & Real-Time Analyzer
Location:
Note1:
Note2:

LOCATION 5

Overall Measurement
Start Time: 20-Nov-2012 16:16:00

Ln Start Level: 15 dB

L10.00	61.3 dBA	L30.00	57.4 dBA	L90.00	51.2 dBA
L20.00	59.0 dBA	L50.00	55.2 dBA	L95.00	50.4 dBA

Interval Records: Enabled — Number Interval Records: 1
History Records: Enabled — Number History Records: 14402

Current Any Data
Start Time: 20-Nov-2012 16:16:00
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	59.6 dBA	71.1 dBC	72.3 dBF
SEL:	95.2 dBA	106.7 dBC	107.9 dBF
Peak:	97.0 dBA	98.1 dBC	98.1 dBF
	20-Nov-2012 16:30:18	20-Nov-2012 16:30:18	20-Nov-2012 16:30:18
Lmax (slow):	82.4 dBA	85.8 dBC	86.5 dBF
	20-Nov-2012 16:30:19	20-Nov-2012 16:34:34	20-Nov-2012 16:34:34
Lmin (slow):	48.2 dBA	63.4 dBC	64.9 dBF
	20-Nov-2012 16:31:52	20-Nov-2012 16:17:30	20-Nov-2012 16:17:19
Lmax (fast):	84.8 dBA	89.0 dBC	89.8 dBF
	20-Nov-2012 16:30:18	20-Nov-2012 16:34:33	20-Nov-2012 16:34:33
Lmin (fast):	47.6 dBA	61.6 dBC	62.9 dBF
	20-Nov-2012 16:31:51	20-Nov-2012 16:17:30	20-Nov-2012 16:17:30
Lmax (impulse):	85.6 dBA	90.1 dBC	90.8 dBF
	20-Nov-2012 16:30:18	20-Nov-2012 16:34:33	20-Nov-2012 16:34:33
Lmin (impulse):	48.1 dBA	64.3 dBC	65.4 dBF
	20-Nov-2012 16:31:48	20-Nov-2012 16:17:19	20-Nov-2012 16:17:19

Spectra

Date	Time	Run Time
20-Nov-2012	16:16:00	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	56.9		68.6		38.4		630	52.8		77.9		38.2	
16.0	59.4	65.0	72.0	75.8	40.7	44.6	800	51.5		75.4		36.3	
20.0	62.6		71.8		40.0		1000	50.0	54.9	71.8	77.5	35.9	40.0
25.0	61.4		67.7		46.0		1250	48.2		68.1		32.7	
31.5	61.8	66.9	68.0	72.7	44.5	50.3	1600	46.8		71.2		31.3	
40.0	63.1		68.2		46.0		2000	46.9	51.1	76.2	79.3	27.8	33.6
50.0	64.9		68.2		51.7		2500	45.0		74.7		25.5	
63.0	64.2	68.7	66.6	72.8	48.9	54.5	3150	39.8		63.7		21.4	
80.0	62.2		69.0		47.6		4000	37.7	43.1	63.2	68.6	20.1	25.0
100	61.4		67.1		48.1		5000	36.9		64.6		18.8	
125	57.7	63.7	62.7	69.1	45.9	51.0	6300	31.0		54.8		18.6	
160	55.6		60.6		43.5		8000	29.5	34.0	50.1	56.2	18.8	23.6
200	54.6		73.5		41.8		10000	25.5		40.9		19.2	
250	53.8	58.5	57.9	73.7	42.1	46.2	12500	29.5		35.1		19.4	
315	52.5		57.0		40.2		16000	25.0	31.6	26.4	36.1	20.8	25.8
400	53.5		79.3		39.6		20000	23.6		25.7		22.4	
500	52.8	57.8	59.7	81.7	38.6	43.6							

Overall Spectral Ln's

Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00	Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00
12.5	59.0	57.0	56.0	54.0	49.0	47.5	630	54.0	51.5	49.5	47.0	42.5	41.5
16.0	62.0	60.0	58.5	56.0	51.0	49.5	800	53.0	50.5	49.0	46.5	41.5	41.0
20.0	61.5	59.5	58.0	56.0	51.5	50.0	1000	51.5	49.0	47.5	45.0	40.5	39.5
25.0	62.5	60.5	59.5	58.0	54.0	52.5	1250	50.5	47.5	46.0	43.5	38.0	37.0
31.5	64.0	62.5	61.0	59.5	55.0	54.0	1600	48.0	45.5	43.5	41.5	36.5	35.5
40.0	64.5	62.0	60.5	58.5	55.0	53.5	2000	45.5	43.0	41.0	38.5	33.0	32.0
50.0	66.5	64.0	63.0	61.5	58.0	57.5	2500	43.0	40.0	38.0	35.5	30.5	29.5
63.0	66.5	63.5	62.0	60.0	56.0	55.0	3150	39.5	36.0	34.0	31.5	26.5	25.0
80.0	64.0	61.5	60.0	58.0	54.5	53.5	4000	36.5	33.0	31.0	27.5	23.0	22.0
100	63.5	60.5	59.0	57.0	53.5	53.0	5000	32.0	28.5	26.0	23.5	20.5	20.0
125	59.5	57.5	56.0	54.5	51.0	50.0	6300	28.5	24.5	22.5	21.0	19.5	19.0
160	58.0	55.5	54.0	51.5	48.0	47.5	8000	24.5	21.5	20.5	20.0	19.0	19.0
200	57.0	54.5	52.5	50.5	46.5	45.5	10000	21.5	20.5	20.0	20.0	19.5	19.5
250	56.5	54.0	53.0	51.0	46.5	45.5	12500	20.5	20.5	20.0	20.0	19.5	19.5
315	55.0	52.5	50.5	48.5	45.0	44.0	16000	21.5	21.5	21.5	21.5	21.0	21.0
400	55.0	52.0	50.0	48.0	44.0	43.5	20000	23.0	23.0	23.0	23.0	22.5	22.5
500	54.5	51.5	50.0	47.5	43.5	43.0							

File Translated: C:\Program Files\Larson Davis\824 Utility\20Nov16s_003.slmdl
Model/Serial Number: 824 / A1515
Firmware/Software Revs: 4.290 / 3.080
Name: Vibra-Tech Engineers, Inc.
Descr1: 109 East First Street
Descr2: Hazleton, PA 18201
Setup/Setup Descr: urs.ssa / SLM & Real-Time Analyzer
Location:
Note1:
Note2:

LOCATION 6

Overall Measurement
Start Time: 20-Nov-2012 16:18:13

Ln Start Level: 15 dB

L10.00	59.5 dBA	L30.00	56.7 dBA	L90.00	52.0 dBA
L20.00	57.8 dBA	L50.00	55.1 dBA	L95.00	51.3 dBA

Interval Records: Enabled Number Interval Records: 1
History Records: Enabled Number History Records: 14402

Current Any Data
Start Time: 20-Nov-2012 16:18:13
Elapsed Time: 01:00:00

	A Weight	C Weight	Flat
Leq:	57.0 dBA	69.7 dBC	71.2 dBF
SEL:	92.6 dBA	105.3 dBC	106.8 dBF
Peak:	87.9 dBA	97.9 dBC	97.8 dBF
	20-Nov-2012 16:30:18	20-Nov-2012 17:09:03	20-Nov-2012 17:09:03
Lmax (slow):	75.4 dBA	86.7 dBC	86.9 dBF
	20-Nov-2012 16:30:19	20-Nov-2012 17:09:03	20-Nov-2012 17:09:03
Lmin (slow):	48.8 dBA	63.4 dBC	64.8 dBF
	20-Nov-2012 16:31:51	20-Nov-2012 16:25:48	20-Nov-2012 16:25:48
Lmax (fast):	79.0 dBA	90.5 dBC	90.6 dBF
	20-Nov-2012 17:09:03	20-Nov-2012 17:09:03	20-Nov-2012 17:09:03
Lmin (fast):	48.3 dBA	62.2 dBC	63.8 dBF
	20-Nov-2012 16:31:51	20-Nov-2012 16:25:46	20-Nov-2012 16:25:47
Lmax (impulse):	79.8 dBA	91.4 dBC	92.4 dBF
	20-Nov-2012 17:09:03	20-Nov-2012 17:09:03	20-Nov-2012 16:22:23
Lmin (impulse):	48.9 dBA	64.6 dBC	65.8 dBF
	20-Nov-2012 16:31:51	20-Nov-2012 16:25:47	20-Nov-2012 16:25:47

Spectra

Date	Time	Run Time
20-Nov-2012	16:18:13	01:00:00

Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1	Hz	Leq1/3	Leq1/1	Max1/3	Max1/1	Min1/3	Min1/1
12.5	59.5		68.4		40.2		630	49.6		77.8		39.0	
16.0	61.3	65.7	75.6	77.2	41.3	47.2	800	48.4		66.5		38.4	
20.0	61.7		69.6		44.6		1000	47.5	52.3	60.3	67.9	37.2	41.8
25.0	61.6		67.6		44.4		1250	46.5		57.5		34.8	
31.5	62.5	66.7	67.4	72.2	48.4	52.3	1600	43.6		59.4		32.4	
40.0	61.6		67.2		48.7		2000	42.0	46.7	60.7	63.9	29.1	34.7
50.0	61.1		63.4		48.3		2500	39.2		56.3		26.0	
63.0	61.5	66.1	61.9	71.0	49.2	53.7	3150	35.6		48.4		21.3	
80.0	61.5		69.5		49.2		4000	32.5	38.1	45.4	51.1	18.7	24.3
100	60.9		68.2		49.0		5000	29.9		44.0		17.9	
125	57.1	63.2	60.4	69.5	46.3	52.0	6300	27.2		30.9		17.7	
160	55.5		60.9		45.5		8000	25.5	30.2	24.9	32.2	18.2	23.1
200	55.5		64.7		44.3		10000	22.4		21.1		19.0	
250	52.2	58.0	60.0	66.3	43.5	47.9	12500	21.0		21.3		19.2	
315	50.5		54.9		40.8		16000	22.7	27.1	22.8	27.8	20.6	25.6
400	50.9		73.8		39.3		20000	23.0		24.4		22.1	
500	49.7	54.9	55.8	79.3	38.9	43.8							

Overall Spectral Ln's

Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00	Hz	L10.00	L20.00	L30.00	L50.00	L90.00	L95.00
12.5	61.0	59.0	57.5	55.5	50.0	49.0	630	51.5	50.0	48.5	47.0	43.0	42.0
16.0	63.5	61.0	60.0	58.0	53.0	51.5	800	50.5	49.0	48.0	46.5	42.5	42.0
20.0	63.0	61.0	59.5	57.5	53.0	52.0	1000	50.0	48.5	47.0	45.0	41.5	40.5
25.0	63.5	61.5	60.5	59.0	54.5	53.5	1250	49.0	47.0	45.5	43.5	39.5	38.5
31.5	65.0	63.5	62.0	60.0	56.0	55.0	1600	46.0	44.0	43.0	41.0	37.5	36.5
40.0	63.5	62.0	61.0	59.0	55.5	54.5	2000	44.0	42.0	40.0	38.0	34.5	34.0
50.0	62.5	60.5	59.5	58.0	54.5	53.5	2500	41.0	38.5	37.0	34.5	31.0	30.5
63.0	63.5	61.5	60.0	58.5	55.0	54.0	3150	38.0	34.5	32.5	30.5	26.0	25.0
80.0	63.5	61.5	60.0	58.5	55.0	54.0	4000	34.0	30.0	28.0	25.5	21.5	20.5
100	62.5	60.5	59.0	57.5	54.0	53.5	5000	30.0	26.0	24.5	22.5	19.0	19.0
125	59.0	57.5	56.5	55.0	52.0	51.0	6300	26.5	23.0	21.5	20.0	18.5	18.5
160	57.0	55.5	54.5	53.0	50.0	49.5	8000	23.0	20.5	20.0	19.0	18.5	18.5
200	55.5	53.5	52.5	51.0	48.0	47.5	10000	21.0	20.0	20.0	19.5	19.5	19.5
250	54.5	52.5	51.5	50.5	47.5	46.5	12500	20.0	20.0	20.0	20.0	19.5	19.5
315	52.5	50.5	49.5	48.0	45.0	44.5	16000	22.5	22.0	22.0	21.5	21.0	21.0
400	52.5	50.5	49.5	47.5	44.0	43.0	20000	23.0	22.5	22.5	22.5	22.5	22.5
500	52.5	50.0	49.0	47.5	43.5	43.0							

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163410

Instrument Model 824, Serial Number A1502, was calibrated on 05SEP2012. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 05SEP2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 1999

Signed:
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163397

Instrument Model PRM902, Serial Number 1999, was calibrated on 05SEP2012. The instrument meets factory specifications per Procedure D0001.8126.

Instrument found to be in calibration as received: YES
Date Calibrated: 05SEP2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792
Hewlett Packard	34401A	US36033460	12 Months	27JUN2013	5708507

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.

Signed:
Technician: Sean Childs

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ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163468

Microphone Model 2541, Serial Number 8071, was calibrated on 06SEP2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 06SEP2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	PRM902	0529	12 Months	07SEP2012	2011-148677
Larson Davis	PRM902	0528	12 Months	07SEP2012	2011-148679
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336
Larson Davis	2900	0575	12 Months	26JUL2013	2012-162047
Larson Davis	PRM902	0206	12 Months	14AUG2013	2012-162575
Larson Davis	2559	3034LF	12 Months	14AUG2013	2012-162596
Larson Davis	PRM915	0102	12 Months	15AUG2013	2012-162597

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

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ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-163370

Instrument Model CAL200, Serial Number 3207, was calibrated on 30AUG2012. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 30AUG2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	2900	0661	12 Months	06APR2013	2012-157399
PCB	1502B02FJ15PSIA	1428	12 Months	10APR2013	3416909125.00
Hewlett Packard	34401A	3146A10352	12 Months	28AUG2013	5778699

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155614

Instrument Model 824, Serial Number A1515, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 2334

Signed:
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155643

Microphone Model 2560, Serial Number 3200, was calibrated on 28FEB2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	2559	3034LF	12 Months	15AUG2012	2011-147516
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	PRM902	0529	12 Months	07SEP2012	2011-148677
Larson Davis	PRM902	0528	12 Months	07SEP2012	2011-148679
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

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ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155608

Instrument Model PRM902, Serial Number 2334, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8126.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	US36033460	12 Months	20JUN2012	5254394
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

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"As received" data is the same as shipped data.

Signed: Sean Childs
Technician: Sean Childs

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ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155612

Instrument Model CAL200, Serial Number 3106, was calibrated on 28FEB2012. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 28FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Before: 113.90 dB, 93.89 dB, 1000.3 Hz @ sea level.
After: Refer to Certificate of Measured Output.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Sound Level Prediction and Control Program
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

Prepared for:

Mr. Colin Wasteneys
URS Corporation
77 Goodell Street
Buffalo, New York 14203

Prepared by:

Vibra-Tech Engineers, Inc.
109 E. First Street
Hazleton, PA 18201
1-800-233-6181

July 31, 2012

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Executive Summary

As per an agreement between Vibra-Tech Engineers, Inc. and URS Corporation, Vibra-Tech has completed a sound prediction and control program for the Williamsburg Works former MGP site in Brooklyn, New York. The sound prediction analysis focuses on all major noise sources associated with the environmental remediation site, including pile driving, drilling, and excavation.

Based on the noise predictions performed for the former Williamsburg Works MGP site, the vibratory pile driver is the loudest noise source (92.08 dBA). The next highest noise sources are the auger drill rig, roller, and dozer (all at 82.08 dBA). The backhoe and the front end loader had the lowest predicted noise levels. Maximum noise levels of 85.46 to 92.08 from the pile driver exceed the New York City Noise Code of 85 dBA at or beyond a distance of 50 feet from the source. For all other equipment running individually, the predicted levels are below 85 dBA.

Based on an analysis of combined noise levels from all noise sources running at the same time, predicted sound levels in excess of the 85 dBA New York City Noise Code were calculated at four of the six monitoring locations. If the pile driver was eliminated from this analysis, then only two locations would exceed 85 dBA.

According to the DEP Environmental Protection Citywide Construction Noise Mitigation regulations, several noise mitigation efforts should be made to reduce noise at the receptor locations. Additional noise mitigation efforts must be made when operating the vibratory pile driver, dump trucks, and the auger drill rig.

Sound should be monitored during the use of the construction equipment to verify sound level predictions for comparison to the levels noted in the Federal Highway Administration Roadway Construction Noise Model User's Guide, and to ensure compliance with local noise ordinances.

Sound Level Prediction and Control Program
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

July 31, 2012

Introduction

As per an agreement between Vibra-Tech Engineers, Inc. and URS Corporation, Vibra-Tech has completed a sound level prediction and control program for the Williamsburg Works former MGP site in Brooklyn, New York. The sound prediction analysis focuses on all major noise sources associated with work at the environmental remediation project, including pile driving, rock drilling, and excavation. This report discusses both existing and predicted sound levels at receptor locations adjacent to the project site. The predicted noised levels were compared to the Local Laws of The City of New York - New York City Noise Code. In addition, noise control efforts such as those described in the DEP Citywide Construction Noise Mitigation regulations have been summarized for proposed equipment operation.

Discussion of Sound Level Measurements

The measurement of noise involves quantifying both its rate (frequency in Hz) and intensity (pressure) relative to normal atmospheric pressure. People do not perceive all frequencies with equal sensitivity; rather, they respond to higher frequencies more than lower frequencies. The following discussion of sound levels measurements describes the types of measurements collected for these studies.

dB
A decibel (dB) is a unit of measure of sound pressure. The base or threshold of hearing is 0 dB. The calculations of dB are logarithmic allowing very large and very small relationships of sound pressure to be compared.

dBA
The A-weighted decibel level (dBA). A dBA sound level measurement weighs the various frequency components of a sound as perceived by the human ear in order to yield a single number indicator of its relative loudness. All measurements used in this study are dBA.

Ambient Sound
The sound level at a given location that exists as a result of the combined contribution in that location of all sound sources, excluding the contribution of a source or sources under investigation.

Impulsive Sound
A sound that is of short duration; where each peak sound lasts two seconds or less, and is characterized by abrupt onset and rapid decay.

Non-Impulsive Sound
A sound that is of long duration; where each peak sound lasts longer than two seconds.

Extraneous Sound
Sound that is intense, intermittent, not representative of the relatively steady sound levels at a given location, such sounds include but are not limited to sirens of passing emergency vehicles, and unusually load motor vehicles such as motorcycles.

Maximum – dBA L_{max}
The maximum measured sound level at any instant in time.

Ln Exceedance Levels
Exceedance Level measurements are taken for a pre-determined period of time, which is variable. The results of these measurements are expressed as a dBA value and the percentage of time of the total measurement period that the level was exceeded. For example, if L_{10} = 50 dBA, for 10 percent of the test period, the sound level present was 50 dBA or above.

Total Sound Level
Measured sound level that represents the combined sound level of the source or sources under investigation and the ambient sound level. Total sound level measurements shall exclude extraneous sound sources.

Combining Sound Levels

In general, the approximate addition of sound levels can be made using the table below.

Table 1. Approximate Addition of Sound Levels

Difference between two sound levels	*Add to the Higher of the two sound levels*
1 dBA or less	*3 dBA*
2 to 3 dBA	*2 dBA*
4 to 9 dBA	*1 dBA*
10 dBA or more	*0 dBA*

Noise Source Data

According to the DEP Citywide Construction Noise Mitigation regulations, noise levels in the Federal Highway Administration Roadway Construction Noise Model User's Guide, January 2006, page 3, are to be used as the basis for predicting noise levels from proposed equipment. The DEP Citywide Construction Noise Mitigation regulations can be found in Appendix A; the Federal Highway Administration Roadway Construction Noise Model User's Guide noise levels can be found on page 31 and 32 in Appendix A.

Table 2 below shows all major noise sources associated with the environmental remediation of the Williamsburg Works former MGP site and the corresponding L_{max} values at a reference distance of 50 feet. These values were taken directly from the Federal Highway Administration Roadway Construction Noise Model User's Guide.

Table 2. Construction Equipment 50 feet Noise Emission Reference Levels – Federal Highway Administration Roadway Construction Noise Model User's Guide

Equipment Description	*L_{max} at 50 feet (dBA slow)*
Backhoe	*80*
Dozer	*85*
Front End Loader	*80*
Vibratory Pile Driver	*95*
Auger Drill Rig	*85*
Roller	*85*
Dump Truck	*84*

Regulations

Local Laws of the City of New York - New York City Noise Code

The New York City Noise Code took effect on July 1, 2007. This noise code is found in the Local Laws of the City of New York for the year 2005 - No. 113 and can also be found in Appendix B of this report. In Subchapter 5 of the New York City Noise Code - "Prohibited Noise - Specific Noises Sources - Sound Level Standard" Subsection 24-228 - Construction, exhausts and other devices it reads:

(a) No person shall operate or use or cause to be operated or used a construction device or combination of devices in such a way as to create an unreasonable noise. For the purposes of this section unreasonable noise shall include but shall not be limited to sound that exceeds the following prohibited noise levels:

(1) Sound, other than impulsive sound, attributable to the source or sources, that exceeds 85 dB(A) as measure 50 or more feet from the source or sources at a point outside the property line where the source or sources are located or as measure 50 or more feet from the source or sources on a public right-of-way

(2) Impulsive sound, attributable to the source, that is 15 dB(A) or more above the ambient sound level as measure at any point within a receiving property or as measure at a distance of 15 feet or more from the source on a public right-of-way. Impulsive sound levels shall be measured in the A-weighting network with the sound level meter set to fast response. The ambient sound level shall be taken in the A-weighted network with the sound level meter set to slow response.

The proposed construction equipment to be operated at the Williamsburg Works former MGP site will generate steady state (non-impulsive) sound. There may be some instances when impulsive sounds may be produced, such as the impact of an excavator shovel on ground or asphalt.

As per the New York City Noise Code the allowable limit for construction noise is 85 dBA. The predicted equipment noise will be compared to the limit of 85 dBA.

Ambient Sound Level Study

An ambient sound study was conducted at the Williamsburg Works former manufactured gas plant site from April 23 to April 29, 2012. Monitoring was conducted at six (6) unattended sound level stations at receptor locations adjacent to the project site. The table below provides the location number, a brief description, and GPS coordinate for each location. A map showing monitoring locations is located in Appendix C.

Table 3. Monitoring Locations for the Ambient Sound Study

Location	Description	GPS
1	20 N. 12th Street Block 2287 - South Corner	N 40° 43’ 24.02” W 73° 57’ 38.02”
2	Block 2294 Lot 1 - North Side of Building	N 40° 43’ 22.24” W 73° 57’ 36.30”
3	51 Kent Avenue - North Corner	N 40° 43’ 20.67” W 73° 57’ 33.76”
4	35 Kent Avenue Block 2288 Lot 1 - North Corner	N 40° 43’ 22.62” W 73° 57’ 31.43”
5	Block 2277 Lot 1 - South of Building	N 40° 43’ 24.27” W 73° 57’ 33.02
6	20 N. 12th Street Block 2287 - Northeast Corner	N 40° 43’ 25.49” W 73° 57’ 36.07”

In addition to the six stations deployed, two Larson Davis 824 Systems were used to conduct 1 hour spot checks at each of the six monitoring locations. The sound level meters were mounted on tripods approximately five feet above the ground and the microphones were equipped with wind screens. All sound level meters meet American National Standards Institute (ANSI) S1.4-1983. The data collected by these systems contains various sound level quantities, including Exceedance Levels, L_{eq}, and other noise measurements, all measured simultaneously. All ambient and noise source sound level measurements were made using the A-weighted scale with the meter set to slow response. The sound level systems were laboratory calibrated by the manufacturer prior to the study. The systems were also field calibrated immediately before and after the study.

The data recorded during the spot checks (L_{max} Onsite) and the data collected during the week of ambient data collection (L_{max} Week) can be found in Table 4. The data which was collected on site (L_{max} Onsite) was collected in one hour intervals during the hours when construction will be taking place and field technicians were on site to take detailed notes throughout the testing.

Sound Level Prediction Analysis

In order to assess the overall potential noise impact from the remediation site, sound level prediction analysis for the Williamsburg Works former MGP site was completed. All sound level predictions were made using a standard sound attenuation formula known as the “inverse square law” as found in Equation 1. Sound pressure level changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound.

$$\text{Sound Level}_1 - [20 \times \text{Log}(d_2 / d_1)] = \text{Sound Level}_2 \quad \textbf{Equation 1}$$

d_1 = Distance from source where Sound Level$_1$ was measured
d_2 = Distance from source where Sound Level$_2$ is to be determined

Sound level prediction calculations were based on the L_{max} source sound level from seven (7) noise sources which will be used during the environmental remediation project. The L_{max} noise source data for all construction equipment proposed to be in operation at the site were provided by URS Corporation, or acquired from the Federal Highway Administration Roadway Construction Noise Model User's Guide, January 2006.

For each piece of construction equipment, the maximum noise level at a specific reference distance (50 feet) was used to calculate the noise level at each receptor. The receptor locations were the locations for which Vibra-Tech had previously conducted ambient noise level testing. After the noise levels were calculated for each piece of equipment to each receptor location, the noise level was determined for all equipment running simultaneously at each receptor location.

Results

Table 4 provides a summary of the L_{max} (Onsite) and L_{max} (Week) data collected at each of the six monitoring locations located adjacent to the project site. The projected L_{max} sound levels for each type of construction equipment are noted in Table 5, the predicted L_{max} noise levels with all equipment running can be found in Table 6, and the predicted L_{max} noise levels with all equipment running other than the pile driver can be found in Table 7.

Table 4. Ambient L_{max} (Onsite) and Ambient L_{max} (Week) Noise Levels.

Monitoring Location	Lmax (Onsite) Ambient	Lmax (Week) Ambient
Location 1	72.7	88.2
Location 2	75.9	92.9
Location 3	93.6	102
Location 4	95.4	115.8
Location 5	84.1	107
Location 6	83.2	97.3

Table 5. Predicted L_{max} Noise Levels for Each Type of Equipment

Monitoring Location	Estimated Distance	Dozer Predicted L_{max} (dBA)	Front End Loader Predicted Lmax (dBA)	Vibratory Pile Driver Predicted Lmax (dBA)	Auger Drill Rig Predicted Lmax (dBA)	Roller Predicted Lmax (dBA)	Dump Truck Predicted Lmax (dBA)
Location 1	210	72.54	67.54	82.54	72.54	72.54	71.54
Location 2	70	82.08	77.08	92.08	82.08	82.08	81.08
Location 3	115	77.77	72.77	87.77	77.77	77.77	76.77
Location 4	150	75.46	70.46	85.46	75.46	75.46	74.46
Location 5	70	82.08	77.08	92.08	82.08	82.08	81.08
Location 6	220	72.13	67.13	82.13	72.13	72.13	71.13

Table 6. Predicted L_{max} noise levels with All Equipment Running

Monitoring Location	Estimated Distance	Projected L_{max} (dBA)
Location 1	210	82.54
Location 2	70	92.08
Location 3	115	87.77
Location 4	150	85.46
Location 5	70	92.08
Location 6	220	82.13

Table 7. Predicted L_{max} noise levels with Equipment other than Pile Driver Running

Monitoring Location	Estimated Distance	Projected L_{max} (dBA)
Location 1	210	78.54
Location 2	70	88.08
Location 3	115	83.77
Location 4	150	81.46
Location 5	70	88.08
Location 6	220	78.13

Construction Noise Mitigation

Department of Environmental Protection Citywide Construction Noise Mitigation

According to the DEP Environmental Protection Citywide Construction Noise Mitigation regulations, several noise mitigation efforts should be made to reduce noise at the receptor locations. The following list represents mitigations efforts which may be necessary to comply with the DEP regulations.

- The use of manufacturer's noise reduction device(s) on construction equipment.
- Keep engine housing doors closed; the use of noise-insulating material mounted on the engine housing; and operating the machinery at lower engine speeds.
- Cover portable compressors, generators, pumps, and other such devices with noise-insulating fabric.
- Prevent the idling of vehicles on site.
- The use of quieter backup alarms which are in conformance with OSHA standards.
- The fabrication of perimeter noise barriers in accordance with the standards set forth in the DEP Citywide Construction Noise Mitigation regulations Chapter 28-107 - Perimeter Noise Barriers.
- Construction activities limited to between the hours of 7:00 A.M. to 6:00 P.M on weekdays.

According to the DEP, the operation of certain types of equipment requires additional noise mitigation. The type of equipment which requires the additional mitigation measures are:

- Impact Equipment (Pile Drivers, Jackhammers, Hoe Rams, Blasting)
- Earth Moving Devices (Vacuum Excavators)
- Construction Trucks (Dump Trucks)
- Stationary Devices (Cranes, Auger Drills, Street Plates, Backup Alarms)
- Manual Devices (Concrete Saws)

Impact equipment such as a pile driver, construction trucks such as dump trucks, and stationary devices such as auger drills, are to be used at the Williamsburg Works former MGP site remediation project. When operating the impact equipment such as the pile driver at this site the pile holes can be pre-augured or pre-trenched to soften the underlying ground, reducing ground resistance, and potentially reducing pile driving noise based on geotechnical conditions at the site.

When operating construction trucks or vehicles such as the dump trucks at this site the smallest sized and quietest dump trucks that are adequate for a particular job should be selected. Bed liners made of thick rubber, spray-on liner, or other material which can mitigate the noise of the first load being dropped in the dump truck should be installed. Dump trucks should be positioned so they are not at the closest point to the receptor locations. Dump trucks should use quieter warning devices such as backup alarms, be equipped with an effective muffler, and ensure the engine housing doors are kept closed when the engine is in operation.

Auger drill rigs should be equipped with an effective muffler, and all moving parts should be well lubricated. Debris from the drill bit should be removed without quick twisting, jerking, or hammering the bit. The use of pathway controls such as noise barriers and curtains should be in place and utilized while using auger drills. The noise barriers should be in conformance with DEP Citywide Construction Noise Mitigation regulations 28-102. Construction Devices - d. - Stationary Equipment, 2. - Auger Drill Rigs, C. - Pathway Controls: Noise Barriers & Curtains.

Discussion

As per the Local Laws of the City of New York - The New York City Noise Code, each person, corporation or other business entity performing construction work in the city shall adopt and implement a noise mitigation plan for each construction site. The plan shall provide in detail the noise mitigation strategies, methods, and procedures for each device or activity employed or performed at this site. The Department of Environmental Protection Citywide Construction Noise Mitigation regulations provide mitigation measures for certain types of construction equipment that should be implemented. Site visits may be made by DEP personnel throughout the course of the construction activity to ensure compliance with noise ordinances and to ensure noise mitigation measures are employed.

The decrease in sound level over distance normally follows the inverse square law. At distances of fifty (50) feet or greater from a sound source, every doubling of distance produces a 6 dBA reduction in sound. Therefore, a sound of 70 dBA at 50 feet would have a sound level of approximately 64 dBA at 100 feet. At 200 feet the sound level would be 58 dBA. For this project, the closest distance from any noise source to any receiver was approximately 70 feet.

Conclusion

Based on the noise predictions performed for the former Williamsburg Works MGP site, the vibratory pile driver is the major contributing noise source as per Table 7. The next highest noise sources are the auger drill rig, roller, and dozer (all at 82.08 dBA). The backhoe and the front end loader had the lowest predicted noise levels. Maximum noise levels of 85.46 to 92.08 from the pile driver exceed the New York City Noise Code of 85 dBA at or beyond a distance of 50 feet from the source. For all other equipment running individually, the predicted levels are below 85 dBA.

Based on an analysis of combined noise levels from all noise sources running at the same time provided in Table 8, predicted sound levels in excess of the 85 dBA New York City Noise Code were calculated at four of the six monitoring locations. If the pile driver was eliminated from this analysis, then only two locations would exceed 85 dBA.

The L_{max} noise levels recorded during the ambient study represent noise levels from existing sources such as motor vehicle traffic along Kent Avenue and other nearby roads, aircraft flying overhead, pedestrian foot traffic, and activities from nearby warehouses. The predicted L_{max} values for the construction equipment indicated represent the highest dBA sound level from that particular type of machine. The predictions do not take into consideration the length of time the equipment will be emitting this sound level. Therefore, as the remediation efforts progress additional sound measurements should be taken and actions can be employed to minimize the effects of noise from the project site.

Under normal operating conditions of the remediation site, it is probable that all seven noise sources used in this analysis would not be running simultaneously. Mitigation efforts should be made to help reduce offsite noise levels. Sound should be monitored during the use of the construction equipment to verify sound level predictions, for comparison to the levels noted in the Federal Highway Administration Roadway Construction Noise Model User's Guide, and to ensure compliance with local noise ordinances.

Respectfully submitted,
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APPENDIX A

The DEP Citywide Construction Noise Mitigation Regulations -
Federal Highway Administration Roadway Construction Noise Model User's Guide

DEPARTMENT OF ENVIRONMENTAL PROTECTION
NOTICE OF ADOPTION OF RULES FOR
CITYWIDE CONSTRUCTION NOISE MITIGATION

NOTICE IS HEREBY GIVEN PURSUANT TO THE AUTHORITY VESTED IN THE Department of Environmental Protection by section 1043 of the New York City Charter and section 24-219 of the Administrative Code of the City of New York, and after a duly advertised public hearing held on January 18th, 2007, that the Department of Environmental Protection has promulgated rules concerning citywide construction noise mitigation.

STATEMENT OF BASIS AND PURPOSE

On December 29th, 2005, Mayor Michael Bloomberg signed Local Law 113 for the year 2005. The law amended the Administrative Code of the City of New York in relation to the Noise Control Code. Specifically, the law established standards and procedures to reduce noise levels from construction, and established sound level standards for specific noise sources. The law also mandated the adoption of rules in section 24-219 of the Administrative Code. Pursuant to that section, these rules prescribe the methods, procedures and technology that shall be used at construction sites to achieve noise mitigation whenever any one or more of certain construction devices or activities set forth in the rules are employed or performed.

The rules are authorized by section 1043 of the Charter of the City of New York as well as section 24-219 of the Administrative Code of the City of New York.

The text of the rules follow. New matter is <u>underlined.</u>

* * *

Title 15 of the Rules of the City of New York is amended by adding a new Chapter 28 to read as follows:

CHAPTER 28

CITYWIDE CONSTRUCTION NOISE MITIGATION

§ 28-100 General Construction Noise Mitigation Plan.

In accordance with §24-219 of the New York City Noise Code, every construction site where construction activities take place shall have, conspicuously posted, a complete and accurate Construction Noise Mitigation Plan. So long as the plan complies with this chapter, it need not be filed with the Department of Environmental Protection (DEP); however, such plan must be readily available for inspection at the construction site. The Construction Noise Mitigation Plan Form is available at: http://www.nyc.gov/dep or at DEP's Offices at:

New York City Department of Environmental Protection
Bureau of Environmental Compliance, 9th Floor
59-17 Junction Blvd.
Flushing, NY 11373.

§28-101 Required Noise Mitigation Measures for General Construction.

a. The responsible party shall self-certify in its Construction Noise Mitigation Plan that all construction tools and equipment have been maintained so that they operate at normal manufacturer's operating specifications, including at peak loading. Such self-certification shall be indicated on the Construction Noise Mitigation Plan form required by §28-100 of this chapter. Upon a DEP inspection of the work site, DEP shall use the noise level guidelines in the Federal Highway Administration Roadway Construction Noise Model User's Guide, Jan. 2006, page 3, located in the Appendix to this chapter, as a means of identifying equipment that may be the cause of a noise complaint. If an individual piece of equipment is identified by DEP as exceeding the level specified in such Guide located in the Appendix to this chapter, upon notification by DEP, the responsible party shall have the option of: (i) performing maintenance to demonstrate a good faith effort, notwithstanding the model year of the equipment, to mitigate the noise by a measurable level acceptable to the Department, (ii) replacing the equipment with equipment that complies with said level, or (iii) filing an Alternative Noise Mitigation Plan pursuant to §28-104 of this chapter, within five business days of said inspection. If the responsible party elects to perform maintenance pursuant to option (i), but cannot demonstrate within five business days a reduction in noise by a measurable level acceptable to the Department, such party shall pursue one of the other two options to the satisfaction of the Department. The failure to exercise and complete one of such three options within five business days of said inspection shall be a violation of this rule.

b. All construction equipment being operated on site must be equipped with the appropriate manufacturer's noise reduction device(s), including, but not limited to, a manufacturer's muffler (or equivalently rated material) that is free of rust, holes and exhaust leaks.

c. The responsible party shall mitigate noise from construction devices with internal combustion engines by ensuring that the engine's housing doors are kept closed, and by using noise-insulating material mounted on the engine housing that does not interfere with the manufacturer's guidelines for engine operation or exhaust. The responsible party shall further reduce noise by operating the device at lower engine speeds during the work to the maximum extent possible.

d. Portable compressors, generators, pumps and other such devices shall be covered with noise-insulating fabric to the maximum extent possible that does not interfere with the manufacturer's guidelines for engine operation or exhaust, and shall further reduce noise by operating the device at lower engine speeds during the work to the maximum extent possible.

e. Vehicle engine idling on site shall be prevented in accordance with New York City Administrative Code §24-163.

f. Quieter back-up alarms shall be used in pre-2008 model year vehicles when practicable for the job site. 2008 model year or newer vehicles shall be equipped with a quieter back-up warning device in accordance with OSHA standards, as set forth in paragraph 4 of subdivision d of §28-102 of this chapter.

g. When DOB regulations require a perimeter barrier, or "construction fence," and the site is within 200 feet of a receptor or a receiving property as defined in §28-109 of this chapter, perimeter noise barriers shall be fabricated in accordance with the standards set forth in subdivision e of §28-107 of this chapter and lined with material set forth in subdivisions c and e of §28-107 of this chapter. Further, the responsible party shall fill in any gaps and holes in adjacent panels of noise barriers with noise attenuation material, so as to maximize the effectiveness of such barriers. Such noise attenuation material shall include noise curtain material, additional plywood, or similar material. When viewing ports are required in the curtain material, they shall be filled in with clear plastic attached to the curtain.

h. The contractor shall create and utilize a noise mitigation training program, which shall be implemented for all field-worker supervisory personnel including sub-contractor supervisors.

Supervisory personnel shall field-train all field workers to minimize construction noise. Such training program shall be developed in consultation with DEP.

i. When work is planned near sensitive receptors, including but not limited to facilities such as schools, hospitals, places of worship, and homes for the aging, the responsible party shall cooperate with the facility owner or operator to coordinate the work schedule so as to minimize the noise impact on the facility.

j. A DEP inspector may visit a construction site to examine the Noise Mitigation Plan upon receiving a complaint, or as a matter of routine inspection, to ensure that the responsible party is complying with such Plan. A responsible party found not to be complying with such Plan shall be provided a cure period of three business days to correct the condition or to file an Alternative Noise Mitigation Plan under §28-104 of this chapter. If the condition is not corrected nor an Alternative Noise Mitigation Plan filed with DEP within three business days, then a Notice of Violation shall be issued against the responsible party. Said violations may be issued on-site or by mail. Notwithstanding the preceding sentences in this subdivision, there shall be no cure period afforded with respect to compliance with §§28-100, 28-101(a), (b), (e), (f), (h); §28-104; §28-105; and §§28-106(a), (b), (d) (g) & (i) of this chapter.

k. Construction activities may take place during the hours of 7:00 a.m. to 6:00 p.m. on weekdays. At all other times, the permitee shall obtain after-hours authorization, pursuant to §28-103 of this chapter.

l. Where construction projects are of shorter duration of less than 15 days and within the property line and do not require Department of Buildings (DOB) perimeter barriers ("construction fences"), and where the work site is within 75 feet of a residential receptor, a temporary or portable (i.e. unanchored) noise barrier shall be fabricated in accordance with the specifications in §28-108 of this chapter. For long-term street work, defined as 15 days or longer, that is outside the property line and within 75 feet of a residential receptor and where there is a dedicated lane available, a temporary barrier in accordance with the specifications in §28-108 of this chapter shall be required.

m. Whenever a responsible party is engaged in sandblasting operations that require a perimeter or other barrier during sandblasting, said barrier shall be lined with noise barrier material as set forth in subdivision e of §28-107 of this chapter.

n. Responsible parties conducting construction and roadway work that will commence and be completed within a continuous period of no longer than 24 hours, that occurs between the hours of 7:00 a.m. and 6:00 p.m. on weekdays, need not post or file with DEP a Construction Noise Mitigation Plan. However, the responsible party for such construction work shall not create unreasonable noise. In addition, if the work occurs near or adjacent to a sensitive receptor as defined in §28-101(i) of this chapter, then the responsible party shall make modifications including scheduling changes or employing additional noise mitigation methods listed in §§28-102, 28-107, and 28-108. This subdivision shall not apply to construction work that occurs after hours.

o. Technical terms in these rules are defined in the Noise Code or in §28-109 of this chapter.

§28-102 Construction Devices and Activities.

The devices listed in this section require additional noise mitigation. A responsible party using any of these devices shall mitigate the noise by following the rules set forth in this section for the specific device. There are five categories of devices:

a. Impact Equipment: Pile Drivers, Jackhammers, Hoe Rams, Blasting.

b. Earth Moving Devices: Vacuum Excavators.

c. Construction Trucks: Dump Trucks.

d. Stationary Devices: Cranes, Auger Drills, Street Plates, Backup Alarms.

e. Manual Devices: Concrete Saws.

If the responsible party cannot in good faith comply with the noise mitigation rules for each device, the responsible party shall file with DEP an Alternative Noise Mitigation Plan in accordance with §28-104 of this chapter.

a. Impact Equipment.

1. Pile Drivers. This rule provides noise mitigation strategies that responsible parties shall utilize in order to reduce the noise emissions from pile driving and related equipment. Pile drivers for sheet piles and/or column piles are a common necessity on a construction project. Piles can be used to stabilize trench walls during excavation, create coffer dams to hold back water, or to provide an anchored platform upon which structures can be built. There are two basic types of pile drivers - impact hammers and vibratory drivers. Noise emission levels from pile drivers can vary widely based on the type of driver, the type of pile (steel, concrete, wood), and the underlying ground conditions.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS & MUFFLERS

i. The quietest pile driving method shall be selected that allows the work to be performed based on structural, geotechnical, and pile friction requirements and ground conditions. The following list or their equivalent are acceptable pile-driving methods to the Department: a hydraulic pile pushing system, a vibratory pile driver; a hydraulic impact pile driver; a drop hammer, a diesel impact pile driver.

ii. Hydraulic pushing method pile drivers, including the Ken-Jet Still Worker, the Giken Silent Piler, or the SERF Pilemaster, or equivalent, shall be utilized rather than louder impact or vibratory pile drivers when ground conditions permit such use. Further, such quieter pile drivers shall be utilized whenever a responsible party is working within 100 feet of a receptor.

iii. In accordance with the noise mitigation criteria outlined in §28-101(b) of this chapter, an impact pile driver shall be equipped with a well maintained exhaust muffler in order to mitigate the amount of noise escaping out with the diesel exhaust.

iv. The responsible party shall select the type of pile being driven based on structural and/or geotechnical performance requirements. In order of loudness , wooden piles shall be preferred first, followed by concrete piles, and then steel piles.

v. The responsible party shall pre-auger or pre-trench the pile holes to soften the underlying ground, reduce ground resistance, and thus reduce pile driving noise based upon geotechnical conditions at the location. Auger drill rigs may be mounted to the same crane as the pile driver or alternatively, an excavator with a long bucket arm may pre-trench as deep as 25 feet below grade.

vi. A properly secured impact cushion shall be installed on top of piles that are being driven by an impact hammer. Commercially available pile cushions or those fabricated on the job site, out of scrap wood, leather or rubber, may be utilized.

vii. Quieter alternative methods to pile driving, including the use of drilled caissons filled with concrete, or slurry walls dug out initially with a milling machine, shall be used whenever possible, depending on structural and geotechnical performance requirements.

viii. Noise bellows systems such as the IHC Hydrohammer, or an equivalent bellows device, may be used to provide further noise attenuation. Bellows enclosures accompany the pile down to the ground and collapse accordion style as the pile reaches the ground.

ix. When the responsible party uses a vibratory pile driver or a hydraulic impact pile driver as set forth in clause (ii) of this subparagraph and/or noise bellows as set forth in clause (viii) of this subparagraph, between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, the responsible party need not utilize additional pathway controls listed in subparagraph C of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

x. No violation shall be issued to the responsible party if the bellows in clause (viii) of this subparagraph B or the barriers listed in subparagraph C of this paragraph are adjusted such that the operator can view the end of the hammer for safety purposes.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & ENCLOSURES. The responsible party shall utilize one of the following pathway controls. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater. It shall be positioned as close as possible to the pile driver. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels shall be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels shall be filled-in with noise curtain material, additional plywood, or similar material when practicable. A properly balanced canted panel, not susceptible to windy conditions, may be placed on top of the barrier in order to provide better shielding for multi-story receptors. However, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the pile driver and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier should be placed as close to the actual pile driving work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Where applicable, portable noise shields made of steel frames wrapped with noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, shall be hoisted up into position on the crane's second cable to form a noise barrier in the direction of sensitive receptors. The shield shall be large enough to completely block the line of sight between the receptors and the pile driver, and shall be lowered to the ground as the pile is being driven in order to maintain the shielding effect. Such portable noise shield shall be utilized when the pile driver is higher than any barrier at the site required under §28-101(g) of this chapter.

iv. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes or truck trailers may be positioned along the edge of the work site to form an effective semi-permanent noise barrier. Sufficient space at the site is necessary, as these containers are generally 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes shall be filled-in with heavy vinyl noise curtains or similar materials. It should be noted that gaps and spaces are one of the primary contributors to degrading a noise barrier's performance.

2. Jackhammers/Pavement Breakers. This rule shall provide noise mitigation strategies that the responsible party shall utilize in order to reduce the noise emissions from jackhammers and pavement breakers. These devices are defined as manually-operated, powered (pneumatic or other) devices, consisting of chisel-hammers or bits used to cut or break through pavement, concrete, or street surfaces. Jackhammers can be very loud as the steel chisel or bit hits the target object.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules as set forth in §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS & MUFFLERS

i. Quieter makes and models of jackhammers such as the Copco model TEX P90S or equivalent model with an elongated effective muffler casing or bellows measuring a total of greater than 15 inches in length, shall be used whenever practicable.

ii. The quietest jackhammer suitable to perform the given work shall be selected for use. The quieter jackhammers, including the jackhammer specified in clause (i) of this subparagraph or the Chicago Pneumatic CP1240, with a model F-814004 muffler, or equivalent, shall be used when suitable and whenever a responsible party is working in close proximity to receptors, whenever a responsible party is using multiple jackhammers, and whenever jackhammer operations are occurring during after hours as set forth in §24-223 of the Administrative Code.

iii. In all cases, jackhammers shall be equipped with an effective muffler, provided either from the manufacturer or from an aftermarket vendor, which effectively reduces noise from the exhaust air by about 4 dBA or more. In accordance with §28-101(b) of this chapter, an effective muffler shall be properly fitted to the jackhammer to insure against air or noise leakage.

iv. If appropriate to the size of the job, smaller jackhammers shall be used, as they tend to be quieter.

v. When the responsible party uses a device described in clause (i) of this subparagraph between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, the responsible party need not utilize additional pathway controls listed in subparagraph C of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & ENCLOSURES. The responsible party shall utilize one of the following pathway controls for jackhammers or pavement breaker operations within a property line or for long-term work when outside of the property line as specified in §28-106(p) or §28-101(l) of this chapter. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP. The pathway controls are set forth as follows: jersey barriers, tents, or other portable noise barriers.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater and that shall be positioned as close as possible to the jack hammer. The noise barrier shall be long and tall enough to completely block the line of sight between the jackhammer and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier shall be placed as close to the actual jackhammering work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source. A balanced canted panel, not susceptible to high winds shall be placed, when feasible, on top of the barrier in order to provide better shielding for multi-story receptors. However, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. Jersey barriers. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels can be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels should be filled-in with noise curtain material, additional plywood, or similar material. All jersey barriers shall comply with the requirements in clause (i) of this subparagraph, including a Sound Transmission Class rating of STC 30 or greater.

iii. Portable noise enclosures.

(a) Portable noise enclosures (so-called "noise tents") made of steel frames wrapped with noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, may be built to surround the jackhammer (on the top and 3 sides) and the operator. A properly constructed enclosure, using curtain material with a Sound Transmission Class rating of STC 30 or greater, generally provides a 5 dBA insertion loss. Such barrier shall meet OSHA standards for worker exposure to particulate matter.

(b) The responsible party shall utilize multiple tents for multiple jackhammers. For example, when two jackhammers are being utilized and they cannot fit under the same noise tent, the responsible party shall provide an additional noise tent.

(c) The noise tent shall be moved as the jackhammer work progresses in order to maintain the tent's ability to block the line of sight between the jackhammer and the receptors.

(d) In accordance with §24-223 of the Administrative Code, when emergency jackhammering occurs after normal working hours within 500 feet of any residential receptor, the responsible party shall use noise tents with double thick noise curtain material or a noise tent augmented with a portable noise barrier to form a double layer of mitigation. See section §28-108 of this chapter. Quieter jackhammers and compressor vehicles shall also be utilized during after hours work whenever feasible.

(e) Where there are receptors surrounding the jackhammer work site on all sides, two tents shall be used on either side of the jackhammer to form a complete enclosure as close to the jackhammer as practicable.

3. Hoe Rams. This rule shall provide noise mitigation strategies that the responsible party shall utilize in order to reduce the noise emissions from hoe rams. Hoe rams, and hoe ram-like devices, are used to cut through roadway pavement or concrete walls and for demolition of large concrete or steel structures. They are typically large hydraulic chisel-hammers attached on the end of a backhoe or excavator arm that can be very loud as the steel chisel hits the target object.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules as set forth in §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS & MUFFLERS

i. Quieter makes and models of hoe rams, such as the Bosma Hammer-Head or equivalent quieter devices, shall be used whenever feasible, especially near receptors.

ii. The smallest hoe ram necessary shall be selected to perform the task, as smaller devices tend to produce less noise.

iii. A noise shroud enclosure shall be wrapped around the head (i.e. chisel) of the hoe ram whenever working within 200 feet of a receptor. Shrouds may be selected from various manufacturers such as Krupp Industries, Allied Hi-Ram, Montabert, or Rammer Inc. with steel shrouds to attach to the hoe ram head. Alternatively, a shroud may be fabricated on-site by wrapping the chisel head with a heavy vinyl noise curtain material, such as SoundSeal BBC-13-2, or equivalently rated material, and securing it with tie wire.

iv. A skilled hoe ram operator can significantly affect the amount of noise produced during the work. In accordance with §28-101(h) of this chapter, responsible party and sub-contractor personnel shall be trained on the proper angle or position when the hoe ram chisel is placed against the work. The operator shall position and operate the device in such a manner as to minimize its noise output. A violation shall only be issued for failure to train the operator as set forth in subdivision (h) of section 28-101 of this chapter.

v. Alternative methods to hoe ramming concrete, including hydraulic jacks or chemical splitting (use of expansive demolition agents), shall be utilized whenever feasible. For steel demolition, alternative quieter methods may include the use of hydraulic shears and grapples, or the use of torches to cut the steel into more manageable pieces, which can then be trucked off-site for further demolition.

vi. When the responsible party uses specific makes and models as set forth in clause (i) of this subparagraph or a noise shroud as set forth in clause (iii) of this subparagraph, between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, then the responsible party need not utilize additional pathway controls listed in subparagraph C. of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

vii. No violation shall be issued to the responsible party if any of the shrouds in clause (iii) of this subparagraph are adjusted such that the operator can view the end of the bit for safety purposes.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & ENCLOSURES. The responsible party shall utilize one of the following pathway controls below. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater and shall be positioned as close as possible to the hoe ram. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to a overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels can be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels should be filled-in with noise curtain material, additional plywood, or similar material. A balanced canted panel, not susceptible to high winds shall be placed, when feasible, on top of the barrier in order to provide better shielding for multi-story receptors. However, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the hoe ram and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier should be placed as close to the actual hoe ram work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes or truck trailers may be positioned along the edge of the work site to form a semi-permanent noise barrier. Sufficient space must be available since containers are generally 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes should be filled-in with heavy vinyl noise curtains or similar material.

iv. Where there are receptors surrounding the hoe ram work site on all sides, several noise barriers shall be used to form a complete enclosure around the hoe ram.

4. Blasting. This rule shall provide noise mitigation strategies that the responsible party shall utilize in order to reduce the noise emissions from blasting. The controlled use of explosives is occasionally necessary on a construction site, primarily to loosen hard rock ledges or to demolish large concrete structures. This rule does not apply to tunneling activities subject to the regulations set forth in §24-246 of the Administrative Code.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules as set forth in §28-103 of this chapter.

ii. The necessary and FDNY-regulated use of blasting shall be done in close coordination with the affected public in order to minimize potential disturbance.

B. SOURCE CONTROLS:

i. The smallest appropriate blasting charge possible shall be used in order to minimize blasting noise at its source. The quietest explosive material possible shall also be selected. Relatively slow-burning explosives produce quieter noise emissions as compared to faster-burning explosives.

C. NOISE PATHWAY CONTROLS: BLAST MATS AND BARRIERS

i. Blast mats made of heavy rubber shall be laid over the blast site.

ii. When blasting occurs close to receptors, the responsible party shall construct a portable noise barrier that shall be free from gaps and holes, constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater, and positioned as close as possible to the blast site.

iii. The noise barrier shall be long and tall enough to completely block the line of sight between the blasting and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to a maximum height of 15 feet.

b. Earth Moving Equipment.

1. Vacuum Excavators. This rule shall provide noise mitigation strategies the responsible party shall utilize when working with a vacuum excavator, or vac-truck. A vac-truck is a vehicle equipped with a low pressure suction hose leading to an on-board storage tank. Vac-trucks are generally used when removing dirt to avoid disrupting underground utility services such as telecommunications cables, water and sewer pipes, gas lines, or electrical cables.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules as set forth in §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS & SILENCERS

i. Smaller capacity (lower suction) vac-trucks tend to be quieter and shall be used whenever practicable. Listed from the quietest to the loudest order, examples include GapVac, BSI Dewitz, BoVac and Guzzler.

ii. Vac-trucks shall be run in their lower power setting whenever practicable. While suction capacity is reduced with lower engine speeds, there remains adequate suction to perform almost any job.

iii. Several manufacturers do provide silencers on the air intake and exhaust sides of the blower. Heavier duty silencers including Universal, Industrial Acoustics, McGill and Burgess-Manning, or equivalent, shall be used whenever practicable.

iv. The vac-truck's suction creating component (i.e. blower) shall be covered with a noise-reducing housing or enclosure.

v. When the responsible party uses a specific vac-truck as set forth in clause (i) of this subparagraph and/or silencers specifically set forth in clause (iii) of this subparagraph between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, then the responsible party need not utilize additional pathway controls listed in subparagraph C of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & CURTAINS
The responsible party shall utilize one of the following pathway controls below. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free of gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30, or greater, and shall be positioned as close as possible to the vac-truck. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels shall be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels should be filled-in with noise curtain material, additional plywood, or similar material. A properly balanced canted panel, not susceptible to windy conditions, may be placed on top of the barrier in order to provide better shielding for multi-story receptors. However, such barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the vac-truck and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier should be placed as close to the actual vac-truck work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Portable noise shields made of steel frames wrapped with noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, shall be used to form a noise barrier in the direction of sensitive receptors and completely block the line of sight between the receptors and vac-truck. Noise curtains are typically made out of a ¼-inch thick heavy vinyl material, often with a noise absorptive quilt attached to one side. These noise curtains generally weigh 1.5 lbs/sq. ft., have an STC rating of about 32, and come in 4-foot wide sheets complete with grommets and Velcro edges to aid in hanging the curtains and sealing the sheets side-by-side.

iv. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes or truck trailers can be positioned along the edge of the work site to form a semi-permanent noise barrier. Sufficient space at the site is necessary as these containers are typically 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes should be filled-in with heavy vinyl noise curtains or similar materials.

v. Whenever possible, vac-truck exhaust shall be positioned and directed away from receptors.

c. Construction Trucks and Vehicles.

1. Dump Trucks. This paragraph shall provide noise mitigation strategies that the responsible party shall utilize in order to reduce the noise emissions from dump trucks. Dump trucks are commonly used on construction sites in order to deliver construction materials, remove and excavate debris, or transfer materials around the job site. However they can produce loud noises when their tailgates are slammed when dumping a load, when their engines are revved with inadequate exhaust mufflers, when the first shovel-full is dropped into the bed, or due to use of their backup alarms.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules as set forth in §28-103 of this chapter.

B. SOURCE CONTROLS

i. The smallest sized and quietest dump truck that is adequate for a particular job shall be selected.

ii. A bed liner made of thick rubber, spray-on liner, plywood, sand or gravel shall be installed to mitigate the noise of the first load being dropped into the dump truck.

iii. Though not required for use in the United States (US), most US dump truck manufacturers produce quieter models for use in Europe. European Environmental Label (i.e. Blue Angel) low noise emission construction equipment, which is required for import and use in European Union (EU) nations in accordance with Quality Assurance Publication RAL UZ 53 and the Treaty on European Union 992-02-07 Journal C224, shall be used whenever feasible if it meets the US Environmental Protection Agency's emission requirements and/or regulations. These models are generally 10 dBA quieter than similar equipment used in the US.

iv. The positioning of the dump truck shall be carefully selected in order to minimize operation near receptors. Responsible parties shall attempt to reduce the necessity of backing-up by selecting a straight drive-through truck route. If a backup alarm is used, a quieter warning device shall be installed in accordance with §28-101(f) of this chapter.

v. The truck shall be equipped with an effective muffler in accordance with §28-101(b) of this chapter, which shall be well-maintained to ensure maximum noise reduction.

vi. Slamming a tail gate shall be avoided to the extent possible to prevent unreasonable noise. Alternately, a pad made of heavy rubber, leather or wood, when practicable, shall be used under the tail gate to prevent metal contact.

vii. The engine housing doors shall be kept closed while the engine is in operation.

viii. When the responsible party uses quieter dump truck models as set forth in clause (iii) of this subparagraph, between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, the responsible party need not utilize additional pathway controls listed in subparagraph C of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & CURTAINS
The responsible party shall utilize one of the following pathway controls. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30, and shall be positioned as close as possible to the vehicle, in order to provide the greatest insertion loss. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels may be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels shall be filled-in with noise curtain material, additional plywood, or similar material. A canted panel may be placed on top of the barrier in order to provide better shielding for multi-story receptors; however care must be taken to avoid having the barrier tip over from unbalanced loading. Further, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the dump truck and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier shall be placed as close to the actual dump truck work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, shall be used to form a noise barrier in the direction of sensitive receptors and completely block the line of sight between the receptors and dump truck. It shall also be draped over the dump truck to augment the engine housing and exhaust stack. Noise curtains are typically made out of a ¼-inch thick heavy vinyl material, often with a noise absorptive quilt attached to one side. These noise curtains generally weigh 1.5 lbs/sq. ft., have an STC rating of about 32, and come in 4-foot wide sheets complete with grommets and Velcro edges to aid in hanging the curtains and sealing the sheets side-by-side.

iv. Conveyor belts shall be used whenever practicable, as they may allow the dump trucks to operate much farther away from receptors.

v. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes or truck trailers may be positioned along the edge of the work site to form a semi-permanent noise barrier. Sufficient space at the site is necessary as these containers are generally 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes shall be filled-in with heavy vinyl noise curtains or similar material.

d. Stationary Equipment.

1. Cranes. This rule shall provide noise mitigation strategies that the responsible party shall utilize in order to reduce the noise emissions from cranes. Cranes are an essential piece of equipment on most large construction sites in order to load and unload delivery trucks, lift building materials to required heights, lift excavated materials out of tunnels and for other sub-surface excavations, and move other equipment and personnel around the job site. Cranes come in many varieties and sizes, including tracked or wheeled mobile cranes, fixed or floating derricks, and tower cranes.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules set forth in §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS

i. There are various makes and models that are inherently quieter than others. Smaller, quieter cranes, including rubber-tired mobile cranes, shall be used whenever possible based on load lifting requirements.

ii. New modern hydraulic cranes shall be used whenever possible to avoid the squeal produced by cable drum brakes on mechanical cranes.

iii. Though not required for use in the United States, most US crane manufacturers produce quieter models for use in Europe. European Environmental Label (i.e. Blue Angel) low noise emission construction equipment, which is required for import and use in European Union (EU) nations in accordance with Quality Assurance Publication RAL UZ 53 and the Treaty on European Union 992-02-07 Journal C224, shall be used whenever feasible and if it meets the US Environmental Protection

Agency's emission requirements and/or regulations. These cranes are about 10 dBA quieter than similar models sold in the US.

iv. The positioning of the crane shall be carefully selected in order to minimize the need to relocate it around the job site. Whenever possible, tower cranes shall be used, as they essentially produce no noise at ground level.

v. The crane shall be equipped with an effective muffler in accordance with §28-101(b) of this chapter, which shall be well maintained to ensure maximum noise reduction.

vi. When the responsible party uses new modern hydraulic cranes as set forth in clause (ii) of this subparagraph and/or additional source controls set forth in clause (iii) of this subparagraph, between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, the responsible party need not utilize additional pathway controls listed in subparagraph C of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & CURTAINS

The responsible party shall utilize one of the following pathway controls. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater, and shall be positioned as close as possible to the crane. A portable (i.e. unanchored) noise barrier can be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels shall be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels shall be filled-in with noise curtain material, additional plywood, or similar material. A properly balanced canted panel, not susceptible to windy conditions, may be placed on top of the barrier in order to provide better shielding for multi-story receptors. However, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the crane and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier shall be placed as close to the actual crane work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Portable noise shields made of steel frames wrapped with noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, shall be used to form a noise barrier in the direction of sensitive receptors and completely block the line of sight between the receptors and crane. Noise curtains are typically made out of a ¼-inch thick heavy vinyl material, often with a noise absorptive quilt attached to one side. These noise curtains generally weigh 1.5 lbs/sq. ft., have an STC rating of about 32, and come in 4-foot wide sheets complete with grommets and Velcro edges to aid in hanging the curtains and sealing the sheets side-by-side.

iv. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes or truck trailers may be positioned along the edge of the work site to form a semi-permanent noise barrier. Sufficient space at the site is necessary as these containers are generally 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes shall be filled-in with heavy vinyl noise curtains or similar material.

2. Auger Drill Rigs. This rule shall provide mitigation strategies the responsible party shall utilize when using auger drill rigs. Auger drill rigs are typically mounted to cranes or they can be built as dedicated machines as well. Auger drill rigs are used to drill shafts into the ground, which are then filled with cement form concrete piles, to loosen underlying soil and allow solid piles to be driven more easily, or used in multiple configuration to "mix" grout into the soil and change the soil's properties (i.e. strengthen it and reduce its water content).

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules set forth in §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS & SILENCERS

i. The auger drill rig or crane shall be equipped with an effective muffler in accordance with §28-101(b) of this chapter, which shall be well- maintained to ensure maximum noise reduction.

ii. All moving parts shall be well lubricated for proper drilling performance and to avoid unnecessary noise from squeaking parts.

iii. Debris on the drill bit shall be removed without quick twisting, jerking or hammering the bit, unless geotechnical conditions at the location so require. Alternative quieter methods include use of a high pressure water hose where debris is not contaminated or a laborer using a hand shovel.

C. PATHWAY CONTROLS: NOISE BARRIERS & CURTAINS

The responsible party shall utilize one of the following pathway controls. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30, or greater, and shall be positioned as close as possible to the auger drill rig. A portable (i.e. unanchored) noise barrier may be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels shall be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels shall be filled-in with noise curtain material, additional plywood, or similar material. A properly balanced canted panel, not susceptible to windy conditions, may be placed on top of the barrier in order to provide better shielding for multi-story receptors. However, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the auger drill rig and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier should be placed as close to the actual auger drill rig work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, shall be used to form a noise barrier in the direction of sensitive receptors and completely block the line of sight between the receptors and auger drill rig. Noise curtains are typically made out of a ¼-inch thick heavy vinyl material, often with a noise absorptive quilt attached to one side. These noise curtains generally weigh 1.5 lbs/sq. ft., have an STC rating of about 32, and come in 4-foot wide sheets complete with grommets and Velcro edges to aid in hanging the curtains and sealing the sheets side-by-side.

iv. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes or truck trailers may be positioned along the edge of the work site to form a semi-permanent noise barrier. Sufficient space at the site is necessary as these containers are generally 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes shall be filled-in with heavy vinyl noise curtains or similar material.

3. **Street Plates.** In addition to the Department of Transportation rules set forth in 34 RCNY §2-11(10), the responsible party shall follow one or more of the following methods to reduce noise emissions from loose or rattling street plates.

A. SOURCE CONTROLS:

i. The street plates shall be installed in the street surface in accordance with 34 RCNY §2-11(10) in order to have a level and smooth transition from pavement to plate surface and to keep the plates firmly in place.

ii. Asphalt cold-patch shall be applied when feasible around the edges of the street plate to minimize vehicular tire impact on the plate and to help keep the plate in place.

B. NOISE PATHWAY CONTROLS:

i. Whenever feasible, traffic shall be routed around the street plates by placing traffic cones, barrels, and/or warning tape around the plated area.

4. **Backup Alarms.** In accordance with §28-101(f) of this chapter, all existing vehicles that enter a work site shall be equipped with OSHA-approved, and OEM manufacturer-approved (if necessary), quieter backup alarms by January 1, 2008. All new vehicles that enter the work site shall be equipped with OSHA-approved quieter backup alarms by January 1, 2008. All on-road vehicles that do not enter the work site, but are in operation after hours pursuant to §28-103 of this chapter, shall also be equipped with OSHA-approved, and OEM manufacturer-approved (if necessary), quieter backup alarms by January 1, 2008. The work site referenced in this paragraph shall mean construction sites within the property line. Subparagraph A of this paragraph contains a list of quieter OSHA-approved backup alarms pursuant to OSHA Regulations, 29 CFR Part 1926, Subpart "O", 1926.601.b.4 and 1926.602.a.9. If the responsible party cannot reasonably comply with the requirements of this paragraph, such person shall file an Alternative Noise Mitigation Plan in accordance with §28-104 of this chapter.

A. SOURCE CONTROLS: QUIETER MAKES & MODELS

i. Quieter alarms or similar backup devices that meet OSHA requirements may be selected from the list below or from equivalent quieter alarms.

(a) Examples of manually-adjustable backup alarms include:
- Preco Model 45AA
- Ecco Model 820

(b) Examples of automatically-adjustable backup alarms include:
- Preco Model 1048
- Ecco Model SA907
- Grote Model 73100

(c) Examples of community sensitive backup alarms include:
- BBS-TEK Brigade Model BBS-92

ii. When the responsible party uses quieter backup alarms as described in clause (i) of this subparagraph, the responsible party need not utilize additional pathway controls listed in subparagraph B of this paragraph, unless the responsible party is performing work within 35 feet of an indoor receptor and with the exception of any required perimeter barriers as specified in §28-101(g) of this chapter.

B. NOISE PATHWAY CONTROLS. If it is not feasible to select one of the OSHA-approved alarms in subparagraph A of this paragraph, responsible parties shall utilize one of the following pathway controls. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. Responsible parties shall attempt to reduce the necessity of backing-up by selecting a straight drive-through truck route.

ii. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater. It shall be positioned as close as possible to the vehicle, in order to provide the greatest insertion loss. A portable (i.e. unanchored) noise barrier may be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels may be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels shall be filled-in with noise curtain material, additional plywood, or similar material. A canted panel may also be built on top of the barrier in order to provide better shielding for multi-story receptors; however care must be taken to avoid having the barrier tip over from unbalanced loading. Further, said barrier's height shall not exceed 15 feet including the balanced canted portion.

iii. The noise barrier shall be long and tall enough to completely block the line of sight between the backup alarm and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier should be placed as close to the actual backup alarm as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iv. Alternative barriers may be utilized in accordance with site specification. Conex containers are likely already available to the responsible party. For example, where sufficient work site space exists, container (Conex) boxes or truck trailers may be positioned along the edge of the work site to form a semi-permanent noise barrier. These containers are typically 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes shall be filled-in with heavy vinyl noise curtains or similar material.

e. Manually Operated Equipment.

1. Concrete Saws. This rule shall provide noise mitigation strategies that the responsible party shall utilize in order to reduce the noise emissions from concrete saws. Concrete saws are used on construction projects primarily for demolition purposes, but can also be used for opening access holes, cutting stress relief channels, and finishing off new construction.

A. GENERAL RULES OF OPERATION

i. The hours of operation shall be in accordance with the rules as set forth in §28-103 of this chapter.

B. SOURCE CONTROLS: QUIETER MODELS

i. Smaller saws shall be used, based on the power and cutting depth necessary to perform the job, as they tend to be quieter.

ii. A quieter-type saw blade, including a grinding saw blade or one made of ceramic or special-tipped cutting teeth, shall be chosen whenever practicable.

C. NOISE PATHWAY CONTROLS: NOISE BARRIERS & ENCLOSURES. The responsible party shall utilize one of the following pathway controls. However, if the Department receives noise complaints concerning the site, the responsible party shall utilize additional pathway controls listed in this subparagraph as required by DEP.

i. The responsible party shall construct a portable noise barrier that shall be free from gaps and holes and constructed of a sufficiently massive material to achieve a Sound Transmission Class rating of STC 30 or greater, and is positioned as close as possible to the saw. A portable (i.e. unanchored) noise barrier may be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels shall be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent panels shall be filled-in with noise curtain material, additional plywood, or similar material. A properly balanced canted panel, not susceptible to windy conditions, may be placed on top of the barrier in order to provide better shielding for multi-story receptors. However, said barrier's height shall not exceed 15 feet including the balanced canted portion.

ii. The noise barrier shall be long and tall enough to completely block the line of sight between the saw and any indoor receptor within 200 feet and that is a maximum of 20 feet above grade level, when work occurs. The barrier shall be placed as close to the actual saw work as feasible. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

iii. Portable noise enclosures made of steel frames wrapped with noise curtain material, such as SoundSeal model BBC-13-2, or equivalently rated material, shall be built to surround (top and 3 sides) the concrete saw and the operator. A well made enclosure, using curtain material with a Sound Transmission Class rating of STC 30 or greater, can generally provide a 5 dBA insertion loss providing there are no gaps in the enclosure. Noise tents may be reused at other sites with proper care and maintenance.

iv. There shall be multiple tents for multiple concrete saws. For example, when two saws are being utilized and they cannot fit under the same noise tent, the responsible party shall provide an additional noise tent.

v. The noise tent shall be moved as the concrete saw work progresses in order to maintain the tent's ability to block the line-of-sight between the saw and the receptors.

vi. Emergency concrete sawing that occurs on any public right-of-way after normal working hours as set forth in §28-103 of this chapter, within 500 feet of any residential receptor, shall require noise tents with double-thick noise curtain material, or a noise tent augmented with a portable noise barrier to form a double layer of mitigation.

vii. Where there are receptors surrounding the concrete saw work site on all sides, two tents shall be used whenever practicable, on either side of the saw, to form a complete enclosure.

§28-103 Authorized Work Hours.

a. Equipment shall be used only during the hours of 7:00 a.m. and 6:00 p.m. on weekdays, unless the responsible party obtains an after hours work authorization, in which case the equipment shall be used in accordance with the hours specified in the permit and in the after hours work authorization, as set forth in §24-223 of the Administrative Code.

b. When work occurs after hours in accordance with §24-223 of the Administrative Code, or falls within one of the exceptions to limits on after hours and weekend construction work set forth in §24-222 of such Code, additional noise mitigation measures and/or techniques shall be implemented when required by DEP.

§28-104 Alternative Noise Mitigation Plan.

When required by §24-221 of the Administrative Code or this chapter, a complete and accurate Alternative Noise Mitigation Plan shall be filed with DEP in accordance with §24-221 of such Code. If and when approved by DEP, such plan shall be conspicuously posted at the job site. When an Alternative Noise Mitigation Plan is required, no construction activities shall take place until said plan is filed with and approved by DEP. The Alternative Noise Mitigation Plan Form is available at: http://www.nyc.gov/dep or at DEP's Offices at:

New York City Department of Environmental Protection
Bureau of Environmental Compliance, 9th Floor
59-17 Junction Blvd.
Flushing, NY 11373

§28-105 Utility Noise Mitigation Plan.

Pursuant to §24-219 of the Administrative Code, every authorized publicly franchised New York City utility company that provides gas, electric, steam and telecommunication services shall have conspicuously posted a complete and accurate Utility Noise Mitigation Plan at all sites where construction activities take place. Although the plan need not be filed with DEP, it shall be readily available for inspection should a complaint be filed or during a routine inspection. The Utility Noise Mitigation Plan Form is available at: http://www.nyc.gov/dep or at DEP's Offices at:

New York City Department of Environmental Protection
Bureau of Environmental Compliance, 9th Floor
59-17 Junction Blvd.
Flushing, NY 11373

§28-106 Required Noise Mitigation Measures for Utilities.

a. A utility company conducting construction activity shall self-certify in its Construction Noise Mitigation Plan that all construction tools and equipment have been maintained so that they operate at normal manufacturer's operating specifications, including at peak loading. Such self-certification shall be indicated on the Construction Noise Mitigation Plan form required by §28-100 of this chapter. Upon a DEP inspection of the work site, DEP shall use the noise level guidelines in the Federal Highway Administration Roadway Construction Noise Model User's Guide, Jan. 2006, page 3, located in the Appendix to this chapter, as a means of identifying equipment that may be the cause of a noise complaint. If an individual piece of equipment is identified by DEP as exceeding the level specified in such Guide located in the Appendix to this chapter, upon notification by DEP, the responsible party shall have the option of: (i) performing maintenance to demonstrate a good faith effort, notwithstanding the model year of the equipment, to mitigate the noise by a measurable level acceptable to the Department, (ii) replacing the equipment with equipment that complies with said level, or (iii) filing an Alternative Noise Mitigation Plan pursuant to §28-104 of this chapter, within five business days of said inspection. If the responsible party elects to perform maintenance pursuant to option (i), but cannot demonstrate within five business days a reduction in noise by a measurable level acceptable to the Department, such party shall pursue one of the other two options to the satisfaction of the Department. The failure to exercise and complete one of such three options within five business days of said inspection shall be a violation of this rule.

b. All tools and equipment being operated on site must be equipped with the appropriate manufacturer's noise reduction device. These devices, including but not limited to portable compressors and other such pneumatic tools, such as jackhammers/pavement breakers, shall be equipped with a standard muffler and jacket, free from air or exhaust leaks.

c. Specialized vehicles, including but not limited to compressor trucks, vacuum excavators, pavement-coring, power-roding, flush trucks, and other vehicles with internal combustion motors, shall require additional noise mitigation measures as specified by DEP, such as the use of noise-insulating material that does not interfere with the engine operation and/or other techniques to reduce noise.

d. Portable compressors, generators, pumps and other such devices shall be covered with noise-insulating fabric, which is not to interfere with engine operations, and/or shall employ other techniques to reduce noise.

e. The time of day that work is in progress shall also determine the technology that provides the appropriate noise mitigation. All work that occurs after the hours of 7:00 a.m. to 6:00 p.m. on weekdays shall require an after hours work authorization in accordance with §24-223 of the Administrative Code. From the hours of 6:00 p.m. to 10:00 p.m. on weekdays, the utility shall use daytime noise mitigation controls. However, work between the hours of 10:00 p.m. and 7:00 a.m. on weekdays and between 7:00 p.m. and 7:00 a.m. on weekends may be required by DEP to employ additional techniques, including noise blankets and barriers to reduce the level of noise for receptors within 200 feet.

f. Quieter jackhammers, compressors, and other such construction devices shall be used when available and/or may be required by DEP. A program shall be initiated between DEP and the utilities to perform additional noise-testing of construction devices and to make recommendations to DEP for future rules and use of devices.

g. All unnecessary vehicle engine-idling on site shall be prevented in accordance with §24-163 of the Administrative Code.

h. All steel traffic plates are to be properly installed and secured to the roadway surface in compliance with 34 RCNY §2-11(10)(e). Within 24 hours after a call to the utility from DEP, plates shall be re-set and secured properly.

i. Notification shall be given to residents within 200 feet of the construction when work is scheduled for longer than 3 days. Such notification shall include information on construction work schedules and locations.

j. The permit-holder shall respond to all noise complaints and/or official notice from DEP the same day as received or the next day if received after regular utility work hours or as may be required by DEP.

k. All new vehicles will be phased in with the installation of quieter backup warning devices in accordance with paragraph 4 of subdivision d of §28-102 of this chapter.

l. A formal noise mitigation training program shall be established and implemented for all field-worker supervisory personnel including sub-contractor supervisors. Supervisory personnel shall field-train all field workers in an effort to minimize construction noise.

m. When work is planned near sensitive receptors, including but not limited to schools, hospitals, places of worship, homes for the aging, etc., the permit-holder shall l cooperate with the facility owner/operator to coordinate the work whenever possible so as to minimize the impact on the facility and the utility shall use quieter devices and other noise mitigation methods, such as blankets and barriers.

n. A DEP Inspector may visit the site to examine the Utility Noise Mitigation Plan upon receiving a complaint and may require further action to reduce the level of noise. The responsible party will be provided a 24-hour cure period to correct the condition or to file an Alternative

Noise Mitigation Plan under §28-104 of this chapter. If the condition is not corrected after 24 hours or if an Alternative Noise Mitigation Plan is not filed with DEP, a Notice of Violation shall be issued. However, there shall be no 24-hour cure period with respect to compliance with §§28-100, 28-101(a), (b), (f), or (h); §28-104; §28-105; and §§28-106(a), (b), (d), (g) , or (i) of this chapter.

o. Perimeter noise barriers shall be used as set forth in §28-101(g) of this chapter. All gaps and spaces in the semi-permanent or temporary barriers shall be filled with noise attenuation material, and such barriers shall be placed as close as possible to the noise source to promote greater noise attenuation.

p. Utilities that engage in non-emergency, long-term projects, defined as continuous work that cannot be completed within 15 calendar days when there is a dedicated lane, shall be required to comply with §§28-100 to 28-104 of this chapter. Work shall be considered continuous even though there may be a cessation of activities for 24 hours or less during the project.

§28-107 Perimeter Noise Barriers.

a. Perimeter Noise Barriers – Noise barriers, positioned between construction equipment and receptors, shall be used whenever practicable for all construction projects. Such barriers may be semi-permanent given the time and space requirements of the job site. They may be made of wood, plastic, Plexiglas, precast concrete or steel panels, or where work site space permits, natural materials, such as dirt piles or earthen berms.

b. Noise barriers shall be used to reduce noise affecting pedestrians. Being relatively tall and solid, noise barriers form an excellent perimeter and/or security fence around a job site in addition to reducing noise at street level. Greater noise attenuation occurs when barriers are placed as close as possible to the noise source.

c. When the work site is within 200 feet of a residential receptor, the responsible party that is required to use a work site perimeter noise barrier (or "construction fence") under DOB rules and regulations shall ensure that noise-resistant material fully lines the interior face (facing the work site) of the perimeter barrier, and shall ensure that:

1. the barrier breaks the line-of-sight between the noise source and indoor receptors within 200 feet and a maximum of 20 feet above grade level where practicable; however, said barrier's height shall not exceed 15 feet, including the balanced canted portion;

2. the barrier is made of a material sufficiently resistant to noise in accordance with subdivision e of this section; and

3. there are no leaks or gaps that will allow noise to pass through the barrier.

d. Noise Barrier Design Options.

1. Semi-permanent noise barriers are barriers that, due to their height, will require some form of anchoring system. Typically, semi-permanent barriers are intended for long term continuous use. Thus they are built out of materials suitable to withstand weather conditions for several years. Materials such as tongue and groove wooden timbers, vertical I-beam posts and lagging, or precast concrete panels, serve very well as semi-permanent noise barriers. Being anchored, semi-permanent barriers can easily extend to heights of 15 feet and must be in accordance with DOB and FDNY rules and regulations.

2. Where practicable, the responsible party shall build a pitched panel on top of the barrier in order to provide better shielding for multi-story receptor buildings, however care must be taken to avoid having the barrier tip over from unbalanced loading.

3. Alternative barriers may be utilized in accordance with site-specific conditions. For example, shipping container (Conex) boxes are likely already available to the responsible party. For example, where work site space permits, these container boxes or truck trailers may be positioned along the edge of the work site to form a semi-permanent noise barrier. These containers are typically 8 feet wide by 8 feet tall and can be double-stacked to form a noise barrier 16 feet in height. The gaps between and/or under container boxes shall be filled-in to avoid having noise flank around or under the container boxes.

4. There are also several product vendors that design and manufacture noise barrier materials and barrier systems. These special purpose products are available in various colors and materials including wood, plastic, Plexiglas, precast concrete or steel panels. They are available with or without anchoring systems, as needed.

e. Noise Barrier Specifications. Noise barriers shall be made of noise-resistant material sufficient to achieve a Sound Transmission Class (STC) rating of STC 30 or greater, based on sound transmission loss data taken according to ASTM Test Method E90. Such a barrier can provide as much as a 10 dBA insertion loss providing it is positioned as close as possible to the noise source or to the receptors. To be at all effective, the barrier must be long and tall enough to completely block the line-of-sight between the noise source and the receptors. The gaps between adjacent panels must be filled-in to avoid having noise penetrate directly through the barrier.

§28-108 Temporary or Portable Noise Barriers.

a. Where there is a dedicated lane for such barrier, temporary or portable (i.e. unanchored) noise barriers shall be used for street work lasting longer than 15 days as set forth in this section. All such barriers shall be placed as close as possible to the noise source in order to maximize noise attenuation.

b. Where construction projects are of shorter duration than 15 days and within the property line and do not require perimeter barriers and are within 75 feet of a residential receptor, a temporary or portable (i.e. unanchored) noise barrier shall be made in accordance with this section.

c. Construction of temporary barrier. Noise barriers shall be made of noise-resistant material sufficient to achieve a Sound Transmission Class (STC) rating of STC 30 or greater, based on sound transmission loss data taken according to ASTM Test Method E90. Such a barrier may provide as much as a 10 dBA insertion loss, provided it is positioned as close as possible to the noise source or to the receptors. To be at all effective, the barrier must be long and tall enough to completely block the line-of-sight between the noise source and the receptors. The gaps between adjacent panels must be filled-in to avoid having noise penetrate directly through the barrier.

i. Temporary or portable noise barriers, where required, may be made, for example, of concrete jersey bases with ¾-inch plywood panels attached to fence posts extending upwards to an overall height of 15 feet and must be in accordance with DOB and FDNY rules and regulations. This shall be the maximum height for a free-standing barrier in order to avoid it tipping over from wind load. Multiple jersey bases and plywood panels may be positioned adjacent to one another to form a barrier of any desired length. The gaps between adjacent sections shall be filled-in to form a continuous solid barrier surface.

ii. Wherever practicable, a pitched panel shall be built on top of the barrier in order to provide better shielding for multi-story receptor buildings; however care must be taken to avoid having the barrier tip over from unbalanced loading. Further, the barrier shall not exceed 15 feet in height including the pitched panel.

d. Noise curtains. Noise curtain material may be mounted or hung over perimeter chain link fences, or draped over small noise sources, to form a flexible noise barrier. The chain link fences can also be attached to the top of jersey bases.

i. Noise curtains shall be made of a ¼-inch thick heavy vinyl material, with a noise absorptive quilt attached to one side (the side facing the noise source).

ii. Noise control curtains shall have a Sound Transmission Class (STC) rating of STC 30 or greater, based on sound transmission loss data according to ASTM Test Method E90. The noise absorptive face of the curtains shall have a Noise Reduction Coefficient (NRC) rating of 0.85 or greater, based on sound absorption coefficient data taken according to ASTM Test Method C423.

iii. Noise curtains of this sort, such as SoundSeal model BBC-13-2, or equivalently rated material, generally weigh about 1.5 lbs/sq. ft. They come in 4-foot wide sheets complete with grommets and Velcro edges to aid in hanging the curtains and sealing the sheets side-by-side.

e. Noise Tents. A noise tent may be used within the property line.

i. Noise curtain material may be attached to a metal frame to form a portable enclosure (known as a "noise tent"). The noise tent shall have noise curtain material attached on three sides and on top of the frame, with the remaining side of the frame left open for work access and ventilation.

ii. A frame size of 8 feet tall by 6 feet wide by 6 feet deep shall allow the tent to be positioned over small noise sources, such as pumps, generators or compressors. The tent may also be used to cover a laborer using hand-held power tools, such as jackhammers, saws or grinders. Caster wheels may be placed under the frame for mobility, or the tent may be picked up and moved with the arm of a backhoe, for example.

§28-109 Definitions.

For the purpose of this chapter, the meaning of terms shall be as follows (unless the context specifically indicates otherwise):

Canted Panel. "Canted Panel" shall mean a tilted panel of noise mitigation material that extends a noise barrier to protect upper floor receptors from noise sources.

Insertion Loss. "Insertion Loss" shall mean the reduction in noise level at the receptor's location attributable to the introduction of a noise barrier, muffler, or other mitigation measure.

Jersey Bases. "Jersey Bases," also known as concrete traffic dividers or jersey barriers, shall mean movable concrete bases used in construction that can accommodate fencing poles to which noise curtain material can be attached.

Noise absorptive quilt. "Noise absorptive quilt" shall mean padded light-weight porous material sewn together into a quilt-like pattern and then attached to one side of a vinyl sheet.

Noise Barrier. "Noise Barrier" shall mean a structure used for the purpose of placing near a noise source to reduce the noise level measurable at a receptor location. This can consist of noise resistant materials such as plywood, timbers, trailer containers, or noise curtains.

Noise curtain. "Noise curtain" shall mean noise control product comprised of (typically) ¼-inch thick vinyl sheet, to act as a noise resistant material, with some noise absorptive quilt material attached on one side of the vinyl as well.

Noise Pathway Controls. "Noise Pathway Controls" shall mean noise mitigation techniques placed between the source of noise and the receptor.

Noise-resistant material. "Noise-resistant material" shall mean material that has sufficient mass and stiffness to resist noise from transmitting through the material.

Receptor. "Receptor," also known as receiving property, shall mean real property, including but not limited to buildings, grounds, offices and dwelling units, from which sound levels from sound sources outside such property may be measured.

Responsible party. "Responsible party" shall mean, with respect to any activity regulated or covered by these rules, the owner of the premises on or where such activity occurs, and any agent of the owner engaged in such activity or any participant in such activity, including contractors and subcontractors. Any agency of the City of New York may also be a responsible party.

Sound Transmission Class (STC). The "Sound Transmission Class", or "STC rating", shall mean a single index number used to describe a solid panel or material's ability to prevent noise from transferring directly through it. Determination of a material's STC is done in accordance with ASTM Test Method E90.

§28-109 Appendix - Federal Highway Administration Roadway Construction Noise Model User's Guide, Jan. 2006.

CA/T Equipment 50 ft Noise Emission Reference Levels and Usage Factors

- All noise levels expressed in A-weighted decibels with RMS "slow" time constant

Label ID	Equipment Description	Impact Device?	Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)
A	All Other Equipment > 5 HP	No	50	85	n/a
B	Auger Drill Rig	No	20	85	84
C	Backhoe	No	40	80	78
D	Bar Bender	No	20	80	80
E	Blasting	Yes	N/A	94	n/a
F	Boring Jack Power Unit	No	50	80	83
G	Chain Saw	No	20	85	84
H	Clam Shovel (dropping)	Yes	20	93	87
I	Compactor (ground)	No	20	80	83
J	Compressor (air)	No	40	80	78
K	Concrete Batch Plant	No	15	83	83
L	Concrete Mixer Truck	No	40	85	79
M	Concrete Pump Truck	No	20	82	81
N	Concrete Saw	No	20	90	90
O	Crane	No	16	85	81
P	Dozer	No	40	85	82
Q	Drill Rig Truck	No	20	84	79
R	Drum Mixer	No	50	80	80
S	Dump Truck	No	40	84	76
T	Excavator	No	40	85	81
U	Flat Bed Truck	No	40	84	74
V	Front End Loader	No	40	80	79
W	Generator	No	50	82	81

X	Generator (<25KVA, VMS signs)	No	50	70	73
Y	Gradall	No	40	85	83
Z	Grader	No	40	85	85
AA	Grapple (on backhoe)	No	40	85	87
AB	Horizontal Boring Hydr. Jack	No	25	80	82
AC	Hydra Break Ram	Yes	10	90	90
AD	Impact Pile Driver	Yes	20	95	101
AE	Jackhammer	Yes	20	85	89
AF	Man Lift	No	20	85	75
AG	Mounted Impact Hammer (hoe ram)	Yes	20	90	90
AH	Pavement Scarafier	No	20	85	90
AI	Paver	No	50	85	77
AJ	Pickup Truck	No	40	55	75
AK	Pneumatic Tools	No	50	85	85
AL	Pumps	No	50	77	81
AM	Refrigerator Unit	No	100	82	73
AN	Rivet Buster/chipping gun	Yes	20	85	79
AO	Rock Drill	No	20	85	81
AP	Roller	No	20	85	80
AQ	Sand Blasting	No	20	85	96
AR	Scraper	No	40	85	84
AS	Shears (on backhoe)	No	40	85	96
AT	Slurry Plant	No	100	78	78
AU	Slurry Trenching Machine	No	50	82	80
AV	Soil Mix Drill Rig	No	50	80	80
AW	Tractor	No	40	84	84
AX	Vacuum Excavator (Vac-truck)	No	40	85	85
AY	Vacuum Street Sweeper	No	10	80	82
AZ	Ventilation Fan	No	100	85	79
BA	Vibrating Hopper	No	50	85	87
BB	Vibratory Concrete Mixer	No	20	80	80
BC	Vibratory Pile Driver	No	20	95	101
BD	Warning Horn	No	5	85	83
BE	Water Jet deleading	No	20	85	92
BF	Welder / Torch	No	40	73	74

APPENDIX B

Local Laws of the City of New York -
New York City Noise Code

LOCAL LAWS
OF
THE CITY OF NEW YORK
FOR THE YEAR 2005

No. 113

Introduced by Council Members Gennaro, Avella, Comrie, Fidler, Jackson, Provenzano, Recchia, Weprin, Liu, Addabbo Jr. and The Public Advocate (Ms. Gotbaum) (by request of the Mayor). Passed under a Mayor's Message of Necessity.

A LOCAL LAW

To amend the administrative code of the city of New York, in relation to the noise control code and the repeal of subchapters 4, 5 and 6 of chapter 2 of title 24 of such code.

Be it enacted by the Council as follows:

Section 1. Section 24-202 of the administrative code of the city of New York, as amended by local law number 22 for the year 2002, is amended to read as follows:

§24-202 Declaration of policy. It is hereby declared to be the public policy of the city to reduce the ambient [noise] *sound* level in the city, so as to preserve, protect and promote the public health, safety and welfare, and the peace and quiet of the inhabitants of the city, prevent injury to human, plant and animal life and property, foster the convenience and comfort of its inhabitants, and facilitate the enjoyment of the natural attractions of the city. It is the public policy of the city that every person is entitled to ambient [noise] *sound* levels that are not detrimental to life, health and enjoyment of his or her property. It is hereby declared that the making, creation or maintenance of excessive and unreasonable noises within the city affects and is a menace to public health, comfort, convenience, safety, welfare and the prosperity of the people of the city. For the purpose of controlling and reducing such noises, it is hereby declared to be the policy of the city to set the unreasonable *and prohibited* noise standards and decibel levels contained herein and to consolidate certain of its noise control legislation into this code. The necessity for legislation by enactment of the provisions of this chapter is hereby declared as matter of legislative determination.

This code shall be liberally construed so as to effectuate the purposes described in this section. Nothing herein shall be construed to abridge the emergency powers of the board of health or the right of the department of health and mental hygiene to engage in any of its necessary or proper activities. [Nothing herein shall abridge the powers and responsibilities of the] *It is the intent of the council that the* police department [to] *as well as other agencies of the city designated by the commissioner of the department of environmental protection shall have the authority to* enforce the provisions of this code *and police officers and designated employees of the department of environmental* *protection and of such other city agencies shall have the power to issue summonses, appearance tickets and notices of violation for violations of this code.*

§2. Section 24-203 of such code is amended to read as follows:

§24-203 General definitions. When used in the New York city noise control code *the following terms shall have the following meanings*:

[(a)] *(1)* "A" level means the [total] sound level [of all noise] as measured with a sound level meter using the "A" weighting network. The unit of measurement is the [db(A)] *dB(A). This frequency weighting network for the measurement of sound levels shall comply with standards established by the American National Standards Institute specifications for sound level meters S1.4-1971, as amended or S1.4-1983, as amended.*

[(b)] *(2)* Activity means any act or combination of acts which actually results in the production of sound.

[(c)] *(3)* Air compressor means a device which draws in air or gas, compresses it, and delivers it at a higher pressure.

[(d) Aircraft means any device that is used or intended to be used for flight in the air but does not include any such device used only in the service of a government or political subdivision thereof unless such device is engaged in carrying persons or property for commercial purposes. Aircraft includes but is not limited to:

1. subsonic transport aircraft;
2. subsonic turbojet-powered aircraft;
3. aircraft capable of flying at supersonic speeds;
4. rotocraft;
5. vertical take-off and landing aircraft (VTOL aircraft);
6. short take-off and landing aircraft (STOL aircraft); and
7. aircraft capable of landing or taking off on water.]

[(e)] *(4)* Air horn means a device intended to produce a sound signal by means of compressed air or gas or exhaust gas.

[(f)] *(5)* Airport means an area of land or water that is used or intended to be used for the landing and take off of aircraft, and includes its buildings and facilities, if any.

[(g)] *(6)* Ambient [noise] *sound* means [the all-encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far] *the sound level at a given location that exists as a result of the combined contribution in that location of all sound sources, excluding the contribution of a source or sources under investigation for violation of this code and excluding the contribution of extraneous sound sources. For purposes of the enforcement of this code, the ambient sound level of a given location may be determined based upon measurements taken at a comparable site (which includes but is not limited to comparable physical locations and time of day) in the nearby area.*

[(h)] *(7)* Apparatus means any mechanism which prevents, controls, detects, measures or records the production of sound.

(8) Audible status indicator means any sound reproduction device on a motor vehicle that emits or causes to be emitted any continuous or near continuous sound (exceeding 5 seconds if tonal in nature or any duration if verbal in nature) for the purpose of warning that an audible burglar alarm has been installed on such motor vehicle and is operational or for creating the appearance that such an alarm has been installed on such motor vehicle and is operational.

[(i)] *(9)* Authorized emergency vehicle means [every ambulance and every vehicle operated by a police department, fire department, fire patrol, chief or assistant chief of a fire department, county or deputy county fire coordinator, county or assistant county fire marshal, sheriff, or by a chief, assistant chief or deputy chief of a police department, a regular paid deputy sheriff or a motor vehicle of the New York city housing authority when engaged in the performance of duty as a peace officer, or by an authorized public utility company when on emergency calls, every state-owned vehicle operated by a law enforcement officer of the conservation department when engaged in performance of duty in enforcement of the environmental conservation law, and every vehicle operated by a bridge authority or bridge and tunnel authority when on emergency calls] *an authorized emergency vehicle as defined by section 101 of the vehicle and traffic law.*

[(j)] *(10)* Board means the environmental control board of the city of New York.

[(k)] *(11)* Building means a building as defined in [article two of subchapter two of chapter one of title twenty-seven of the code] *section 27-232 of the administrative code.*

[(l)] *(12)* Building aperture means any designed opening in a building to which a person may reasonably have access including but not limited to any door, gate, window, skylight or hatch.

[(m)] *(13)* Burglar alarm means any sound signal device designed and intended to produce a sound signal upon unauthorized entrance by a person into a building or motor vehicle.

[(n)] *(14)* "C" level means the [total] sound level [of all noise] as measured with a sound level meter using the "C" weighting network. The unit of measurement is the [db(C)]*dB(C). This frequency weighting network for the measurement of sound levels shall comply with standards established by the American National Standards Institute specifications for sound level meters S1.4-1971, as amended or S1.4-1983, as amended.*

[(o)] *(15)* Certificate means an operating or temporary operating certificate.

[(p)] *(16)* Charter means the New York city charter including all of its amendments.

[(q)] *(17)* Circulation device means any device which circulates a gas or fluid, including but not limited to any air conditioner, pump, cooling tower, fan or blower.

[(r)] *(18)* Claxon means any manually, mechanically, or electrically powered device, other than an emergency signal device, including but not limited to a motor vehicle horn, which is intended to, and when operated actually does, emit a sound signal.

[(s)] *(19)* This code means the New York city noise control code.

[(t)] *(20)* Commissioner means commissioner of environmental protection *or his or her authorized representative.*

[(u)] *(21)* Construction *or construction work* means any or all activity[, except tunneling,] necessary or incidental to the erection, demolition, assembling, altering, installing or equipping of buildings, public or private highways, roads, premises, parks, utility lines including such lines in already-constructed tunnels, or other property, including land clearing, grading, excavating and filling.

[(v)] *(22)* Construction device means any device designed and intended for use in construction including, but not limited to any air compressor, pile driver, [manual tool] *sledgehammer*, bulldozer, pneumatic hammer, steam shovel, derrick, crane, steam or electric hoist, *construction vehicle or pneumatic or electric tool.*

[(w)] *(23)* Construction material means any material, regardless of composition, designed and customarily used in construction including but not limited to any rails, pillars, columns, beams, bricks, flooring, wall, ceiling or roofing material, gravel, sand, cement or asphalt.

[(x)] *(24)* Container means any receptacle, regardless of contents, manufactured from wood, metal, plastic, paper or any other material including but not limited to any barrel, basket, box, crate, tub, bottle, can or refuse container.

[(y)] *(25)* Decibel[. The decibel is one-tenth of a bel. Thus, the decibel is a unit of level when the base of the logarithm is the tenth root of ten, and the quantities concerned are proportional to power.] *means the practical unit of measurement for sound pressure level; the number of decibels of a measured sound is equal to 20 times the logarithm to the base 10 of the ratio of the sound pressure to the pressure of a reference sound (20 micropascals); abbreviated "dB".*

[(z)] *(26)* Device means any mechanism which is intended to or which actually produces sound when operated or handled.

[(aa)] *(27)* Department means the department of environmental protection.

[(bb)] *(28)* Dwelling means any building *lawfully* occupied in whole or in part as the temporary or permanent residence of one or more natural persons.

[(cc)] *(29)* Dynamic insertion loss means the difference between two sound pressure levels which are measured at the same point in space before and after a muffler is inserted between the measurement point and the sound source under operating conditions.

[(dd)] *(30)* Emergency means a public calamity or an exposure of any person or property to imminent danger.

[(ee)] *(31)* Emergency signal device means any gong, siren whistle, or siren or any air horn or any similar device the use of which on authorized emergency vehicles is permitted by subdivision twenty-six of section three hundred seventy-five of the vehicle and traffic law.

[(ff)] *(32)* Exhaust source means a system which removes and transports air or gas from a device.

(33) Extraneous sound is sound that is intense, intermittent, not representative of the relatively steady sound levels at a given location and not attributable to a source or sources under investigation for violation of this code. Such sound includes but is not limited to sirens of passing emergency vehicles, unusually loud motor vehicle braking (screeching) or exhaust noise, people shouting, animal vocalization, passing aircraft, horn honking, car door slamming and passing trains. Notwithstanding the foregoing provision, sounds that are individually persistent or controlling of the sound level at a given location shall not be considered to be extraneous sounds if they constitute more than 50 percent of the duration of an ambient or total sound level measurement such as for example the sound of a passing aircraft at a specific location if airplanes regularly pass over such location and the proximity of such passing aircraft to the location, its sound level, and the duration of such sound level, control the sound level at the given location at the time the sound source under investigation is being measured. For the purposes of the enforcement of this code, extraneous sounds are excluded when measuring the ambient sound level at a given location and when measuring the sound level of a source or sources under investigation for violation of this code except where such sounds are themselves under investigation for violation of this code.

(34) Impulsive sound is sound that is of short duration, where each peak of sound lasts 2 seconds or less. The sound is characterized by abrupt onset and rapid decay. As used in this code, the term impulsive sound shall not include music.

[(gg)] *(35)* Internal combustion engine means a device for the production of energy by means of the combustion under pressure of fossil fuel.

[(hh)] *(36)* Lawn care device means any device powered mechanically, by electricity, by gasoline, by diesel fuel or by any other fuel, which is intended to be used or is actually used for the mowing of grass, the cutting or chipping of trees, tree roots or tree branches, or the clearing of leaves or other vegetation from lawns, sidewalks, public streets or public highways and shall include, but not be limited to, such devices as lawn mowers and lawn mower attachments, lawn edgers, leaf blowers, leaf vacuums, mulchers and chippers.

(37) Lmax means the maximum measured sound level at any instant in time.

[(ii)] *(38)* Motor vehicle means any device which is propelled by an engine in or upon which a person or material may be transported on the ground and which is intended to be operated upon a public highway.

[(jj)] *(39)* Muffler means an apparatus generally consisting of but not limited to a series of chambers or baffles for the purpose of transmitting gases while reducing sound levels.

[(kk) Noise means an erratic, intermittent, or statistically random oscillation.]

[(ll)] *(40)* Owner means and includes the owner of the freehold of the premises or lesser estate therein, or mortgagee thereof, a lessee or agent of any of the above persons, a lessee of a device or his or her agent, a tenant, operator, or any other person who has regular control of a device or an apparatus.

[(mm)] *(41)* Paving breaker means any powered construction device intended to cut or trench pavement, subbase macadam, gravel, concrete or hard ground.

[(nn)] *(42)* Person means any individual, partnership, company, corporation, association, firm, organization, governmental agency, administration or department, or any other group of individuals, or any officer or employee thereof.

(43) Personal audio device means a portable sound reproduction device as normally and customarily used for personal purposes including but not limited to a personal radio, phonograph, television receiver, tape recorder or compact disc player. For the purposes of this definition such term shall include a sound reproduction device installed in or operated from a motor vehicle whether or not portable.

(44) Plainly audible sound means any sound for which any of the content of that sound, such as, but not limited to comprehensible musical rhythms, is communicated to a person using his or her unaided hearing faculties. For the purposes of the enforcement of this code, the detection of any component of music, including but not limited to the rhythmic bass by a person using his or her unaided hearing faculties is sufficient to verify plainly audible sound. It is not necessary for such person to determine the title, specific words or artist of such music. In the case of motor vehicles the detection of the sound of a muffler or of an exhaust by a person using his or her unaided hearing faculties is sufficient to verify plainly audible sound. Plainly audible sound does not require measurement with a sound level meter.

[(oo)] *(45)* Power tool means any device powered mechanically, by electricity, by gasoline, by diesel fuel or by any other fuel, which is intended to be used or is actually used for, but shall not be limited to, the performance of such functions as cutting, nailing, stapling, sawing, vacuuming or drilling.

(46) Public right-of-way means a public highway, road, street, avenue, alley, driveway, path, sidewalk, roadway or any other public place or public way.

[(pp)] *(47)* Railroad means a railroad, other than a rapid transit railroad or street railroad, operated for public use in the conveyance of persons or property for compensation, with all bridges, ferries, tunnels, equipment, switches, spurs, tracks, stations and terminal facilities used, operated or owned by or in connection therewith.

[(qq)] *(48)* Rapid transit railroad means a rapid transit railroad used for local service in the transportation of passengers as a common carrier for hire together with the appurtenances, facilities and equipment thereof.

(49) Receiving property means real property, including but not limited to buildings, grounds, offices and dwelling units, from which sound levels from sound sources outside such property may be measured. For the purposes of this definition, individual offices or dwelling units within a building may constitute a receiving property.

[(rr)] *(50)* Refuse [compacting] *collection* vehicle means a motor vehicle designed *or used* to [compact and] remove, *collect, or transport* refuse, *solid waste or recyclables.*

[(ss)] *(51)* Sound means an oscillation in pressure, stress, particle displacement, particle velocity, etc., in a medium with internal forces (e.g., elastic, viscous), or the superposition of such propagated oscillation which evokes an auditory sensation.

[(tt)] *(52)* Sound level meter means any instrument including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of noise and sound levels in a specified manner and which complies with standards established by the Amercian National Standards Institute specifications for sound level meters S1.4-1971, as amended *or S1.4-1983, as amended.*

[(uu)] *(53)* Sound pressure level (decibels) means [a sound that is]*an expression of the acoustic pressure calculated as* twenty times the logarithm to the base ten of the ratio of the *root mean square of the* pressure of the sound to the reference pressure. [2 x 10-4 microbars] *20 micropascals.*

[(vv)] *(54)* Sound reproduction device means a device intended primarily for the production or reproduction of sound, including but not limited to any musical instrument, radio receiver, television receiver, tape recorder, phonograph or *electronic* sound amplifying system.

[(ww)] *(55)* Sound signal means any sound produced by a sound signal device designed to transmit information.

[(xx)] *(56)* Sound signal device means a device designed to produce a sound signal when operated, including but not limited to any claxon, air horn, whistle, bell, gong, siren, but not an emergency signal device.

[(yy)] *(57)* Sound source means any activity or device [as herein defined] *that emits sound.*

[(zz)] *(58)* This code means the *New York city* noise control code.

(59) Total sound level means that measured sound level that represents the combined sound level of the source or sources under investigation and the ambient sound level. Total sound level measurements shall exclude extraneous sound sources.

[(aaa)] *(60)* Tunnel means an underground passage which is intended for use as a railway, aqueduct, road, sewer or major utility artery.

[(bbb)] *(61)* Tunneling means any activity necessary or incidental to the construction of any tunnel, including the sinking of shafts to tunnel or to an intermediate level and the surface activities required to sink the shafts and construct the tunnel.

[(ccc)]) *(62)* Unreasonable noise means any excessive or unusually loud sound that disturbs the peace, comfort or repose of a reasonable person of normal sensitivities, injures or endangers the health or safety of a reasonable person of normal sensitivities or which causes injury to plant or animal life, or damage to property or business.

(63) Refuse collection facility means any structure, building or other premises at which solid waste is received for the purpose of subsequent transfer to another location regardless of whether such solid waste is subject to any processing or reduction in volume at such structure, building or premises.

[(ddd) Zone means any zone as defined in the zoning resolution of the city of New York, except that zone shall not mean any ambient noise quality zone under subchapter five or subchapter six of this chapter of this code or any noise sensitive zone under subchapter four of this chapter of this code

(ddd) Nursing home means a facility providing therein nursing care to sick, invalid, infirm, disabled, or convalescent persons in addition to lodging and board or health-related service, or any combination of the foregoing, and in addition thereto, providing nursing care and health-related service, or either of them, to persons who are not occupants of the facility.

(eee) Audible status indicator means any sound reproduction device on a motor vehicle that emits or causes to be emitted any continuous or near continuous sound for the purpose of warning that an audible burglar alarm has been installed on such motor vehicle and is operational or for creating the appearance that such an alarm has been installed on such motor vehicle and is operational.]

§3 Sections 24-204, 24-205, 24-206 and 24-207 of the administrative code of the city of New York, sections 24-204, 24-205 and 24-207 as amended by local law number 18 for the year 1993, are amended to read as follows:

§24-204 General powers of the commissioner. *(a)* Subject to the provisions of this code, the commissioner may take such action as may be necessary to abate a sound source which causes or may cause, by itself or in combination with any other sound source or sources, an unreasonable *or prohibited* noise. The commissioner may exercise or delegate any of the functions, powers and duties vested in him or her or in the department by this code.

(b) The commissioner shall promulgate such rules as are necessary to effectuate the purposes of this code, including, without limitation, rules setting forth specifications for the operation, installation, best available technology, or manufacture of sound generating equipment or devices, or sound mitigation equipment or devices.

(c) The commissioner shall promulgate such rules as are necessary with regard to standards and procedures to be followed in the measurement of sound pressure levels governed by the provisions of this code, provided that such standards and procedures are substantially in compliance with any similar standards and procedures promulgated by the American National Standards Institute, International Standards Organization, Society of Automotive Engineers, Compressed Air and Gas Institute, American Society of Heating, Refrigeration, and Air Conditioning Engineers, American Refrigeration Institute or any generally recognized professional standard-setting organization.

(d) The police department, as well as other agencies of the city designated by the commissioner, shall have the authority to enforce the provisions of this code and police officers and designated employees of the department and of such other city agencies shall have the power to issue summonses, appearance tickets and notices of violation for violations of this code.

§24-205 Investigations and studies by the commissioner. *(a)* The commissioner may make or cause to be made any investigation or study which in his or her opinion is desirable for the purpose of enforcing this code or controlling or abating an unreasonable *or prohibited* noise. For such purposes, the commissioner may make tests, conduct hearings, compel the attendance of witnesses, and take their testimony under oath and may compel the production of books, papers and other things reasonably necessary to the matter under consideration.

(b) The commissioner shall study and propose strategies to control and/or reduce sound levels associated with airports, rapid transit and railroad operations and within twenty-four months of the effective date of this section shall report to the mayor his or

her findings and recommendations, specifically identifying those recommendations that may only be implemented through state or federal legislation or rules.

(c) The commissioner, in conjunction with the police department, shall study noise abatement strategies for audible motor vehicle burglar alarms and within twenty-four months of the effective date of this section shall report to the mayor his or her findings and recommendations.

(d) The commissioner, in conjunction with the police department, shall study on an ongoing basis emerging technology in acoustical measurement and shall periodically report to the mayor his or her findings and recommendations regarding the testing and potential use of equipment for enforcement of this code. In conjunction with such study, the commissioner may issue a request for expressions of interest to determine new and emerging technological solutions for accurate and efficient measurement of sounds as enumerated in this code.

(e) The commissioner shall study the impact of motor vehicle back-up warning devices installed on motor vehicles on ambient sound levels and within twenty-four months of the effective date of this section shall report to the mayor his or her findings and recommendations, specifically identifying those recommendations that may only be implemented through state or federal legislation.

§24-206 Testing by order of the commissioner. (a) If the commissioner has reasonable cause to believe that any device is in violation of this code, the commissioner may order the owner of the device to conduct such tests as are necessary in the opinion of the commissioner to determine whether the device or its operation is in violation of this code and to submit the test results to the commissioner within ten days after the tests are completed.

(b) Such tests shall be conducted in a manner approved by the commissioner. If any part of the test is conducted at a place other than the site where the device is located, that part of the test shall be certified by a laboratory acceptable to the commissioner. The commissioner may require that the entire test results shall be reviewed and certified by *(i)* a professional engineer *with acoustical experience as specified in the rules of the department or (ii) a noise consultant with qualifications of education and/or acoustical experience as set forth in the rules of the department.*

(c) [The owner shall notify the commissioner of the time and place of a test at least seven days before the commencement of such test. Reasonable facilities shall be made available for the commissioner to witness the test.

(d)] If in the opinion of the commissioner, tests by the department are necessary, the commissioner may order the owner to provide such access to the device as the commissioner may reasonably request, to provide a power source suitable to the points of testing, and to provide allied facilities, exclusive of sound level meter. These provisions shall be made at the expense of the owner of the device. The owner shall be furnished with copies of the analytical results of the data collected.

(d) If after the analysis of such testing, it is determined by the commissioner that such device or devices generate sound levels that exceed the limits of this code, the commissioner may make recommendations for modifications and/or mitigation measures to bring such device or devices into compliance.

(e) The commissioner may issue a separate notice of violation for every 24-hour period of noncompliance with the orders of the commissioner issued pursuant to this section.

§24-207 Inspection. (a) The department may inspect at any reasonable time and in a reasonable manner any device which creates or may create unreasonable *or prohibited* noise including but not limited to the premises where the device is used.

(b) The department may inspect at any reasonable time and in a reasonable manner any record relating to a use of a device which creates or may create unreasonable *or prohibited* noise.

(c) No person shall refuse entry or access into the public areas of a multiple dwelling or a place of business to an authorized employee of the department *or other authorized city employee* who presents appropriate credentials, nor shall any person refuse entry or access into any other portion of a [premise]*premises* to an authorized employee of the department *or other authorized city employee* who presents appropriate credentials and a [search] warrant *for such inspection.*

(d) No person shall refuse to allow an authorized employee of the department or other authorized city employee who presents appropriate credentials to perform reasonable sound testing on any device or devices, including but not limited to requiring the temporary shutting down of said device or devices for the purposes of such testing except that upon a showing that the inspection would produce a noticeable interruption of services that would cause discomfort to employees or customers or require a building engineer or other professional to work with the equipment, such authorized employee shall reschedule the inspection for a more convenient time.

§4. Subdivision (a) of section 24-208 of such code is amended to read as follows:

(a) The commissioner may require the written registration of air compressors, paving breakers, refuse compacting vehicles and rapid transit railroads, including but not limited to its rolling stock, track and trackbeds, passenger stations, *circulation devices rated 300,000 BTUs or higher*, tunnels, elevated structures, yards, depots and garages. A period of sixty days shall be allowed for the filing of such registration *measured from the date such registration is required by the commissioner or with respect to devices installed after such requirement is instituted measured from the date of installation.* However, in cases of emergency, the commissioner may designate a shorter period of time.

§5. Section 24-211 of such code is amended to read as follows:

§24-211 Display of permits[,] *and* certificates [and other notices; removal or mutilation prohibited]. Any tunneling permit or certificate required by this code shall be displayed in the vicinity of the device on the premises designated on the tunneling permit or certificate or in the vicinity of the place where the device will be operated or supervised.

§6. Paragraph (1) of subdivision (b) of section 24-213 of such code is amended to read as follows:

(1) Either by mailing the notice, order or decision directed to the person at his or her principal place of business *or home address*; or

§7. Section 24-217 of such code is amended to read as follows:

§24-217 Exemptions. The provisions of this code shall not apply to the operation or use of any organ, bell, chimes or other similar instrument [by] *from on or within* any church, synagogue, mosque or [school] *other house of worship.*

§8. Such code is amended by adding a new section 24-217.1 to read as follows:

§24-217.1 Measurements. Unless otherwise specifically provided, all sound level measurements under this code shall be taken in Lmax with the sound level meter set to slow response.

§9. Section 24-218 of such code, as amended by local law number 18 for the year 1993, is amended to read as follows:

§24-218 General prohibitions. *(a)* No person shall make, continue or cause or permit to be made or continued any unreasonable noise[, except that this section shall not apply to any sound from any source where the decibel level of such sound is within the limits prescribed by another section of this title and where there is compliance with all other applicable requirements of law with respect to such sound].

(b) Unreasonable noise shall include but shall not be limited to sound, attributable to any device, that exceeds the following prohibited noise levels:

(1) Sound, other than impulsive sound, attributable to the source, measured at a level of 7 dB(A) or more above the ambient sound level at or after 10:00 p.m. and before 7:00 a.m., as measured at any point within a receiving property or as measured at a distance of 15 feet or more from the source on a public right-of-way.

(2) Sound, other than impulsive sound, attributable to the source, measured at a level of 10 dB(A) or more above the ambient sound level at or after 7:00 a.m. and before 10:00 p.m., as measured at any point within a receiving property or as measured at a distance of 15 feet or more from the source on a public right-of-way.

(3) Impulsive sound, attributable to the source, measured at a level of 15 dB(A) or more above the ambient sound level, as measured at any point within a receiving property or as measured at a distance of 15 feet or more from the source on a public right-of-way. Impulsive sound levels shall be measured in the A-weighting network with the sound level meter set to fast response. The ambient sound level shall be taken in the A-weighting network with the sound level meter set to slow response.

(c) Notwithstanding the provisions of subdivision b of this section, where a particular sound source or device is subject to decibel level limits and requirements specifically prescribed for such source or device elsewhere in this code, the decibel level limits set forth in this section shall not apply to such sound source or device.

(d) The decibel level limits set forth in this section shall not apply to sound attributable to construction devices and activities.

(e) Where the commissioner finds that sound from any refuse collection facility regulated by the department of sanitation exceeds the decibel level limits set forth in this section, the commissioner shall order the operator of such facility to submit a certification by a professional engineer as to whether or not the facility is in compliance with the noise standards required by the department of sanitation rules (16 RCNY Ch. 4) and if not in compliance, the mitigation measures that will be undertaken to bring such facility into compliance. The testing and certification must be submitted to the department and to the department of sanitation within forty-five days after the issuance of such order. A facility that complies with an order issued pursuant to this section and with any required mitigation measures shall be deemed to be in compliance with the decibel limits of this section. With respect to any refuse collection facility owned or operated by the department of sanitation such facility shall be deemed to be in compliance with the decibel level limits of this section if it is in compliance with a best management practices plan developed in conjunction with the department. A notice of violation may only be issued for a refuse collection facility pursuant to this section where the operator of such facility fails to comply with an order of the commissioner issued pursuant to this subdivision or the mitigation measures set forth in a certification.

§10. Subchapters 4, 5 and 6 of chapter 2 of title 24 of such code are REPEALED and new subchapters 4, 5 and 6 are added to read as follows:

SUBCHAPTER 4

Construction Noise Management

§24-219 Noise mitigation rules. (a) The commissioner shall adopt rules prescribing noise mitigation strategies, methods, procedures and technology that shall be used at construction sites whenever any one or more of the construction devices or activities listed below are employed or performed:

(1) air compressors.

(2) pile drivers.

(3) sledgehammers.

(4) bulldozers.

(5) pneumatic hammers.

(6) steam shovels.

(7) derricks.

(8) cranes.

(9) steam or electric hoists.

(10) off-road construction vehicles other than trucks.

(11) pumps.

(12) pneumatic tools.

(13) blasting.

(14) power tools.

(15) tunneling machines.

(16) construction devices with internal combustion engines.

(17) construction devices that emit impulsive sound.

(18) construction devices that create vibration.

(19) metal plates used in street construction to temporarily cover excavations.

(20) any other construction devices or activities specified in such rules.

(b) Such rules shall include but shall not be limited to:

(1) The use of perimeter fences with acoustical insulation, where appropriate.

(2) The use of portable barriers with acoustical insulation, where appropriate.

(3) The use of acoustical blanket insulation, where appropriate.

(4) Testing of exhaust mufflers and certification, in a form and manner to be specified in the rules, that mufflers meet factory specifications for noise emissions at maximum loading at the commencement of construction at the site.

(5) The development of generic noise mitigation plans, where appropriate.

(6) Additional mitigation measures for sensitive receptors such as hospitals and schools, where appropriate.

(c) The commissioner shall appoint an advisory committee, which shall include, but shall not be limited to, representatives of utility companies and the construction industry, including those industries related to heavy construction, persons with acoustical expertise and/or expertise regarding the health effects of noise, a representative of the city council and employees of the department and of other relevant city agencies. The committee shall provide advice and recommendations to the department relating to construction noise mitigation and shall assist the department in the development of the noise mitigation rules required by this section. The commissioner shall consult with the committee regarding any proposed amendments of such rules. In the development of such rules the commissioner shall consider factors such as the availability, cost and safety of proposed noise mitigation measures.

§24-220 Noise mitigation plan. (a) Each person, corporation or other business entity performing construction work in the city shall adopt and implement a noise mitigation plan for each construction site in accordance with the provisions of this

subchapter and such rules whenever any one or more of the construction devices or activities listed above or in the department's rules are employed or performed at the site.

(b) Such plan shall be adopted prior to the commencement of construction at the site or, with respect to emergency work, as defined in the department's rules, within three days thereafter, and shall apply to all work at the site throughout the construction process. The plan shall provide in detail the noise mitigation strategies, methods, procedures and technology, as prescribed in the rules of the department or specifically approved by the commissioner in accordance with section 24-221 of this code, for each device or activity employed or performed at the site. Each permit holder or other person in charge of such construction site will be accountable for compliance with such rules and shall ensure that each person performing construction work at the site shall be aware of the plan and shall be responsible for complying with those provisions that affect his or her work.

(c) A copy of the plan shall be kept at the construction site and shall be made available for inspection upon the request of persons authorized to enforce the provisions of this code.

(d) The plan shall be amended whenever additional devices or activities unforeseen at the commencement of construction are employed at the site or at the direction of the commissioner in accordance with section 24-223 of this subchapter.

(e) A plan need not be filed with or approved by the department prior to the commencement of construction if it conforms in all respects to the rules of the department with respect to construction devices and activities employed or performed at the construction site. A plan that deviates in any respect from such rules or an alternative noise mitigation plan required to be certified in conjunction with a undue hardship application pursuant to paragraph (5) of subdivision (e) of section 24-223 shall be subject to the prior approval of the commissioner in accordance with section 24-221 of this code.

(f) This section shall not apply to construction work in connection with the alteration or repair of an existing one or two family owner-occupied dwelling classified in occupancy group J-3 or a convent or rectory.

§24-221 Alternative noise mitigation plan. (a) Upon application, the commissioner may approve an alternative noise mitigation plan for a particular construction site that deviates from strict compliance with the noise mitigation rules. Application for approval of such plan shall be submitted to the department at least ten business days prior to the commencement of construction or as soon as practicable but no later than 24 hours prior to the commencement of construction in a form and manner and accompanied by such information and documentation as shall be set forth in the rules of the department. The commissioner may approve such alternative noise mitigation plan if he or she finds that:

(1) strict compliance with the noise mitigation rules would not be possible or would create an undue hardship because of the location or unique characteristics of the site or of the construction devices or activities to be employed or performed at the site; and

(2) the alternative noise mitigation strategies, methods, procedures or equipment proposed are consistent with the purposes and policies of this code.

(b) Notwithstanding the foregoing provisions, with respect to construction sites where construction is performed pursuant to a permit issued prior to the effective date of this section or in the case of construction by or on behalf of a city agency where construction is performed under a contract bid out prior to the effective date of this section, application for approval of an alternative noise mitigation plan may be

submitted within 60 days after the effective date of this section. The commissioner may approve such plan if he or she finds that:

(1) strict compliance with the noise mitigation rules would not be possible or would create an undue hardship because of the location or unique characteristics of the site or of the construction devices or activities employed or performed at the site, or

(2) strict compliance with such rules would be unreasonable or unduly burdensome with respect to construction work that is imminent or ongoing on the effective date of this section, or

(3) with respect to city construction projects, the implementation of contract modifications to achieve strict compliance with such rules would result in unreasonable delay and/or increased expenditure for a necessary public improvement, and

(4) the alternative noise mitigation strategies, methods, procedures or equipment proposed are consistent with the purposes and policies of this code.

(c) Where the commissioner rejects an alternative noise mitigation plan, an applicant may appeal such rejection in accordance with the rules of the department. An alternative plan shall not be in effect unless and until it has been approved by the commissioner except that where a timely alternative plan has been filed with the commissioner for approval, a construction site in compliance with such alternative plan shall be deemed to be in compliance with this section unless and until such plan is rejected by the commissioner and for a reasonable time thereafter as determined by the commissioner.

§24-222 After hours and weekend limits on construction work. Except as otherwise provided in this subchapter, it shall be unlawful to engage in or to cause or permit any person to engage in construction work other than on weekdays between the hours of 7 a.m. and 6 p.m. A person may however perform construction work in connection with the alteration or repair of an existing one or two family owner-occupied dwelling classified in occupancy group J-3 or a convent or rectory on Saturdays and Sundays between the hours of 10 a.m. and 4 p.m. provided that such dwelling is located more than 300 feet from a house of worship.

§24-223 After hours work authorization. (a) Notwithstanding section 24-222 of this subchapter, an agency authorized to issue permits for construction work may, along with such permit, issue an after hours work authorization for the work site. Such after hours authorization may permit construction work to be performed at the site before 7 a.m. or after 6 p.m. on weekdays and/or on Saturdays and/or Sundays subject to the conditions and restrictions set forth in this section.

(b) The agency issuing such authorization must obtain a certification from its permittee that the permittee has developed a noise mitigation plan for the site in accordance with this subchapter and that such plan is in compliance with the noise mitigation rules. In the case of emergency work such certification shall be submitted within 3 days after the commencement of the work.

(c) If after hours work at the site is not being performed in compliance with such plan or where no plan is in effect, the department or the agency issuing such authorization, at the request of the commissioner or on its own account, may take appropriate action, including but not limited to the refusal to renew such after hours authorization.

(d) Where there is full compliance with the noise mitigation plan yet nevertheless aggregate sound levels from the site where an after hours authorization is in effect exceed 8dB(A) above the ambient sound level as measured in any residential receiving property dwelling unit (with windows and doors that may affect the measurement

closed), the commissioner may request the person performing the work to confer with representatives of the department regarding additional noise mitigation measures that may be employed at the site to reduce aggregate sound levels. After such conference the commissioner may direct amendment of the noise mitigation plan for the site. Failure to respond to a request for a conference or to amend the noise mitigation plan within the time prescribed in a notice issued by the department shall be a violation of this code.

(e) Authorization for after hours construction work may only be issued in the following circumstances:

(1) Emergency work. Agencies shall authorize such after hours construction work for emergency conditions, inside or outside the property line, involving a threat to public safety or causing or likely to cause the imminent interruption of service required by law, contract or franchise. An emergency authorization issued pursuant to this paragraph shall expire as determined by the agency but no later than the ninetieth day after its issuance and shall be renewable in accordance with agency procedures while the emergency continues.

(2) Public safety. Agencies may authorize such after hours work, inside or outside of the property line, where the agency determines that the work cannot reasonably or practicably be performed on weekdays between the hours of 7 a.m. and 6 p.m. because of traffic congestion and/or concern for worker and/or public safety. An authorization issued pursuant to this paragraph shall expire as determined by the agency but no later than the ninetieth day after its issuance and shall be renewable in accordance with agency procedures.

(3) City construction projects. Agencies may authorize after hours work by or on behalf of city agencies for projects that are judicially mandated or the subject of consent orders and/or where a project is necessary in the public interest including but not limited to facilities, equipment, and infrastructure for the provision of water, sewerage, sanitation, transportation and other services necessary for the health or safety of the public. An authorization issued pursuant to this paragraph for a city construction project shall remain in effect for the duration of the project.

(4) Construction activities with minimal noise impact. The commissioner shall promulgate rules setting forth a list of construction activities with minimal noise impact and specific noise mitigation measures applicable to such activities. Agencies may authorize the performance of such construction activities after hours in accordance with such rules.

(5) Undue hardship. Agencies may authorize after hours work if the commissioner certifies that the permit holder has substantiated a claim of undue hardship resulting from unique site characteristics, unforeseen conditions, scheduling commitments and/or financial considerations outside the control of the permit holder and that the applicant has received approval from the department of an alternative noise mitigation plan pursuant to section 24-221 of this subchapter, specifying the activities and devices that will be used for such after hours construction and setting forth the additional mitigation measures, above and beyond those measures otherwise required for such devices and activities pursuant to the department's rules, that the applicant will use to significantly limit noise emissions from the site of such after hours work. Applications for such certification shall be submitted to the department in a form and manner to be set forth in the rules of the department. The applicant for an after hours authorization under this paragraph shall submit such certification to the issuing agency.

§24-224 Construction work without noise mitigation plan unlawful. It shall be unlawful to perform work at any construction site in the city that is not in compliance

with a noise mitigation plan where such plan is required pursuant to this subchapter and with the noise mitigation rules adopted pursuant to this subchapter. Notwithstanding any other provision of this code, construction work performed in accordance with a noise mitigation plan that is in full compliance with this subchapter and such rules shall be deemed to be in compliance with all decibel level limits set forth in other subchapters of this code. The provisions of this subchapter shall supercede all other provisions of this code relating to construction activities or devices that are inconsistent with or in conflict therewith.

SUBCHAPTER 5
PROHIBITED NOISE
SPECIFIC NOISE SOURCES – SOUND LEVEL STANDARD

§24-225 Refuse collection vehicles. (a) No person shall sell, offer for sale, operate or permit to be operated a refuse collection vehicle, equipped with a compacter, that produces a maximum sound level when the compacting mechanism is in the compacting cycle but not engaged in compacting a load that exceeds 80 dB(A), when measured by a sound level meter set for slow response at a distance of 35 feet or more from the compacting unit.

(b) It shall be unlawful to operate or cause to be operated a refuse collection vehicle, including such a vehicle equipped with a compacter, within 50 feet of any residential receiving property at or after 11:00 p.m. and before 7:00 a.m. if the aggregate sound, not including impulsive sound, generated by the collection and compacting activities exceeds 85 dB(A) when measured by a sound level meter set to slow response at a distance of 35 feet or more from the vehicle. On and after July 1, 2012 such aggregate sound shall not exceed 80 dB(A). The provisions of this subdivision shall not apply to the operation of refuse collection vehicles during an emergency such as a storm or other event that causes delays in refuse collection.

§24-226 Air compressors. (a) No person shall operate or cause to be operated an air compressor unless it is equipped with an appropriate muffler with no exhaust leaks.

(b) No person shall sell, offer for sale for use within the city of New York, or operate or permit to be operated an air compressor that, when operated, produces a maximum sound level, when measured at a distance of one meter or more from the nearest major surface of such air compressor, exceeding 80 dB(A) for sizes greater than 350 cfm or exceeding 75 dB(A) for sizes 350 cfm or less.

(c) Except for construction work outside the property line on a public right-of-way, no person shall operate or permit to be operated an air compressor so as to generate sound levels in excess of 75 dB(A) as measured at any receiving property.

§24-227 Circulation devices. (a) No person shall operate or permit to be operated a circulation device in such a manner as to create a sound level in excess of 42 dB(A) when measured inside a receiving property dwelling unit. The measurement shall be taken with the window or terrace door open at a point three feet from the open portion of the window or terrace door.

(b) On and after the effective date of this section, when a new circulation device is installed on any building lot or an existing device on any building lot is replaced, the cumulative sound from all circulation devices on such building lot owned or controlled by the owner or person in control of the new device being installed or the existing device being replaced shall not exceed 45 dB(A), when measured as specified in subdivision a of this section. For a period of two years after the effective date of this section, this subdivision shall not apply to the replacement of a circulation device that was installed

on any building lot prior to the effective date of this section by a device of comparable capacity.

(c) Except as otherwise provided in subdivision b of this section, with respect to circulation devices installed on any building lot prior to the effective date of this section, the sound level limit of 42 dB(A) referred to in subdivision a of this section shall apply to each individual device except that if the cumulative sound from all devices owned or controlled by the same person on a building lot exceeds 50 dB(A), when measured as specified in subdivision a of this section, the commissioner may order the owner or person in control of such devices to achieve a 5 dB(A) reduction in such cumulative sound level within not more than 12 months after the issuance of such order.

§24-228 Construction, exhausts and other devices. (a) No person shall operate or use or cause to be operated or used a construction device or combination of devices in such a way as to create an unreasonable noise. For the purposes of this section unreasonable noise shall include but shall not be limited to sound that exceeds the following prohibited noise levels:

(1) Sound, other than impulsive sound, attributable to the source or sources, that exceeds 85 dB(A) as measured 50 or more feet from the source or sources at a point outside the property line where the source or sources are located or as measured 50 or more feet from the source or sources on a public right-of-way.

(2) Impulsive sound, attributable to the source, that is 15 dB(A) or more above the ambient sound level as measured at any point within a receiving property or as measured at a distance of 15 feet or more from the source on a public right-of-way. Impulsive sound levels shall be measured in the A-weighting network with the sound level meter set to fast response. The ambient sound level shall be taken in the A-weighting network with the sound level meter set to slow response.

(b) Where a particular sound source or device is subject to decibel level limits and requirements specifically prescribed for such source or device elsewhere in this code, such specific decibel limits shall apply to such device or source. However, if aggregate sound levels from a construction site exceed the limits set forth in this section, compliance with such specific decibel limits shall not be a defense in any proceeding relating to a violation of this section.

§24-228.1 Exhausts. No person shall cause or permit discharge into the open air of the exhaust of any device, including but not limited to any steam engine, diesel engine, internal combustion engine, power tools, compressors or turbine engine, so as to create an unreasonable noise. For the purposes of this section unreasonable noise shall include but shall not be limited to sound that exceeds the prohibited noise levels set forth in section 24-228.

§24-229 Containers and construction material. (a) No person shall handle or transport or cause to be handled or transported on any public right-of-way any container or any construction material in such a way as to create an unreasonable noise. For the purposes of this section unreasonable noise shall include but shall not be limited to the following prohibited noise levels:

(1) Sound, other than impulsive sound, attributable to the source measured at a level of 10 dB(A) or more above the ambient sound level, as measured at any point within a receiving property or as measured at a distance of 15 feet or more from the source on a public right-of-way.

(2) Impulsive sound, attributable to the source, measured at a level of 15 dB(A) or more above the ambient sound level, as measured at any point within a receiving property or as measured at a distance of 15 feet or more from the source on a public

right-of-way. Impulsive sound levels shall be measured in the A-weighting network with the sound level meter set to fast response. The ambient sound level shall be taken in the A-weighting network with the sound level meter set to slow response.

(b) This section shall not apply to the operation of refuse collection vehicles regulated pursuant to section 24-225.

§24-230 Paving breakers. (a) No person shall operate or cause to be operated a paving breaker, other than one operated electrically or hydraulically, unless a pneumatic discharge muffler certified by the manufacturer of such muffler to provide a dynamic insertion loss of 5 dB(A) of the sound released from the air discharge of such paving breaker is installed on such air discharge.

(b) No person shall sell, offer for sale for use within the city of New York, operate or permit to be operated a paving breaker that when operated produces a maximum sound level that exceeds 95 dB(A), when measured at a distance of one meter or more from a face of such paving breaker.

§24-231 Commercial music. (a) No person shall make or cause or permit to be made or caused any music originating from or in connection with the operation of any commercial establishment or enterprise when the level of sound attributable to such music, as measured inside any receiving property dwelling unit:

(1) is in excess of 42 dB(A) as measured with a sound level meter; or

(2) is in excess of 45 dB in any one-third octave band having a center frequency between 63 hertz and 500 hertz (ANSI bands numbers 18 through 27, Inclusive), in accordance with American National Standards Institute standard S1.6-1984; or

(3) causes a 6 dB(C) or more increase in the total sound level above the ambient sound level as measured in decibels in the "C" weighting network provided that the ambient sound level is in excess of 62 dB(C).

(b) (1) The commissioner may recommend to the board that there shall be no civil penalty imposed for a first violation of this section if, within 30 days after the issuance of such violation or, if applicable, within the time granted by the commissioner pursuant to paragraph two of this subdivision, the respondent admits liability for the violation and files a certification with the department in a form and manner and containing such information and documentation as shall be prescribed in the department's rules that (i) permanent improvements or modifications have been made to the establishment, including but not limited to the installation of appropriate sound insulation, isolators, suspension mounting and/or sound mitigation devices or materials and (ii) appropriate sound measurements taken in accordance with the department's rules substantiate that the establishment is in full compliance with the sound levels set forth in this section. If the commissioner accepts such certification of compliance, he or she shall recommend to the board that no civil penalty shall be imposed for the violation. Such violation may nevertheless serve as a predicate for purposes of imposing penalties for subsequent violations of this section.

(2) Where the completion of appropriate permanent improvements or modifications and testing within 30 days after the issuance of the violation would cause the respondent undue hardship, the respondent may apply to the commissioner for additional time to submit an appropriate certification of compliance, but not more than 30 days. Application for such additional time must be submitted to the commissioner within 30 days after the issuance of the violation along with an admission of liability and appropriate documents in support of the claim of undue hardship.

(3) Nothing in this subdivision shall be construed to prohibit enforcement personnel from issuing additional notices of violation, summonses or appearance tickets where

sound levels exceed the limits set forth in subdivision a of this section during the periods of time set forth in paragraphs one and two of this subdivision for submission of a certification of compliance for a first violation.

(c) In any proceeding under this section it shall be an affirmative defense that the receiving property dwelling unit was not lawfully occupied at the time of the violation.

(d) The commissioner may grant a variance from strict application of the limits set forth in subdivision (a) of this section for a commercial establishment or enterprise that was in operation at the same site prior to the date of enactment of the local law that added this section if he or she finds that there are practical difficulties or unnecessary hardship in the application of such provisions in the specific case, provided that as a condition to the grant of any such variance, sufficient evidence or data is submitted by an applicant that there are physical conditions or zoning district conditions, including irregularity in lot size characteristics and zoning changes, and that as a result of such physical or zoning district conditions, practical difficulties or unnecessary hardship arise in complying with such provisions. In granting a variance the commissioner may impose such terms and conditions as he or she deems necessary to carry out the intent of this section to minimize noise emissions from the site. Application for a waiver shall be submitted in such form and manner as shall be provided by rules of the department and shall include in detail proposed measures which the applicant proposes will minimize sound from the site. A variance granted pursuant to this subdivision shall not be transferable but shall expire upon a change in ownership, size or location of the commercial establishment or enterprise in accordance with the rules of the department. Violation of the conditions of any variance shall be deemed to be a violation of this section.

§24-232 Allowable decibel levels-octave band measurement. (a) No person shall cause or permit a sound source operating in connection with any commercial or business enterprise to exceed the decibel levels in the designated octave bands shown below as measured within a receiving property as specified therein.

Octave Band	Maximum Sound Pressure Levels (dB) as measured within a receiving property as specified below	
Frequency (Hz)	Residential receiving property for mixed use buildings and residential buildings (as measured within any room of the residential portion of the building with windows open, if possible).	Commercial receiving property (as measured within any room containing offices within the building with windows open, if possible).
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	34	39
4000	33	38
8000	32	37

(b) All sources that are within the A-scale limits prescribed by any other section of this code must also comply with the octave band decibel levels as specified herein. Compliance with this section does not constitute a defense to violation of decibel limits set by any other section of this code.

(c) Measurements performed on residential property shall not be taken in non-living areas such as closets and crawlspaces.

(d) This section shall not apply to impulsive sound, music or construction devices or activities.

(e) This section shall not apply to any utility structure in existence prior to January 1, 2004. For the purposes of this subdivision the term "utility structure" means any electric substation owned or operated by an electric, gas, or steam utility subject to the jurisdiction of the New York state public service commission.

(f) This section shall not apply to any refuse collection facility owned, operated or regulated by the department of sanitation.

SUBCHAPTER 6
SPECIFIC NOISE SOURCES
PLAINLY AUDIBLE AND OTHER STANDARDS

§24-233 Personal audio devices. (a) No person shall operate or use or cause to be operated or used any personal audio device in such a manner as to create an unreasonable noise.

(b) For the purposes of this section unreasonable noise shall include but shall not be limited to:

(1) the operation or use of a personal audio device on or in any public right-of-way so that sound emanating from such device is plainly audible to another individual at a distance of 25 feet or more from the source.

(2) the operation or use of a personal audio device from on or inside a motor vehicle, whether moving, parked, stopped or standing, on or in any public right-of-way so that sound emanating from such device is plainly audible to another individual outside of such motor vehicle at a distance of 25 feet or more from the source.

(c) Nothing in this section shall be construed to permit the operation or use of a personal audio device where such operation or use would otherwise be prohibited pursuant to section 10-108 or 24-244 of the administrative code.

§24-234 Operation or use of sound reproduction device in or on rapid transit railroad, omnibus or ferry. It shall be unlawful to operate or use a sound reproduction device in or on any rapid transit railroad, omnibus or ferry, other than a personal audio device with personal earphones such that sound from such earphones is not plainly audible to another individual at a distance of 5 feet or more from the source.

§24-235 Animals. No person having charge, care, custody, or control of any animal shall cause or permit such animal to cause unreasonable noise including, but not limited to, any sound that is plainly audible at any location within any residential receiving property as set forth below:

(a) At or after 7 a.m. and before 10 p.m., continuously for a period of 10 minutes or more.

(b) At or after 10 p.m. and before 7 a.m., continuously for a period of 5 minutes or more.

§24-236 Motor vehicles. (a) Motor vehicles, other than motorcycles, with a maximum gross weight of 10,000 lbs. or less. No person shall cause or permit any motor vehicle, other than a motorcycle, with a maximum gross weight of 10,000 lbs. or less to

operate on a public right-of-way where the muffler or exhaust generates a sound that is plainly audible to another individual at a distance of 150 feet or more from the motor vehicle.

(b) Motorcycles. No person shall cause or permit any motorcycle to operate on a public right-of-way where the muffler or exhaust generates a sound that is plainly audible to another individual at a distance of 200 feet or more from the motorcycle.

(c) Motor vehicles with a maximum gross weight greater than 10,000 lbs. No person shall cause or permit any motor vehicle with a maximum gross weight greater than 10,000 lbs. to operate on a public right-of-way where the muffler or exhaust generates a sound that is plainly audible to another individual at a distance of 200 feet or more from the motor vehicle, except when compression brake systems are used in an emergency to stop the vehicle.

(d) (1) No person operating a motor vehicle containing a compression brake system or systems shall apply such compression brake system or systems except when such system or systems are used in an emergency to stop the vehicle.

(2) The department is authorized to post signs at every entry point of the city containing the following information: THE USE OF COMPRESSION BRAKE SYSTEMS IS PROHIBITED ON STREETS WITHIN NEW YORK CITY WHERE THE SPEED LIMIT IS 35 MILES PER HOUR OR LESS EXCEPT IN CASE OF AN EMERGENCY.

(e) No person shall cause or permit the total sound from a motor vehicle operating on any public right-of-way to exceed the sound level set forth in section 386 of the vehicle and traffic law and the rules adopted pursuant to such section.

(f) Subdivisions a, b, c and paragraph one of subdivision d of this section may only be enforced on streets where the speed limit is 35 miles per hour or less.

§24-237 Sound signal devices. (a) No person shall operate or use or cause to be operated or used any claxon installed on a motor vehicle, except as a sound signal of imminent danger or in connection with use as an audible motor vehicle burglar alarm as provided in section 24-238 of this code.

(b) No person shall operate or use or cause to be operated or used an air horn or gong installed on any motor vehicle other than as provided in section 24-241 of this code.

(c) No person shall operate or use or cause to be operated or used any steam whistle attached to any stationary boiler, except to give notice of the time to start and stop work or as a sound signal of imminent danger.

(d) No person shall operate or use or cause to be operated or used on any public right-of-way any electrically operated or electronic sound signal device (other than a safety device, such as but not limited to a car horn or back up signal, that is actually used for its intended purpose) attached to, on or in a motor vehicle, wagon or manually propelled cart from which food or any other items are sold or offered for sale when the vehicle is stopped, standing or parked. For the purposes of this subdivision the term "stopped" means the halting of a vehicle, whether occupied or not, except when necessary to avoid conflict with other traffic or in compliance with a police officer or other authorized enforcement officer or a traffic control sign or signal. The terms "standing" and "parked" shall be as defined in the vehicle and traffic law.

§24-238 Audible burglar alarm and audible status indicator. (a) No owner of a building or of a motor vehicle shall have in operation an audible burglar alarm thereon unless such burglar alarm shall be capable of and shall automatically terminate its operation within fifteen minutes of its being activated in the case of a building, and three

minutes of its being activated in the case of a motor vehicle. No audible burglar alarm on a motor vehicle shall be capable of being activated except by:

(i) direct physical contact with that motor vehicle; or

(ii) through the use of an individual remote activation device, that is activated from no further than 15 feet away from such vehicle and, that is designed to be used with the audible burglar alarm system of a particular vehicle which alarm shall be capable of and shall terminate its audible response within three minutes of its being activated.

(b) No owner of a motor vehicle shall have in operation an audible status indicator on such motor vehicle.

§24-239 Audible burglar alarm or audible status indicator may be disconnected. (a) Notwithstanding the provisions of section 24-238, any member of the police department shall have the right to take such steps as may be reasonable and necessary to disconnect any audible burglar alarm or audible status indicator that is installed on a motor vehicle at any time during the period of its activation.

(b) The operator of any motor vehicle on which an audible burglar alarm or audible status indicator has been installed shall when parked on a public highway or parking lot open to the public, prominently display the number and telephone number of the owner's local police precinct where information shall be on file to permit communication with the owner of such vehicle.

§24-240 Removal of vehicle with audible burglar alarm or audible status indicator. (a) Notwithstanding the provisions of section 24-239, any member of the police department may arrange for the removal of a motor vehicle from a public highway or parking lot open to the public, when:

(i) an audible burglar alarm installed on such vehicle is operated in violation of this code or an audible status indicator is operated on such vehicle; and

(ii) all reasonable and necessary steps to disconnect such alarm or audible status indicator have been taken without success. Authorized personnel of the department or the department of transportation may request a member of the police department to arrange for removal of such vehicle. When such removal is requested, the notice of violation for operation of an audible burglar alarm in violation of this section or for operation of an audible status indicator shall state that a member of the police department took all reasonable and necessary steps to disconnect such alarm or such audible status indicator without success. Such removal may be accomplished by utilizing any existing city-operated tow-program, rotation tow program established pursuant to section 20-519 of the code or such other procedures as may be established. The cost of towing and storage of such motor vehicle shall be the responsibility of the owner or other person who claims such vehicle.

(b) An opportunity for a hearing before the board shall be provided to the owner of a motor vehicle removed pursuant to this section within five business days after a request for a hearing is made to determine whether there was a basis for such removal. The board shall render a decision within two business days following the conclusion of the hearing. If it is determined that there was no basis for removal of a vehicle pursuant to this section, the owner of such vehicle may recover from the city any amounts paid by such owner for towing and storage.

§24-241 Emergency signal devices. (a) No person shall operate or use or cause to be operated or used any emergency signal device, except on an authorized emergency vehicle when such vehicle is in the act of responding to an emergency; provided that such device shall not be operated for a period of time longer than is necessary to respond to such emergency. Notwithstanding the foregoing, such a device on a motor

vehicle shall be lawful if designed and used solely as an audible motor vehicle burglar alarm in accordance with section 24-238 and a device attached to a vehicle for the purpose of providing an audible warning when the vehicle is backing up shall be permitted even though the audible warning may consist of a gong or bell sound.

(b) No person shall operate or permit to be operated an emergency signal device installed on an authorized emergency vehicle that when operated at the maximum level creates a sound level in excess of 90 dB(A) when measured at a distance of fifty feet from the center of the forward face of such vehicle. Within one year after the effective date of this subdivision and every two years thereafter, emergency signal devices installed on authorized emergency vehicles shall be tested and certification shall be submitted, in a form approved by the department, that such devices meet the standard set forth in this subdivision for operation at maximum level. Notwithstanding the foregoing provisions, where compliance with the provisions of this subdivision would create an undue hardship, the owner or operator of an authorized emergency vehicle may submit a plan to the commissioner for emergency signal devices to meet the standard set forth in this subdivision within two years after the effective date of this subdivision. Such plan shall be submitted within one year after the effective date of this subdivision in lieu of the required certification. This subdivision shall not apply to authorized emergency vehicles of the police department, fire department or authorized emergency vehicles responding to medical emergencies.

§24-242 Lawn care devices. (a) No person shall operate or use or cause to be operated or used any lawn care device:

(1) On weekdays before eight a.m. and after seven p.m. or sunset, whichever occurs later; or

(2) On weekends and New York state and federal holidays before nine a.m. and after six p.m.; or

(3) At any time in such a way as to create an unreasonable noise. For the purposes of this section unreasonable noise shall include but shall not be limited to an aggregate sound level of 75 dB(A) or more, attributable to the source or sources, as measured at any point within a receiving property. The provisions of paragraph (1) of this subdivision shall not apply to an employee of the department of parks and recreation or an agent or contractor of the department of parks and recreation who operates or uses or causes to be operated or used any lawn care device between the hours of seven a.m. and eight a.m. in any location more than three hundred feet from any building that is lawfully occupied for residential use. The distance of three hundred feet shall be measured in a straight line from the point on the exterior wall of such building nearest to any point in the location at which such lawn care device is operated or used or caused to be operated or used.

(b) No person shall operate or use or cause to be operated or used any leaf blower not equipped with a functioning muffler.

§24-243 Snow blowers. The provisions of this code shall not apply to the operation of a snow blower for the purpose of complying with subdivision a of section 16-123 of the administrative code.

§24-244 Sound reproduction devices. (a) Except as otherwise provided in section 10-108 of the code, no person shall operate or use or cause to be operated or used any sound reproduction device in such a manner as to create unreasonable noise.

(b) No person shall operate or use or cause to be operated or used any sound reproduction device, for commercial or business advertising purposes or for the purpose of attracting attention to any performance, show, sale or display of merchandise, in

connection with any commercial or business enterprise (including those engaged in the sale of radios, television sets, compact discs or tapes), (i) outside or in front of any building, place or premises or in or through any aperture of such building, place or premises, abutting on or adjacent to a public street, park or place; (ii) in or upon any vehicle operated, standing or being in or on any public street, park or place; (iii) from any stand, platform or other structure; (iv) from any airplane or other device used for flying, flying over the city; (v) from any boat on the waters within the jurisdiction of the city; or (vi) anywhere on the public streets, public sidewalks, parks or places where sound from such sound reproduction device may be heard upon any public street, sidewalk, park or place. Nothing in this section is intended to prohibit incidental sounds emanating from a sporting or an entertainment or a public event for which a permit under section 10-108 of the code has been issued.

§11. Paragraph (5) of subdivision (b) of section 24-257 of such code is amended to read as follows:

(5) Impose a civil penalty in each instance in an amount as set out in table [V] *I* against any person who violates a provision of this code, or of any order, rule or regulation promulgated by the commissioner or the board. Each day during which such violation continues shall constitute a separate violation. The board may remit, in whole or in part, such a civil penalty if, at the conclusion of the hearing or at the time of the board determination under section 24-266 of this code, the respondent is no longer in violation of a provision of this code, or of any order, rule or regulation promulgated by the commissioner or the board;

§12. Table V following paragraph (5) of section 24-257 of such code is REPEALED and a new table I is added following such paragraph (5) to read as follows:

TABLE I

Civil Penalties

Violations related to section and subdivision	***First Violation***		***Second Violation****		***Third and Subsequent Violations****	
	Maxi-mum	***Mini-mum***	***Maxi-mum***	***Mini-mum***	***Maxi-mum***	***Mini-mum***
24-216 (d)	*2,625*	*650*	*5,250*	*1,300*	*7,875*	*1,950*
24-218	*1,000*	*350*	*2,000*	*700*	*3,000*	*1,050*
24-218.1	*50*	*50*	*50*	*50*	*50*	*50*
24-220	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-222	*3,500*	*875*	*7,000*	*1,750*	*10,500*	*2,625*
24-223	*3,500*	*875*	*7,000*	*1,750*	*10,500*	*2,625*
24-224	*3,500*	*875*	*7,000*	*1,750*	*10,500*	*2,625*
24-225	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-226	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-227	*875*	*220*	*1,750*	*440*	*2,625*	*660*
24-228	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-229	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-230	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-231 (a)	*8,000*	*2,000*	*16,000*	*4,000*	*24,000*	*6,000*
24-231 (b)	*1,750*	*440*	*3,500*	*880*	*5,250*	*1,320*
24-231 (c)	*875*	*350*	*1750*	*700*	*2,625*	*1,050*
24-232	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-233 (a)	*175*	*50*	*350*	*100*	*525*	*150*
24-233 (b) (1)	*175*	*50*	*350*	*100*	*525*	*150*

24-233 (b) (2)	*350*	*100*	*700*	*200*	*1,050*	*300*
24-234	*175*	*50*	*350*	*100*	*525*	*150*
24-235	*175*	*50*	*350*	*100*	*525*	*150*
24-236 (a)	*525*	*150*	*1050*	*300*	*1,575*	*450*
24-236 (b) (c) (d)	*1,440*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-237 (a)	*1,000*	*150*	*2,000*	*300*	*3,000*	*450*
24-237 (b)	*875*	*220*	*1,750*	*440*	*2,625*	*660*
24-237 (c)	*875*	*220*	*1,750*	*440*	*2,625*	*660*
24-237 (d)	*1,000*	*350*	*2,000*	*700*	*3,000*	*1,050*
24-238	*875*	*220*	*1,750*	*440*	*2,625*	*660*
24-239 (b)	*350*	*100*	*700*	*200*	*1,050*	*300*
24-241	*1,400*	*440*	*2,800*	*880*	*4,200*	*1,320*
24-242	*875*	*220*	*1,750*	*440*	*2,625*	*660*
24-244	*1750*	*440*	*3,500*	*880*	*5,250*	*1,320*
24-245	*2,625*	*660*	*5,250*	*1,320*	*7,875*	*1,980*
All remaining sections and subdivisions	*875*	*220*	*1,750*	*440*	*2,625*	*660*

* *By the same respondent of the same provision of law, order, rule or regulation and, if the respondent is the owner, agent, lessee or other person in control of the premises with respect to which the violation occurred, at the same premises (all violations committed within two years).*

§13. Paragraph (3) of subdivision (c) of section 24-257 of such code is amended to read as follows:

(3) order any person not in possession of [a variance] *an after hours work authorization* issued pursuant to [subdivision (b) of section 24-224] *section 24-223* of this code to cease and desist from construction activities other than during the permissible hours specified in [subdivision (a) of section 24-224] *section 24-222* of this code and the board may also seal any device used in such construction activities;

§14. Subdivision (f) of section 24-257 of such code is amended to read as follows:

(f) (1) The board may order any person to cease and desist from an activity which it reasonably believes causes unreasonable noise which creates imminent peril to the public health and well being, or to cease and desist from an activity which it reasonably believes constitutes a willful or continued violation of any provision of this code or order or regulation, promulgated by the commissioner or board. Such order shall be effective upon service thereof. Any party affected by such an order may request a hearing on written notice, and he or she shall be afforded a hearing, within twenty-four hours after service of such request, pursuant to section 24-263 of this code. If such an accelerated hearing is not requested, then a hearing shall be afforded within ten days of the issuance of the order. The board shall issue its final decision and order thereon within three days from the conclusion of a hearing held pursuant to this subdivision.

[(2) The board may rescind in whole or in part a variance issued by an agency of the city of New York pursuant to subdivision (b) of section 24-224 of this code. Such order shall be effective upon service thereof upon such agency and upon the person to whom such variance was issued.]

§15. Section 24-258 of such code is amended to read as follows:

§ 24-258 The board. (a) The board shall be convened by the chairperson or in the chairperson's absence the assistant commissioner of [air resources] *environmental compliance*, or at the request of any three members thereof.

(b) If a member of the board has presided over the initial hearing, he or she shall not be disqualified from reviewing the hearing.

(c) Five members of the board, at least two of who shall not be city officials, shall constitute a quorum.

§16. All actions and proceedings, civil or criminal, or administrative proceedings commenced under or by virtue of any provision repealed by this local law and pending immediately prior to the taking effect of such repeal may be prosecuted and defended to final effect in the same manner as they might if such provisions were not so repealed.

§17. On or prior to January 1, 2007 the commissioner of environmental protection shall promulgate noise mitigation rules in accordance with section 24-219 of the administrative code, as added by section 10 of this local law.

§18. This local law shall take effect on July 1, 2007 provided that prior to such effective date agencies may promulgate rules or take other administrative actions necessary for the timely implementation of this local law including the appointment of any advisory committee and provided further that section 17 of this local law shall take effect immediately upon its enactment into law.

THE CITY OF NEW YORK, OFFICE OF THE CITY CLERK, s.s.:

I hereby certify that the foregoing is a true copy of a local law of the City of New York, passed by the Council on December 21, 2005 and approved by the Mayor on December 29, 2005.

VICTOR L. ROBLES, City Clerk of the Council

CERTIFICATION PURSUANT TO MUNICIPAL HOME RULE LAW §27

Pursuant to the provisions of Municipal Home Rule Law §27, I hereby certify that the enclosed Local Law (Local Law 113 of 2005, Council Int. No. 397-A) contains the correct text and:

Received the following vote at the meeting of the New York City Council on December 21, 2005: 47 for, 0 against, 0 not voting.

Was signed by the Mayor on December 29, 2005.

Was returned to the City Clerk on December 30, 2005.

JEFFREY D. FRIEDLANDER, Acting Corporation Counsel

APPENDIX C

Site Map – Williamsburg Works Former MGP Site
Six Receptor Locations

Ambient Sound Monitoring Locations

Ambient Vibration Study
Williamsburg Works
Former MGP Site
50 Kent Avenue Parcel
Brooklyn, New York

Prepared for:

Mr. Colin Wasteneys
URS Corporation
77 Goodell Street
Buffalo, New York 14203

Prepared by:

Vibra-Tech Engineers, Inc.
109 E. First Street
Hazleton, Pennsylvania 18201
(800) 233-6181

May 10, 2012

Ambient Vibration Study
Williamsburg Works
Former MGP Site

Introduction

An ambient vibration study was carried out by Vibra-Tech Engineers, Inc. in the area surrounding the former MGP site at 50 Kent Avenue, Brooklyn, New York. The study was authorized by Mr. Colin Wasteneys of URS Corporation for the purpose of measuring ambient vibration levels around the perimeter of the 50 Kent Avenue Parcel prior to the start of the project. Vibration measurements were taken from April 23 to April 29, 2012.

Scope and Conditions of Monitoring

Vibration Monitoring

Six (6) Vibra-Tech Multiseis seismograph systems equipped with triaxial geophones were installed to record vibrations during this study. The seismograph systems are laboratory calibrated on an annual basis. A calibration check was completed by a technician prior to the study and the systems were programmed to check the calibration after each day of recording. Table 1 below gives the location, seismograph serial number, description, and GPS coordinate of the remote seismographs utilized during this study. A map showing monitoring locations is located in Appendix A.

Table 1. Monitoring Locations for the Ambient Vibration Study Conducted from April 23-29, 2012

Location	Seismograph Serial Number	Description	GPS
1	BD8002	20 N. 12th Street Block 2287 - South Corner	N 40° 43’ 24.02” W 73° 57’ 38.02”
2	BF11110	Block 2294 Lot 1 - North Side of Building	N 40° 43’ 22.24” W 73° 57’ 36.30”
3	BD6674	51 Kent Avenue - North Corner	N 40° 43’ 20.67” W 73° 57’ 33.76”
4	BD8340	35 Kent Avenue Block 2288 Lot 1 - North Corner	N 40° 43’ 22.62” W 73° 57’ 31.43”
5	BF14209	Block 2277 Lot 1 - South of Building	N 40° 43’ 24.27” W 73° 57’ 33.02
6	BF10975	20 N. 12th Street Block 2287 - Northeast Corner	N 40° 43’ 25.49” W 73° 57’ 36.07”

Instrumentation

The seismographs used directly measure particle velocity in three mutually perpendicular planes of motion. The seismographs have a range up to 10 in/sec. Each system has a sample rate of 1,024 samples per second per channel. The entire system is calibrated internally prior to each recording in addition to an annual shake table calibration.

The seismographs were programmed to monitor and record the highest peak particle velocity at 1 minute intervals at 1,024 samples/second/channel.

Vibration and Vibration Measurements

The measurement of vibration involves quantifying the rate and amount of oscillation occurring in a vibrating body. The rate of motion, or the number of vibrations occurring in a given time frame, usually one second, is called the frequency of the motion, which is described as the number of cycles/second (cps) or Hertz (Hz).

The amount of movement associated with a vibration can be measured in terms of displacement, velocity, or acceleration. Displacement is a measure of the physical distance traveled from a position of equilibrium or base line. Velocity is a measure of the speed at which the displacement occurred and acceleration is a measure of the change in velocity occurring during the vibration event. The relationships between displacement, velocity, and acceleration are also dependent upon the frequency of the motions measured. For this project Vibra-Tech will provide the results in terms of peak particle velocity.

In order to completely describe the ground motion, three perpendicular components of the motion must be measured. The longitudinal component (L) is a measurement in a direct line from the source to the monitoring location. The remaining components are vertical (V) and transverse (T), which is perpendicular to the longitudinal component.

Results of the Monitoring

Daily Summary for Each Location

A summary of the peak particle velocity vibration data collected from the six monitoring locations can be found in Table 2. Table 2 shows the peak particle velocity in inches per second for each channel at each location and the percentage of data measured at specified frequencies for each channel at each location. The results from the vibration monitoring are displayed in graphical format in Appendix B of this report. Each sheet (event report) contains three plots representing vibration amplitudes for each plane of motion.

Table 2: Ambient Vibration Data Measured at Each Location - April 23 through April 29, 2012

Geophone Location	Measured Peak Particle Velocity (in/sec)	Percent of Measured Frequency		
		< 20 Hz	20-40 Hz	> 40 Hz
Location #1	0.020 (L)	0 .00% (L)	0 .00% (L)	100% (L)
20 N. 12th Street	0.015 (T)	0.04% (T)	0.05% (T)	99.91% (T)
Block 2287 - Southwest Corner	0.040 (V)	0.06% (V)	0.29% (V)	99.65% (V)
Location #2	0.040 (L)	0.03% (L)	0.28% (L)	99.69% (L)
Block 2294 Lot 1	0.020 (T)	0.29% (T)	0.55% (T)	99.16% (T)
North Side of Building	0.055 (V)	0.00% (V)	0.09% (V)	99.91% (V)
Location #3	0.085 (L)	0.01% (L)	0.02% (L)	99.97% (L)
51 Kent Avenue	0.040 (T)	0.04% (T)	0.22% (T)	99.74% (T)
North Corner	0.090 (V)	0.03% (V)	0.09%(V)	99.88% (V)
Location #4	0.015 (L)	0.00% (L)	0.01% (L)	99.99% (L)
35 Kent Avenue	0.030 (T)	59.46% (T)	12.49% (T)	28.05% (T)
Block 2288 Lot 1 - North Corner	0.080 (V)	6.96% (V)	30.74% (V)	62.30% (V)
Location #5	0.025 (L)	0.01% (L)	0.03% (L)	99.96% (L)
Block 2277 Lot 1	0.015 (T)	0.00%(T)	0.01% (T)	99.99% (T)
7 feet South of Building	0.060 (V)	0.01% (V)	0.03% (V)	99.96% (V)
Location #6	0.035 (L)	0.00% (L)	0.00% (L)	100% (L)
20 N. 12th Street	0.045 (T)	0.00% (T)	0.00% (T)	100% (T)
Block 2287 - Northeast Corner	0.100(V)	0.00% (V)	0.00% (V)	100% (V)

Conclusion

Please refer to our original seismograph records in Appendix A for specific recording locations and intensities. If you have any questions or we may be of further assistance, please contact our office.

Sincerely,

VIBRA-TECH ENGINEERS, INC.

Mark Edwards
Vibration and Sound Analyst

Douglas Rudenko
Vice President

Appendix A

Location #6
N 11th St
Location #1
Location #5
Kent Ave
Location #4
Location #2
N 10th St
Location #3

Appendix B

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	11:42:41 April 22, 2012
Histogram Finish Time	23:59:00 April 22, 2012
Number of Intervals	736 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8002 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	J002E91F.751

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

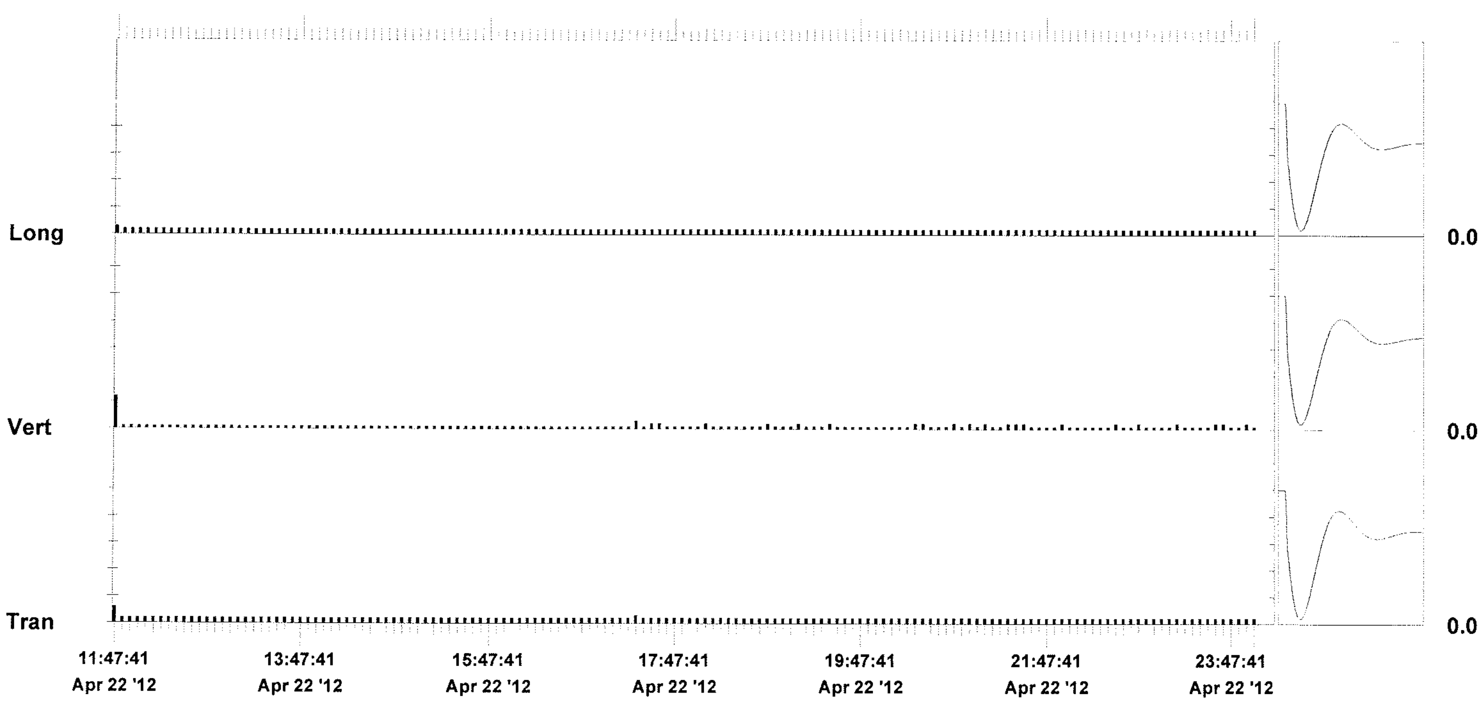
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0300	0.0600	0.0150	in/s
ZC Freq	73	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	11:43:41	11:43:41	11:43:41	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.3	7.3	Hz
Overswing Ratio	3.9	4.4	4.2	

Peak Vector Sum 0.0673 in/s on April 22, 2012 at 11:43:41

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 23, 2012	**Serial Number**	BD8002 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 23, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	February 8, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J002E92D.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

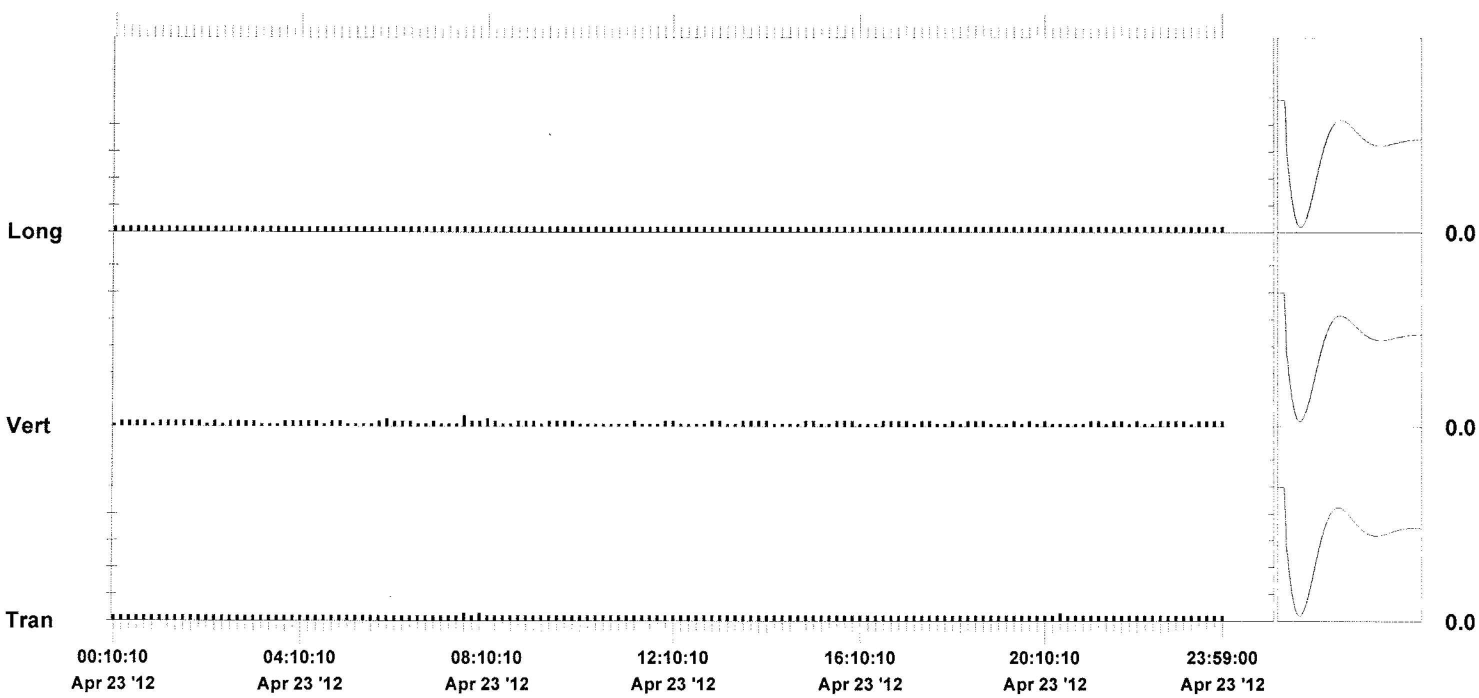
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0150	0.0200	0.01000	in/s
ZC Freq	18	17	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	07:38:10	07:38:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.4	7.4	Hz
Overswing Ratio	3.9	4.3	4.2	

Peak Vector Sum 0.0255 in/s on April 23, 2012 at 07:38:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 24, 2012
Histogram Finish Time	23:59:00 April 24, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8002 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	J002E948.0A1

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

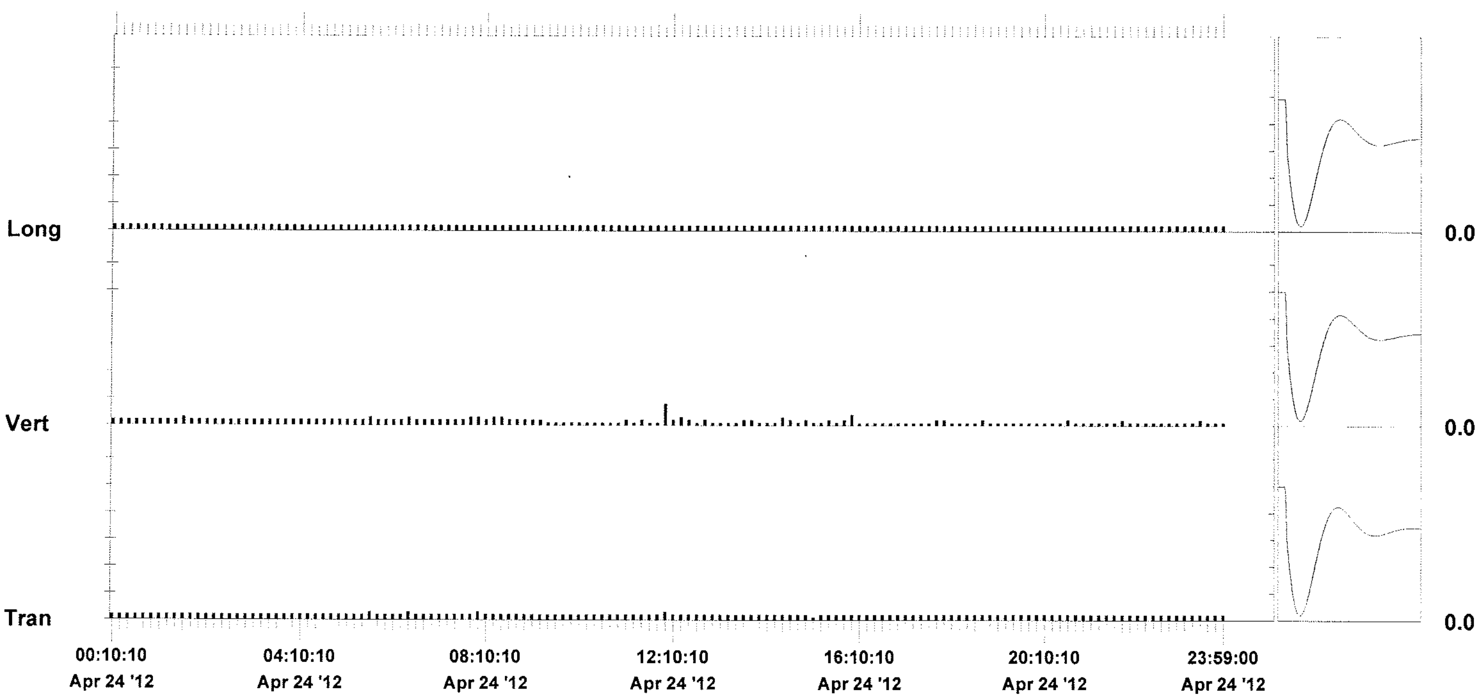
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0400	0.01000	in/s
ZC Freq	18	>100	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	05:31:10	11:59:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.3	7.3	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0439 in/s on April 24, 2012 at 11:59:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 25, 2012
Histogram Finish Time	23:59:00 April 25, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8002 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	J002E962.OA1

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

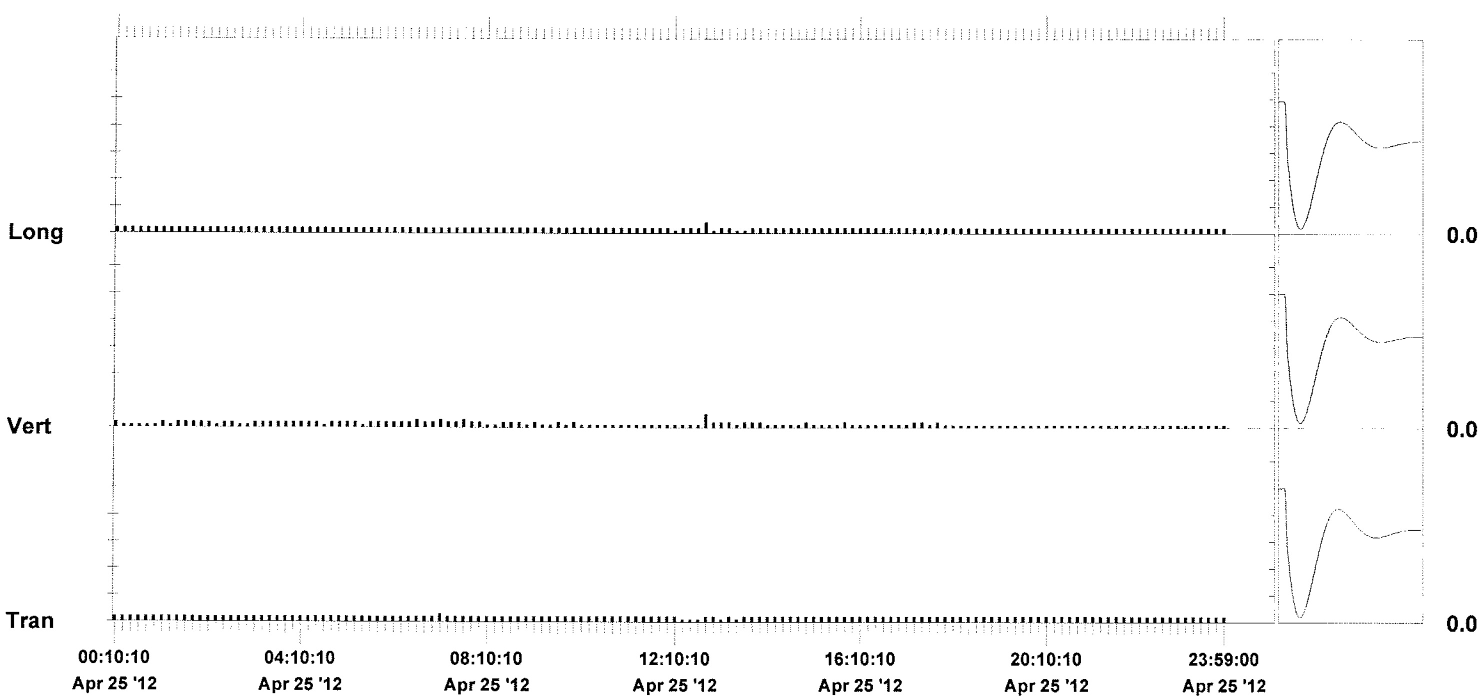
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0250	0.0200	in/s
ZC Freq	22	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	07:01:10	12:48:10	12:48:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.4	7.4	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0255 in/s on April 25, 2012 at 12:48:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 26, 2012
Histogram Finish Time	23:59:00 April 26, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8002 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	J002E97X.CA1

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

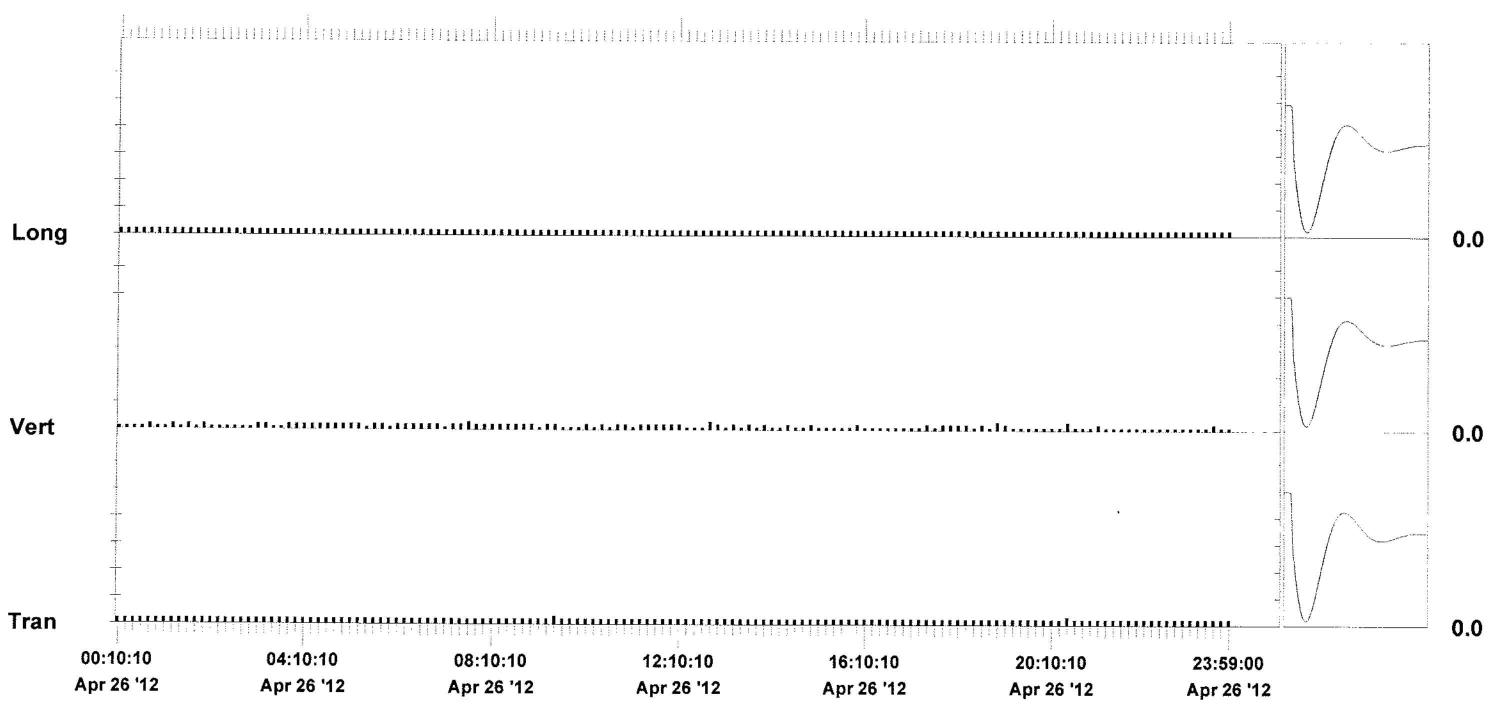
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	23	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	09:25:10	07:39:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.3	7.3	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0187 in/s on April 26, 2012 at 07:39:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 27, 2012
Histogram Finish Time	23:59:00 April 27, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8002 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	J002E99S.0A1

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

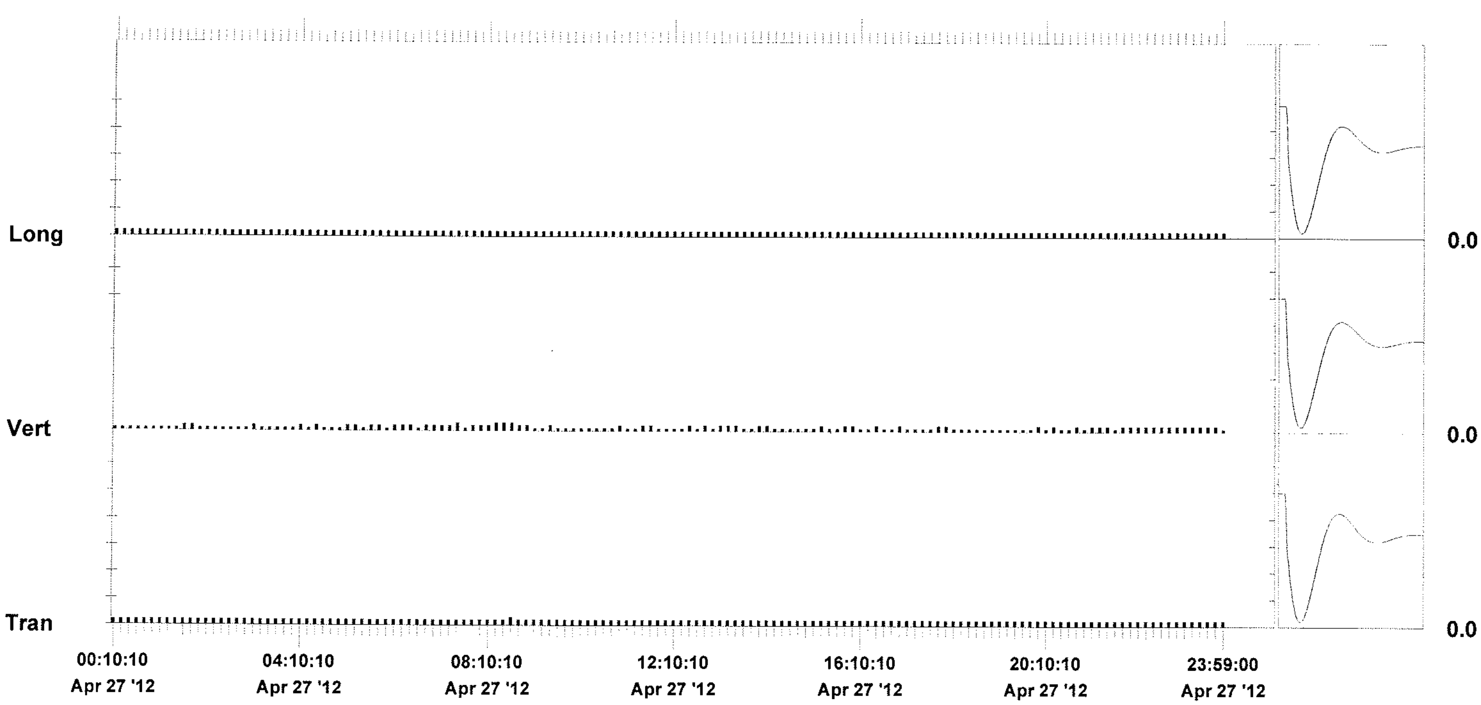
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	18	15	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	08:36:10	07:22:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.4	7.4	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0187 in/s on April 27, 2012 at 07:22:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 28, 2012	**Serial Number**	BD8002 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 28, 2012	**Battery Level**	6.8 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	February 8, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J002E9BM.OA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

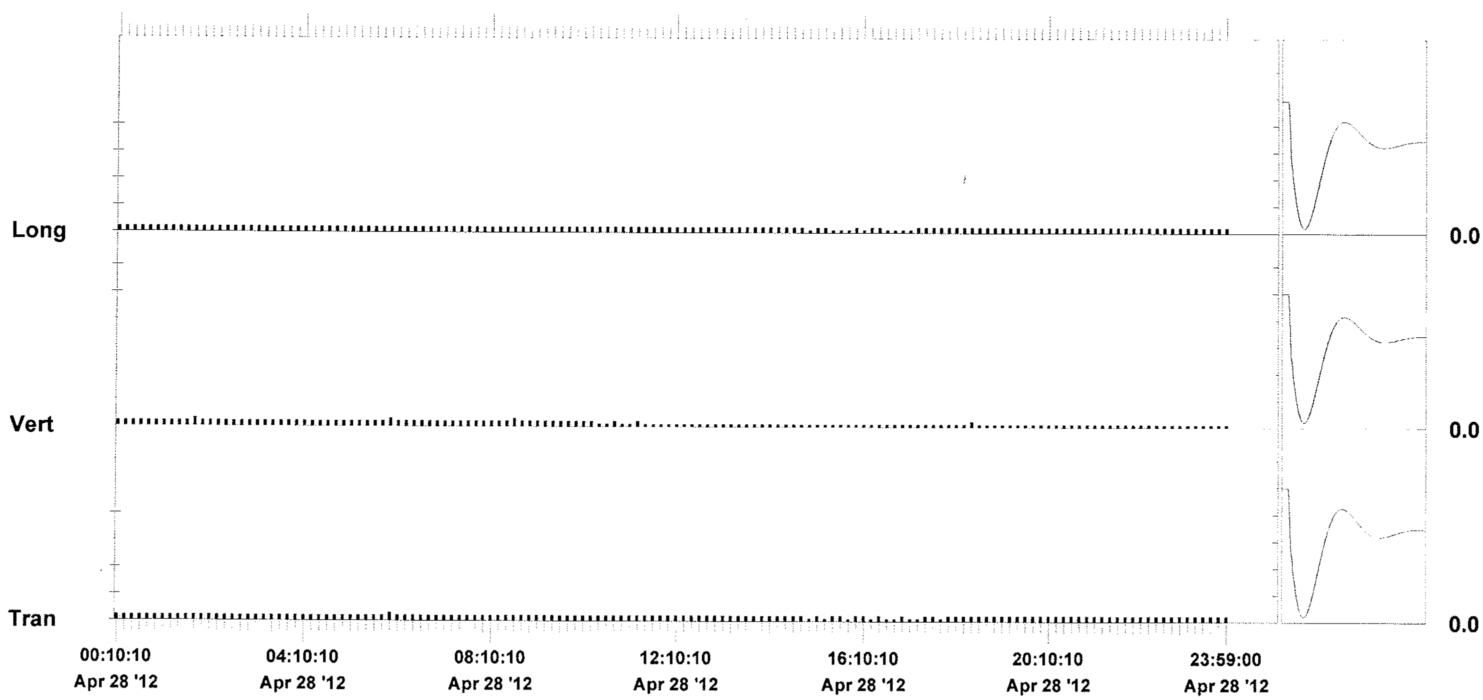
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	24	39	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	05:59:10	01:44:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.4	7.4	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0187 in/s on April 28, 2012 at 01:44:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 29, 2012
Histogram Finish Time	23:59:00 April 29, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8002 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	J002E9DH.CA1

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

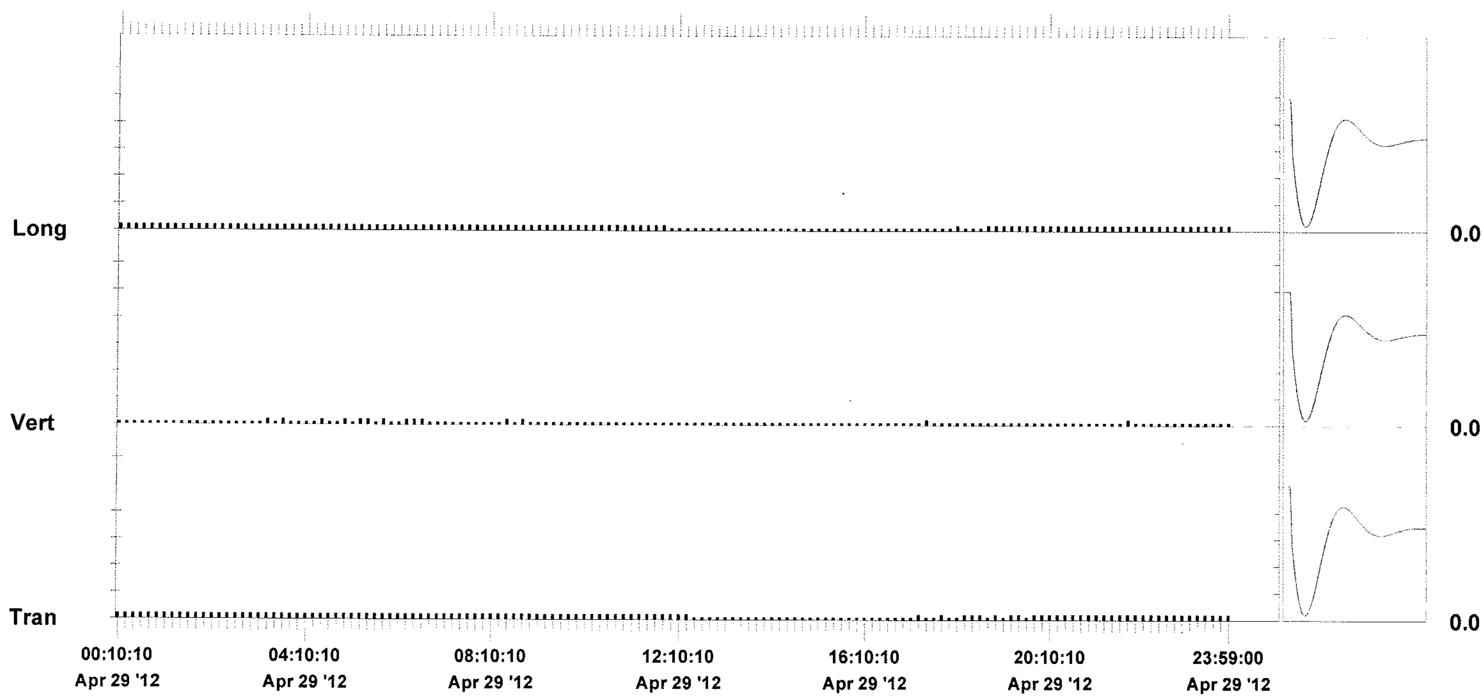
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	00:01:10	03:18:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.3	7.3	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0173 in/s on April 29, 2012 at 06:15:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 30, 2012	**Serial Number**	BD8002 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	10:40:55 April 30, 2012	**Battery Level**	6.8 Volts
Number of Intervals	640 at 1 minute	**Calibration**	February 8, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J002E9FC.0A1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #1
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

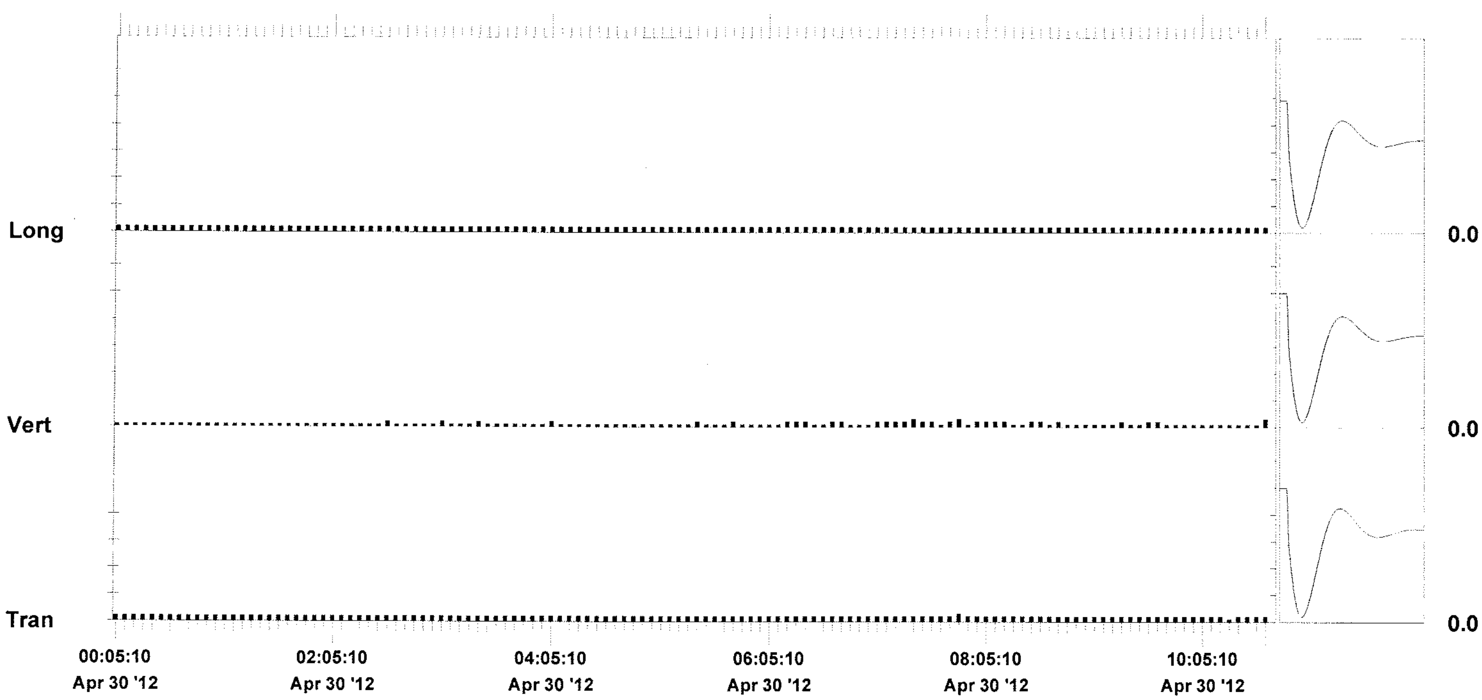
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	23	27	>100	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	07:47:10	07:24:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.4	7.3	Hz
Overswing Ratio	3.8	4.3	4.1	

Peak Vector Sum 0.0187 in/s on April 30, 2012 at 07:24:10

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	12:23:01 April 22, 2012
Histogram Finish Time	23:59:00 April 22, 2012
Number of Intervals	695 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF11110 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	M110E91H.2D1

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

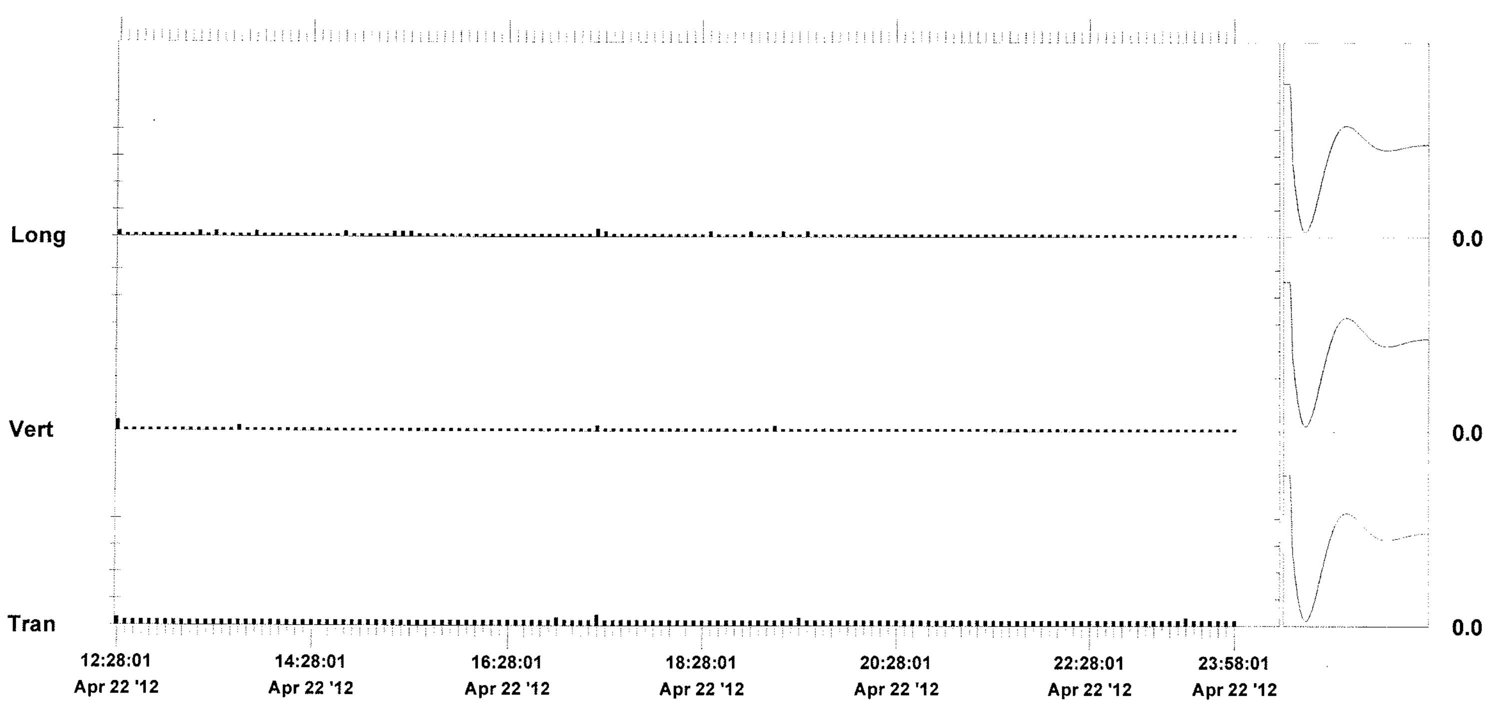
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0200	0.0150	in/s
ZC Freq	20	>100	22	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	17:21:01	12:24:01	17:21:01	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0229 in/s on April 22, 2012 at 17:21:01

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 23, 2012	**Serial Number**	BF11110 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 23, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	February 8, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	M110E92D.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

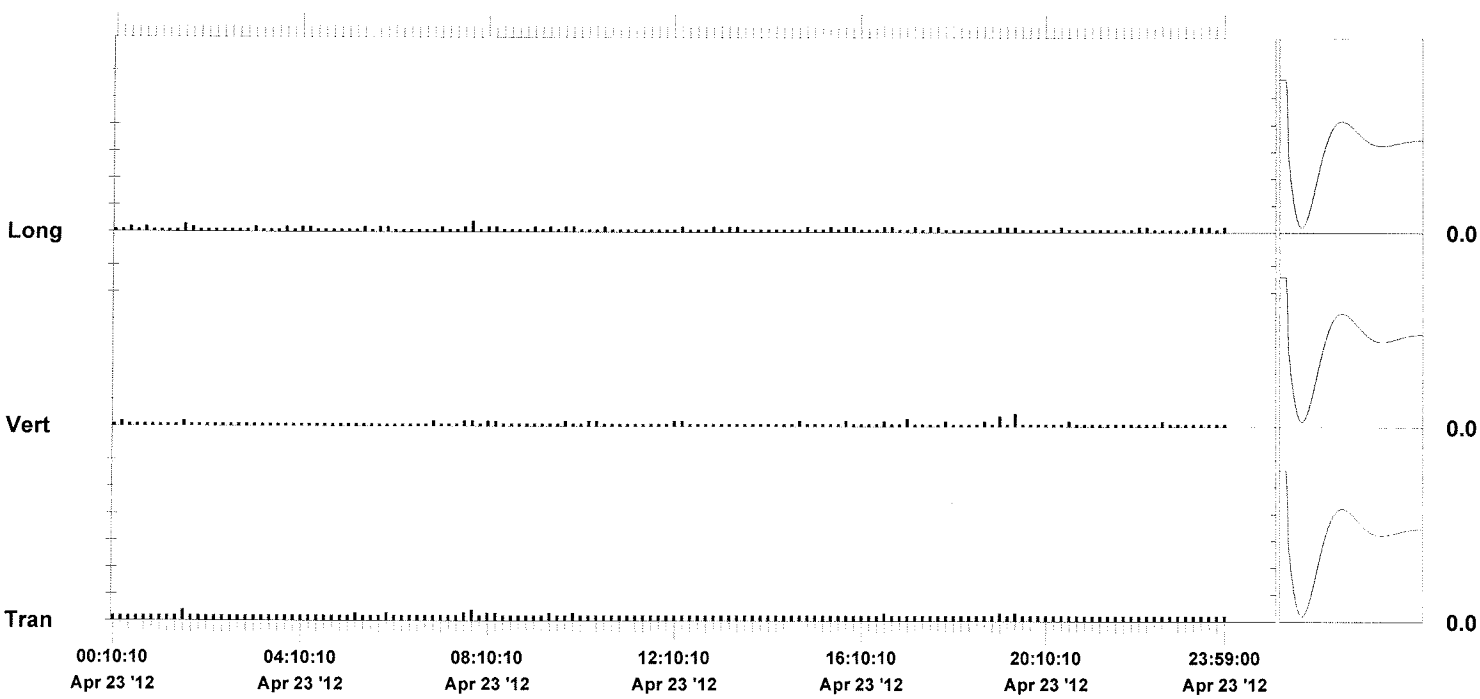
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0200	0.0250	0.0200	in/s
ZC Freq	18	>100	22	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	01:33:10	19:21:10	07:42:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0255 in/s on April 23, 2012 at 07:42:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 24, 2012
Histogram Finish Time	23:59:00 April 24, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF11110 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	M110E948.0A1

Notes

Location:	Location #2
Client:	URS - Williamsburg Works
User Name:	Vibra-Tech Engineers, Inc.
General:	

Extended Notes

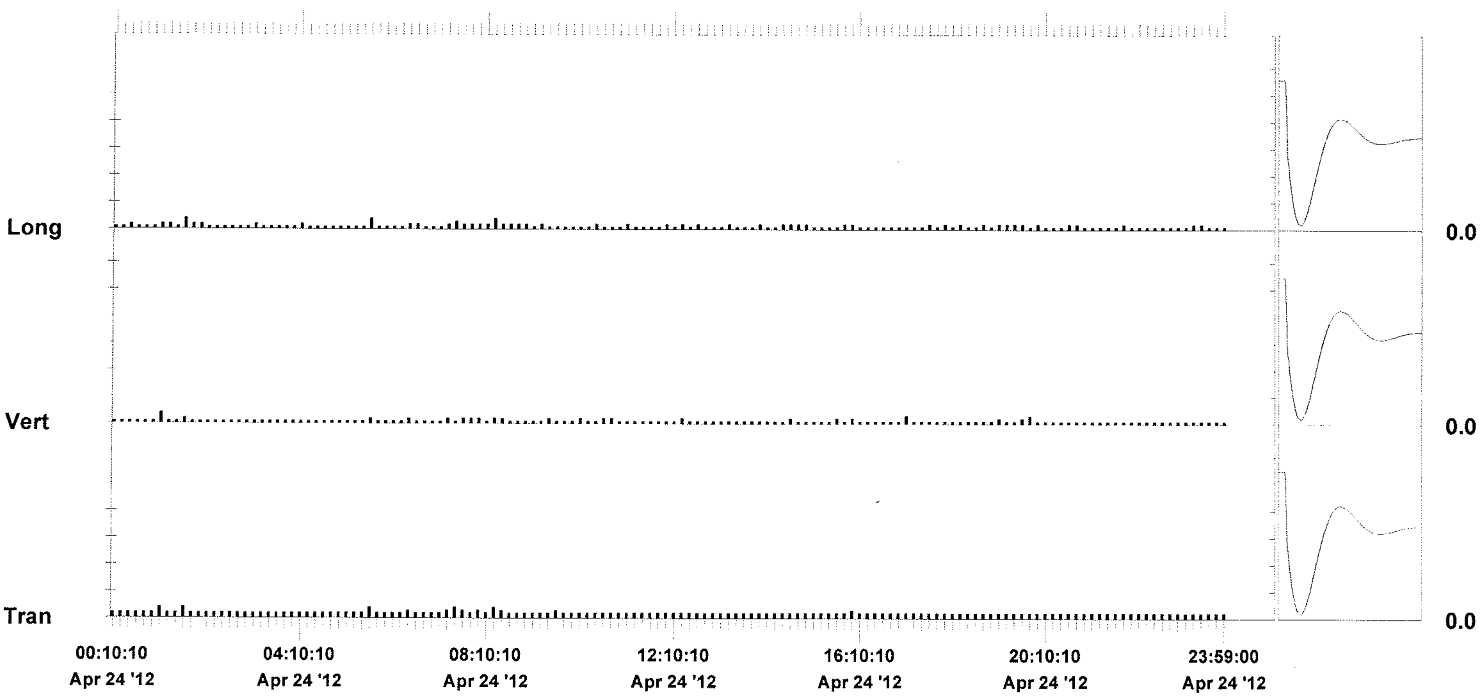
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0200	0.0200	in/s
ZC Freq	28	43	21	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	01:01:10	01:01:10	01:37:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0255 in/s on April 24, 2012 at 01:01:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 25, 2012	**Serial Number**	BF11110 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 25, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	February 8, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	M110E962.OA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

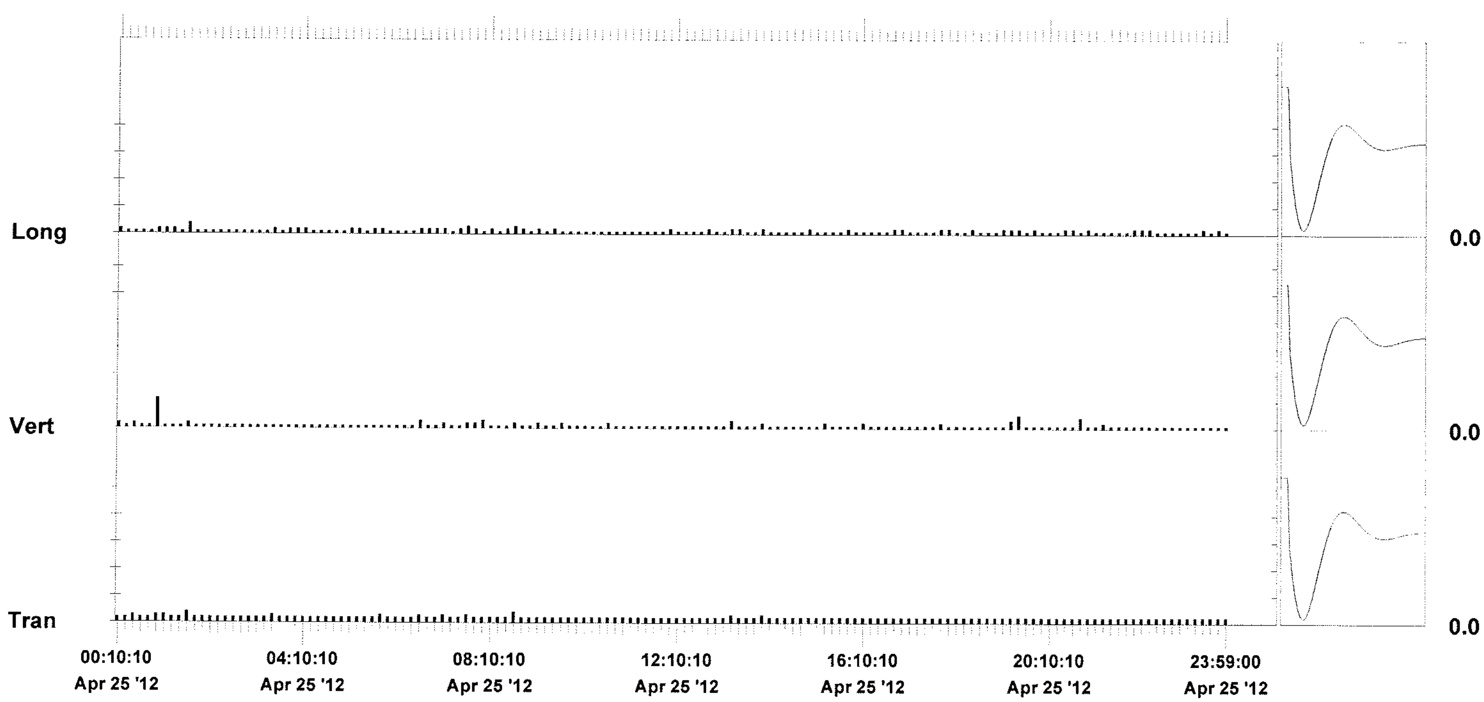
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0200	0.0550	0.0200	in/s
ZC Freq	18	39	19	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	01:39:10	01:00:10	01:39:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0555 in/s on April 25, 2012 at 01:00:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 26, 2012
Histogram Finish Time	23:59:00 April 26, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF11110 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	M110E97X.CA1

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

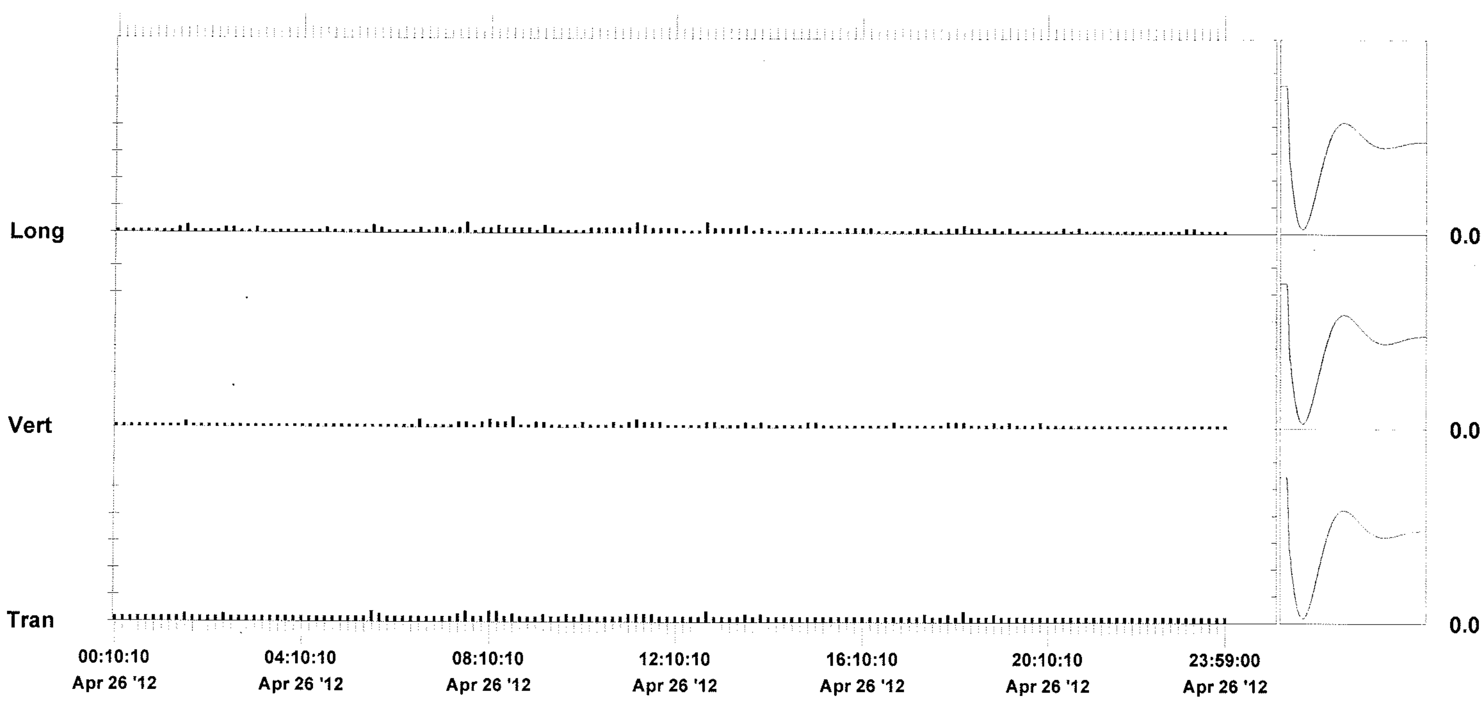
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0200	0.0200	in/s
ZC Freq	20	51	21	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	05:37:10	08:39:10	07:39:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0255 in/s on April 26, 2012 at 11:19:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Event Report

VIBRA-TECH
The Vibration Monitoring Experts

Histogram Start Time	00:00:10 April 27, 2012
Histogram Finish Time	23:59:00 April 27, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF11110 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	M110E99S.0A1

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

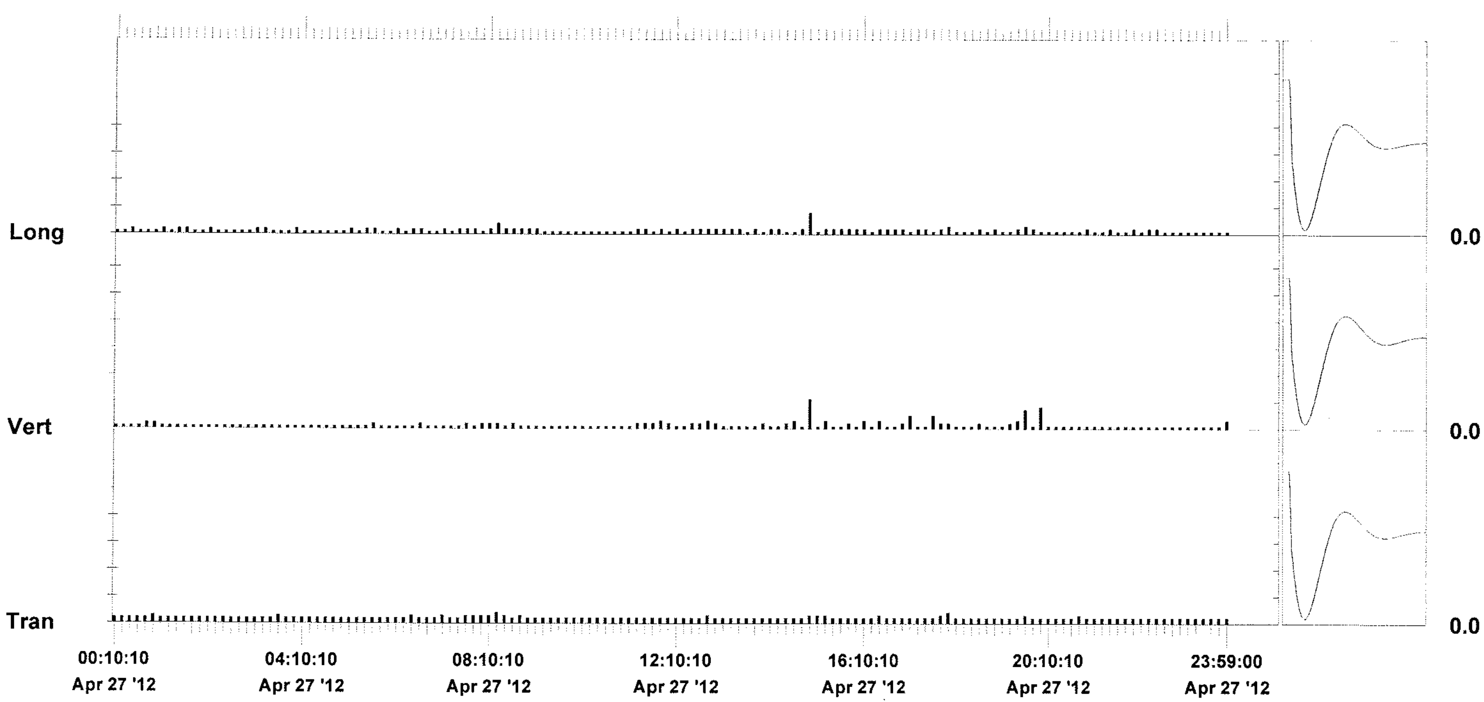
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0550	0.0400	in/s
ZC Freq	20	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	08:12:10	14:55:10	14:55:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.4	

Peak Vector Sum 0.0680 in/s on April 27, 2012 at 14:55:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 28, 2012
Histogram Finish Time	23:59:00 April 28, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF11110 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	M110E9BM.OA1

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

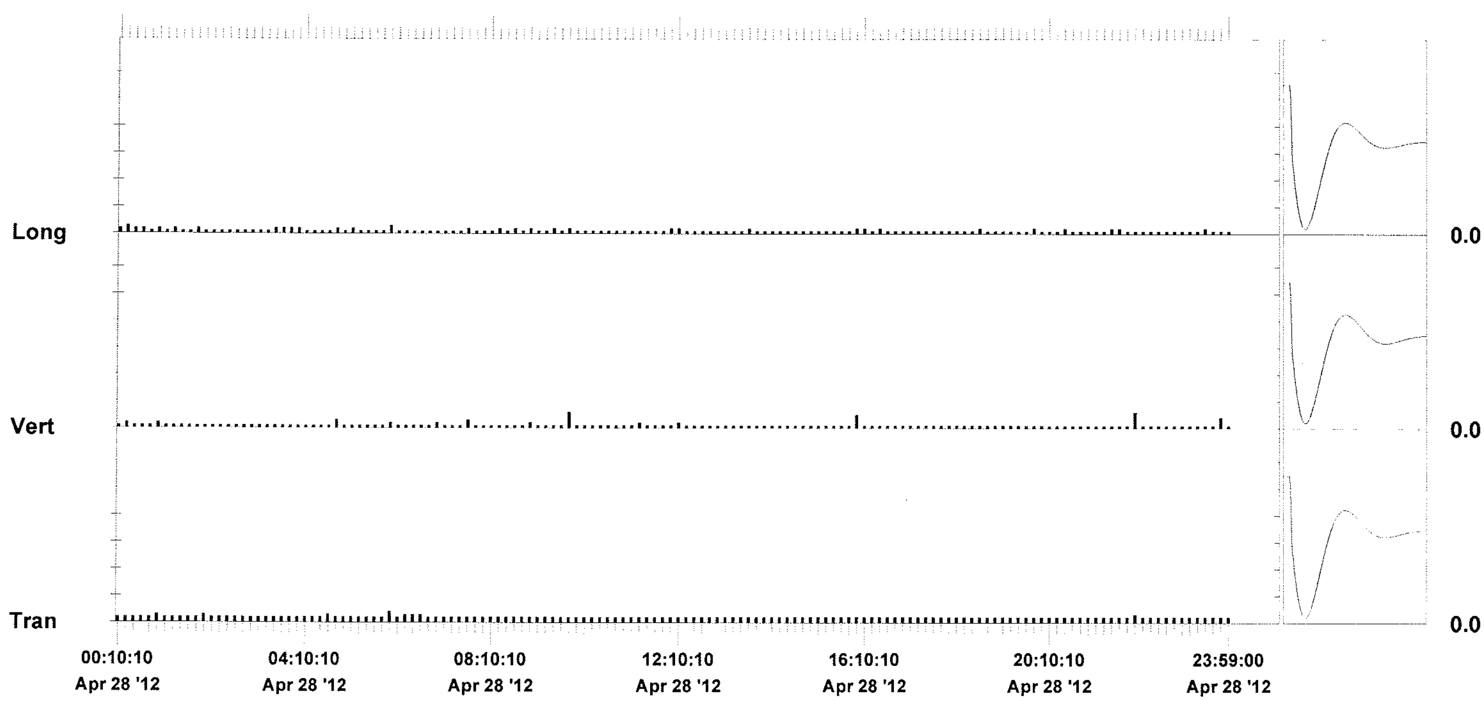
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0300	0.0150	in/s
ZC Freq	18	>100	47	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	05:59:10	09:41:10	00:15:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0304 in/s on April 28, 2012 at 09:41:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 29, 2012	**Serial Number**	BF11110 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 29, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	February 8, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	M110E9DH.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

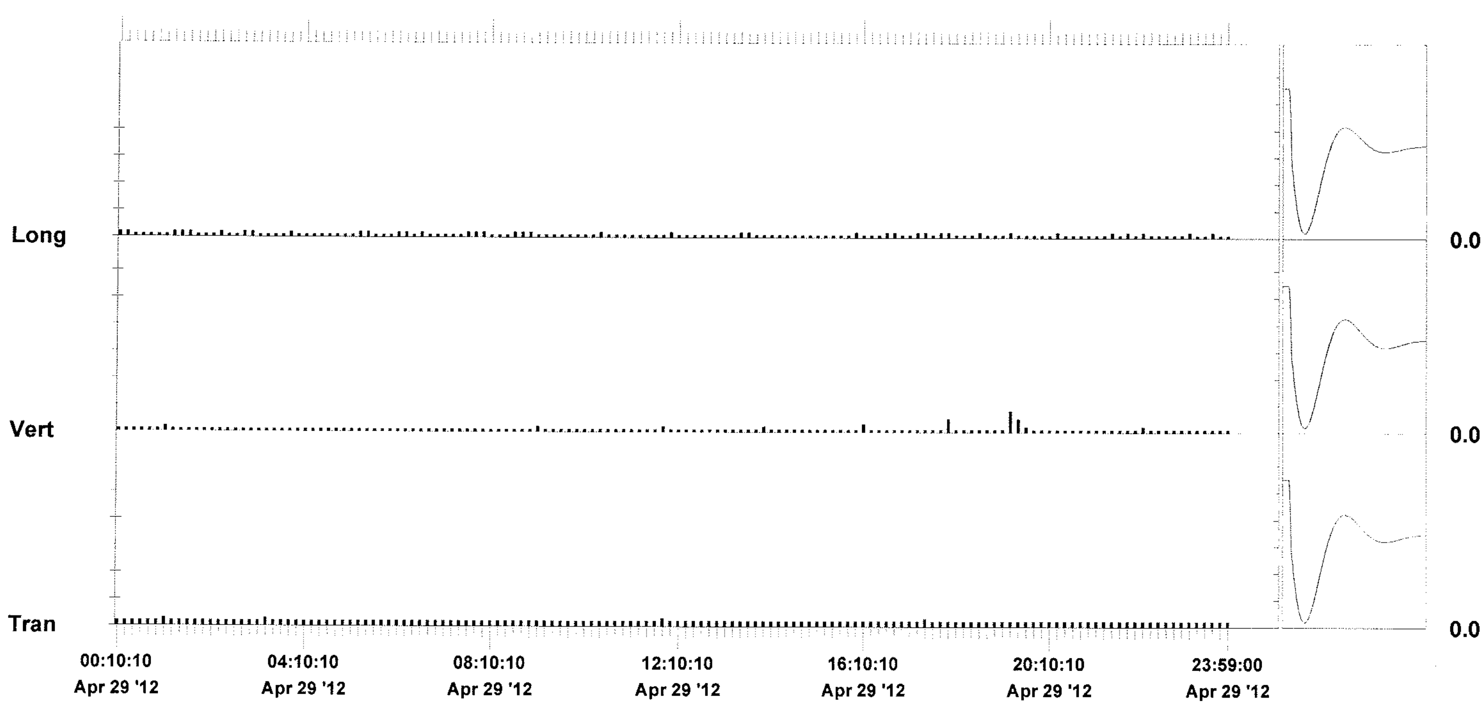
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0400	0.01000	in/s
ZC Freq	>100	47	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	01:03:10	19:20:10	00:04:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.4	7.4	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0403 in/s on April 29, 2012 at 19:20:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 30, 2012
Histogram Finish Time	10:58:37 April 30, 2012
Number of Intervals	658 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF11110 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	February 8, 2012 by Vibra-Tech Inc.
File Name	M110E9FC.0A1

Notes
Location: Location #2
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

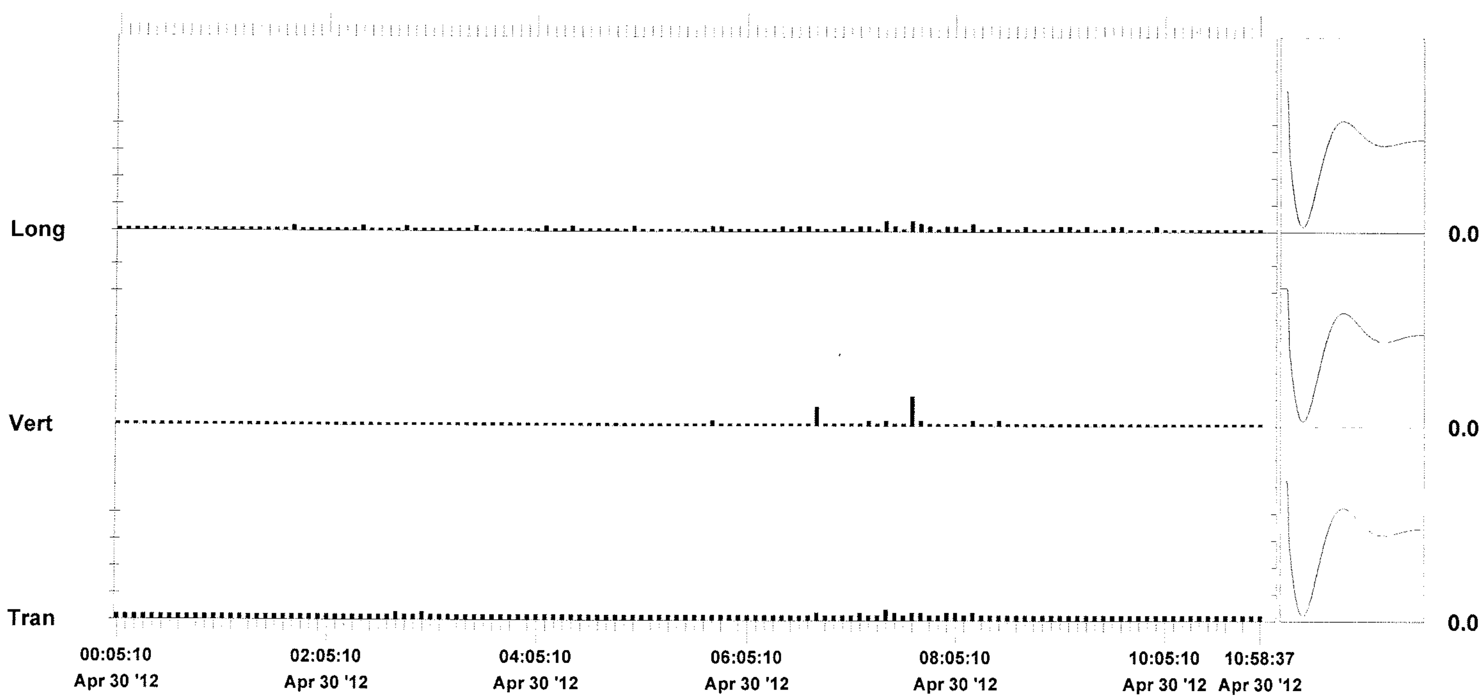
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0550	0.0200	in/s
ZC Freq	18	37	22	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	07:24:10	07:39:10	07:24:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.3	7.4	7.3	Hz
Overswing Ratio	4.0	3.8	4.3	

Peak Vector Sum 0.0559 in/s on April 30, 2012 at 07:39:10

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	12:58:50 April 22, 2012
Histogram Finish Time	19:30:00 April 22, 2012
Number of Intervals	392 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E91I.Q21

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

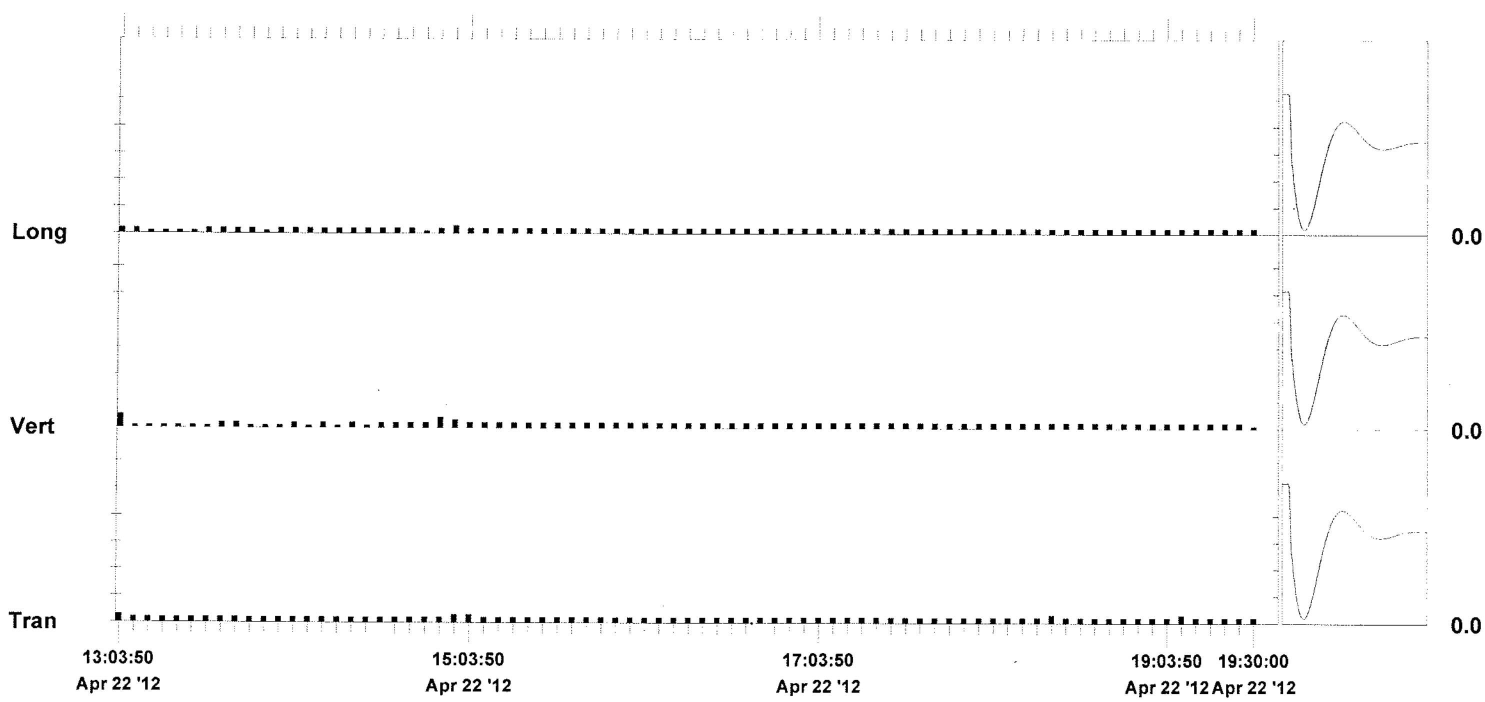
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0250	0.0150	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	13:02:50	13:02:50	14:57:50	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	4.0	

Peak Vector Sum 0.0255 in/s on April 22, 2012 at 13:02:50

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:20 April 22, 2012
Histogram Finish Time	20:00:00 April 22, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E921.2W1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

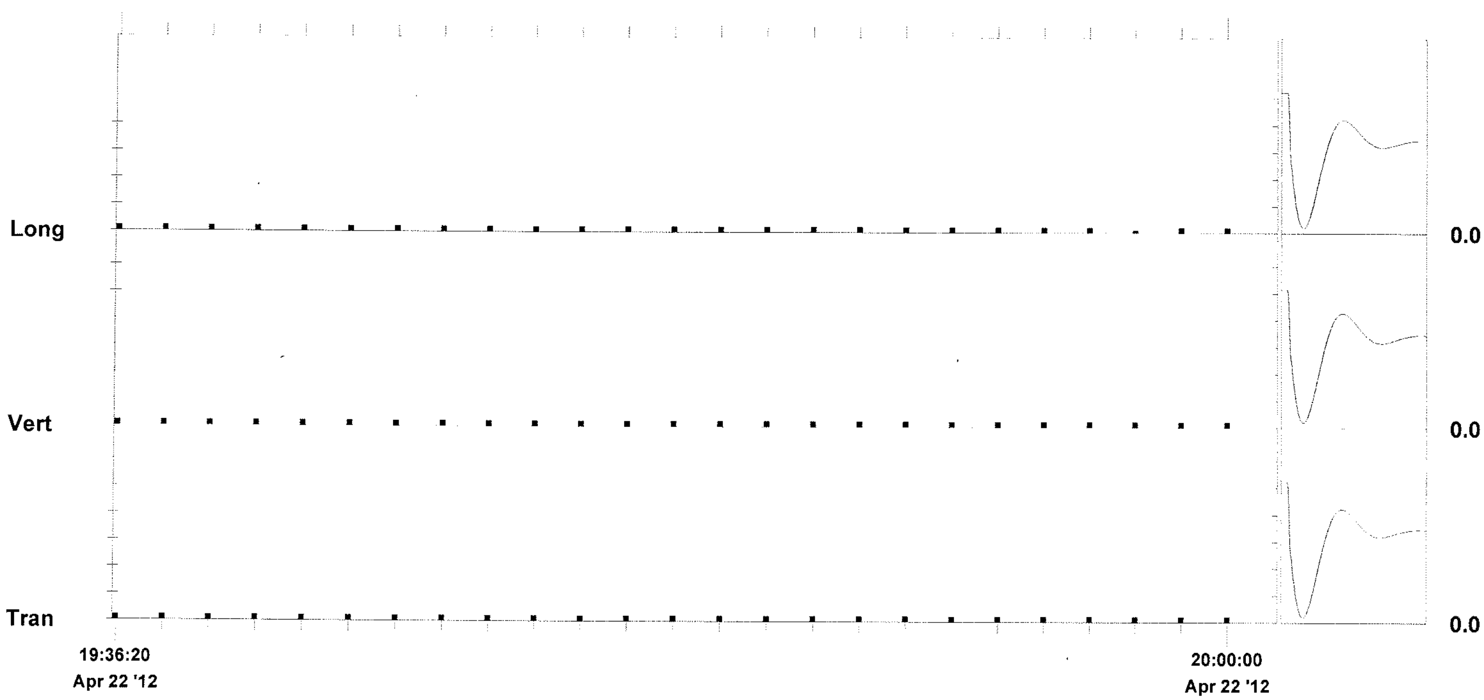
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	19:36:20	19:36:20	19:36:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.6	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0150 in/s on April 22, 2012 at 19:36:20

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Vibra-Tech
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 22, 2012
Histogram Finish Time	23:59:00 April 22, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E922.GV1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

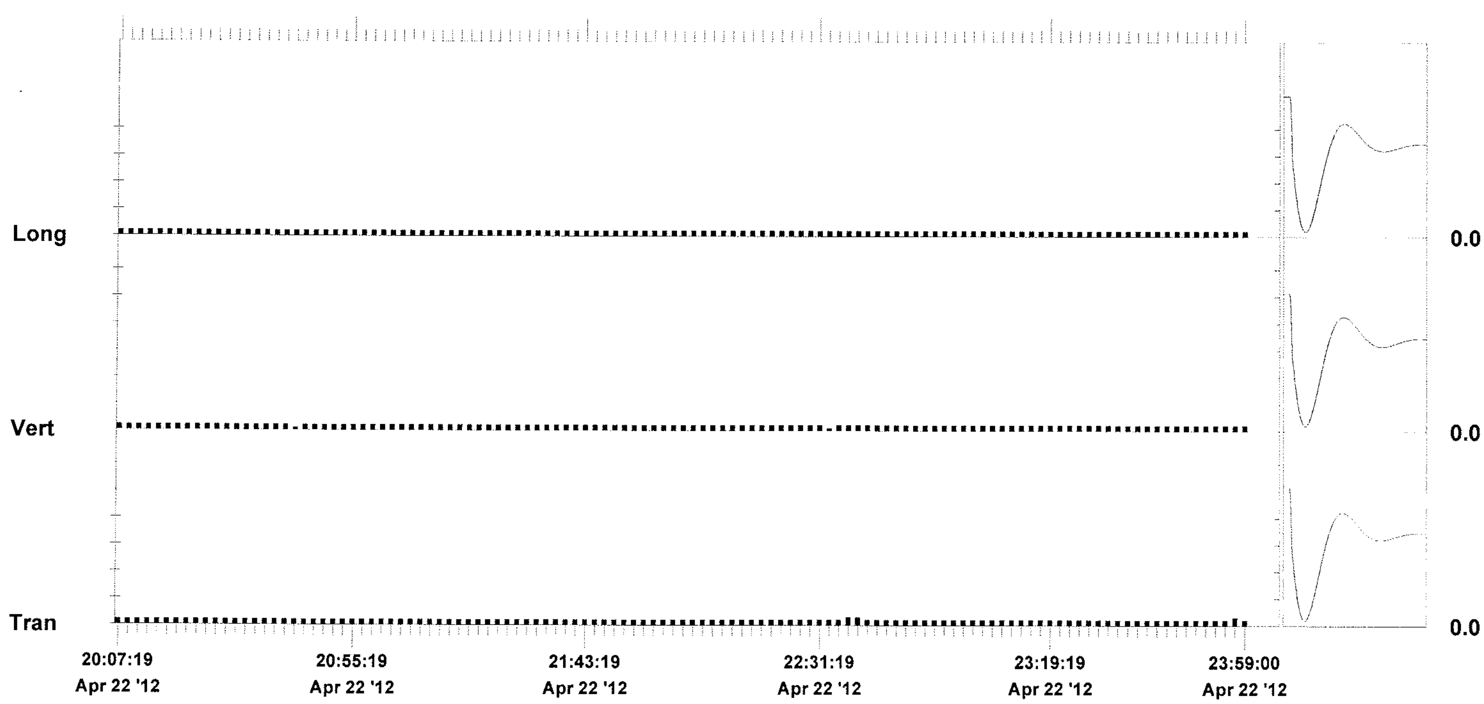
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	22:36:19	20:06:19	20:06:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.6	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0166 in/s on April 22, 2012 at 22:38:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 23, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	05:30:00 April 23, 2012	**Battery Level**	6.8 Volts
Number of Intervals	330 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E92D.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

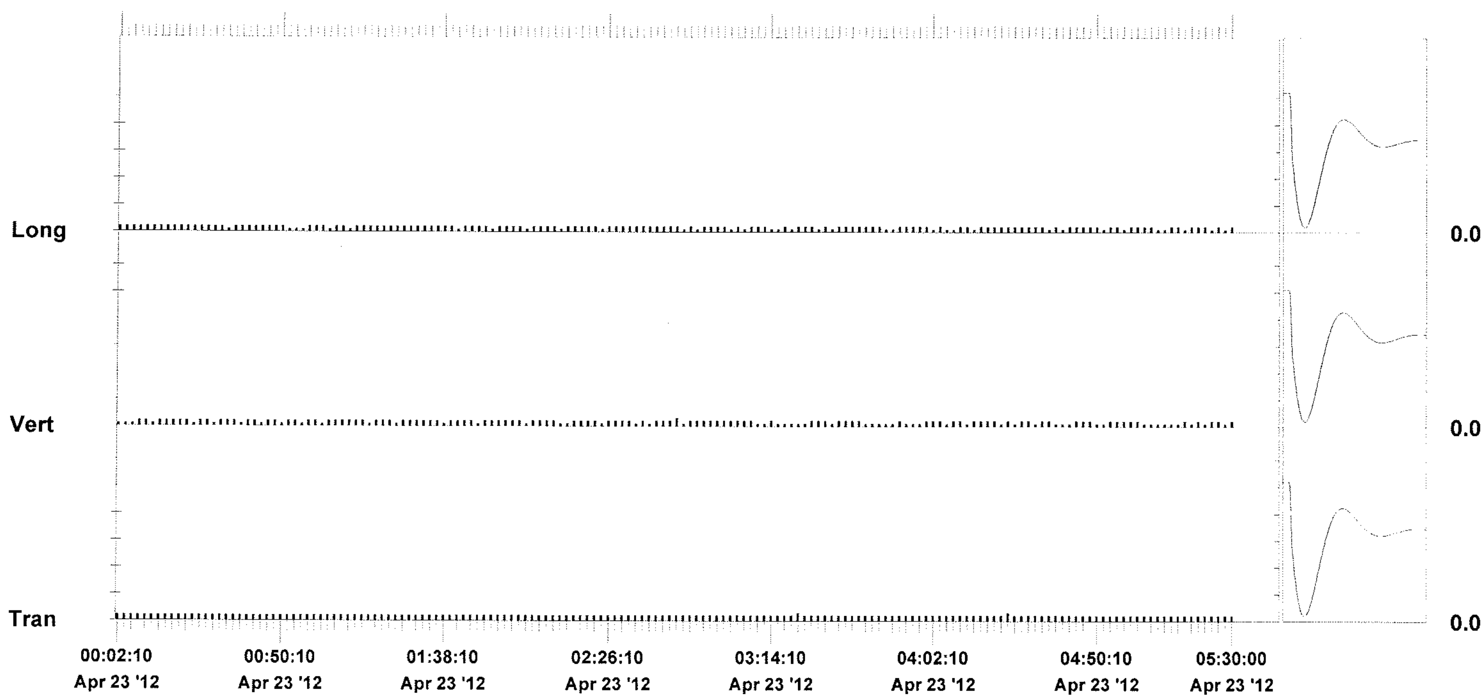
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	43	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	03:22:10	02:45:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0166 in/s on April 23, 2012 at 02:45:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:20 April 23, 2012
Histogram Finish Time	19:30:00 April 23, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E92S.UW1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

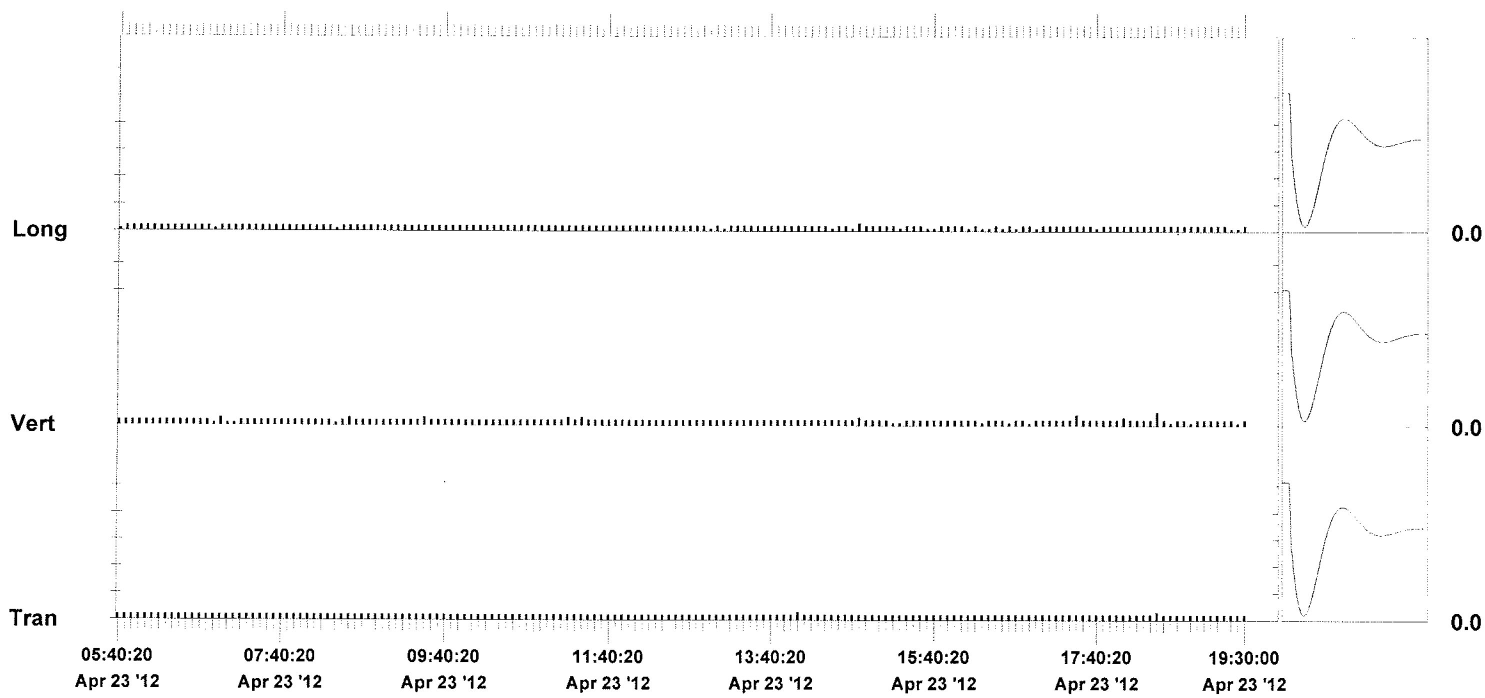
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0250	0.0150	in/s
ZC Freq	>100	85	47	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	13:56:20	18:25:20	14:45:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0274 in/s on April 23, 2012 at 18:25:20

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:20 April 23, 2012
Histogram Finish Time	20:00:00 April 23, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E93V.QW1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

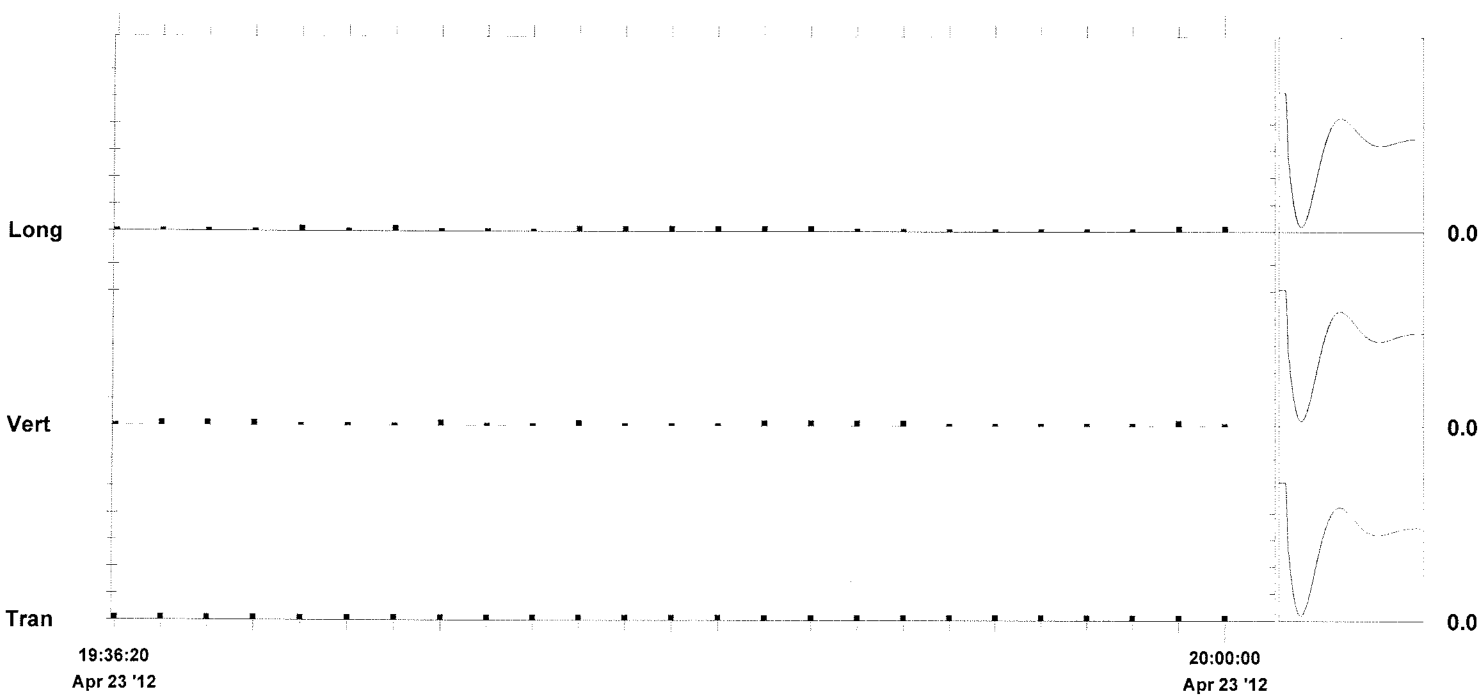
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	19:36:20	19:37:20	19:40:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0150 in/s on April 23, 2012 at 19:42:20

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 23, 2012
Histogram Finish Time	23:59:00 April 23, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E93X.4V1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

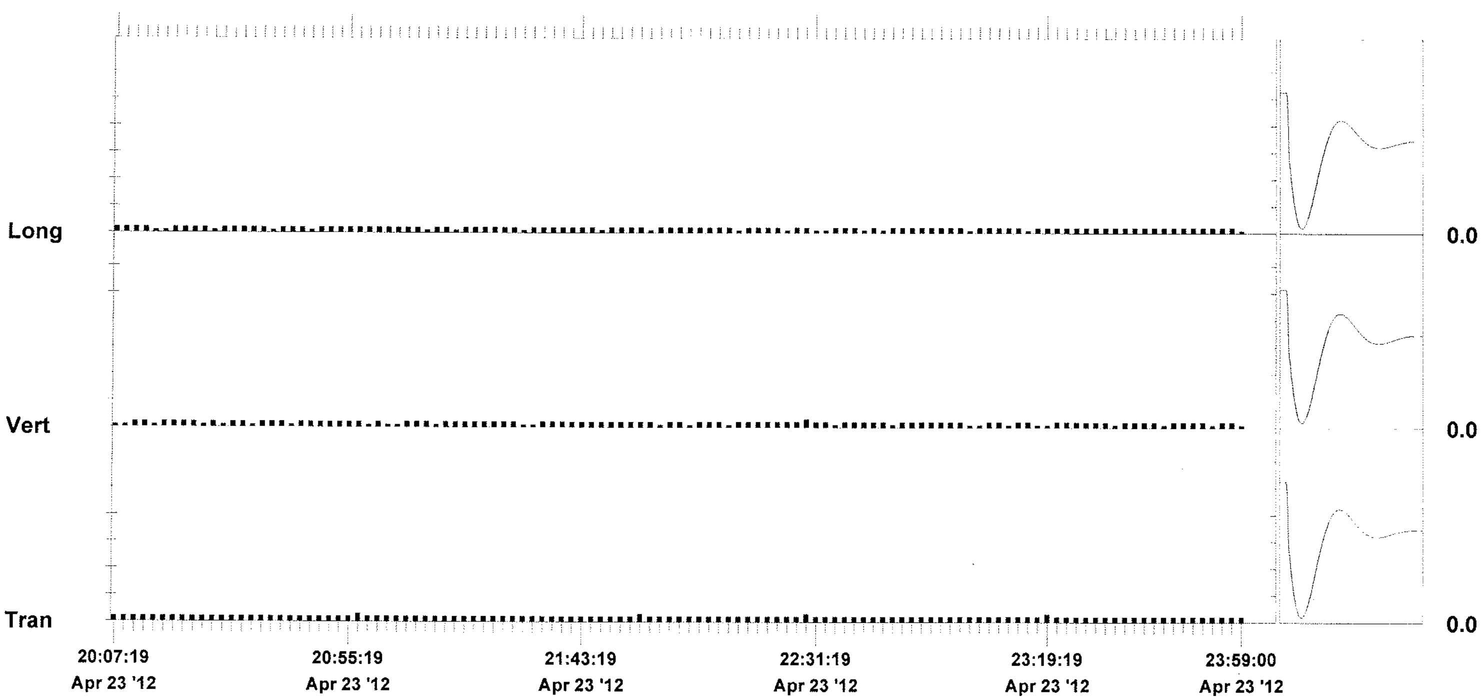
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	57	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	20:57:19	22:28:19	20:06:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0187 in/s on April 23, 2012 at 22:28:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 24, 2012
Histogram Finish Time	05:30:00 April 24, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E948.0A1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

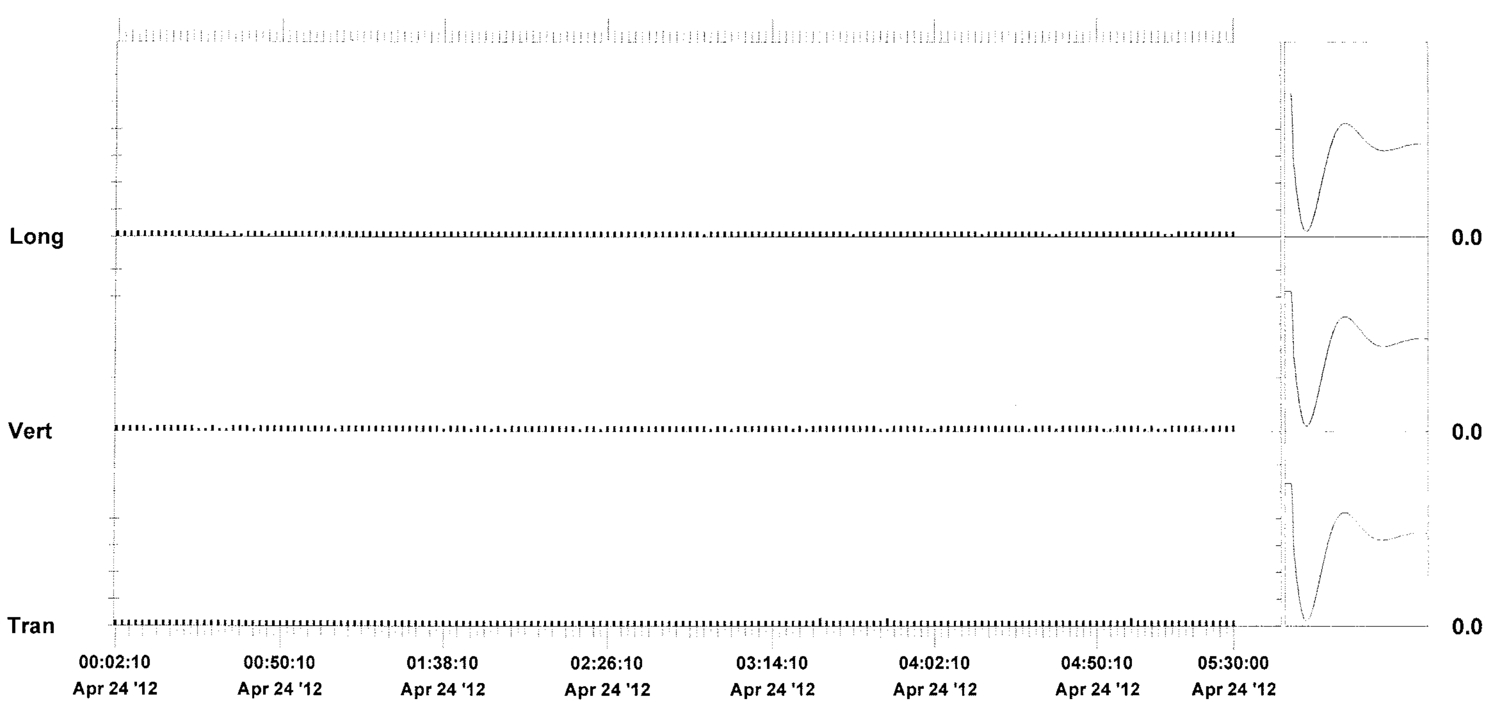
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	03:27:10	00:02:10	00:02:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.6	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0166 in/s on April 24, 2012 at 03:47:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:19 April 24, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	19:30:00 April 24, 2012	**Battery Level**	6.8 Volts
Number of Intervals	835 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E94N.IV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

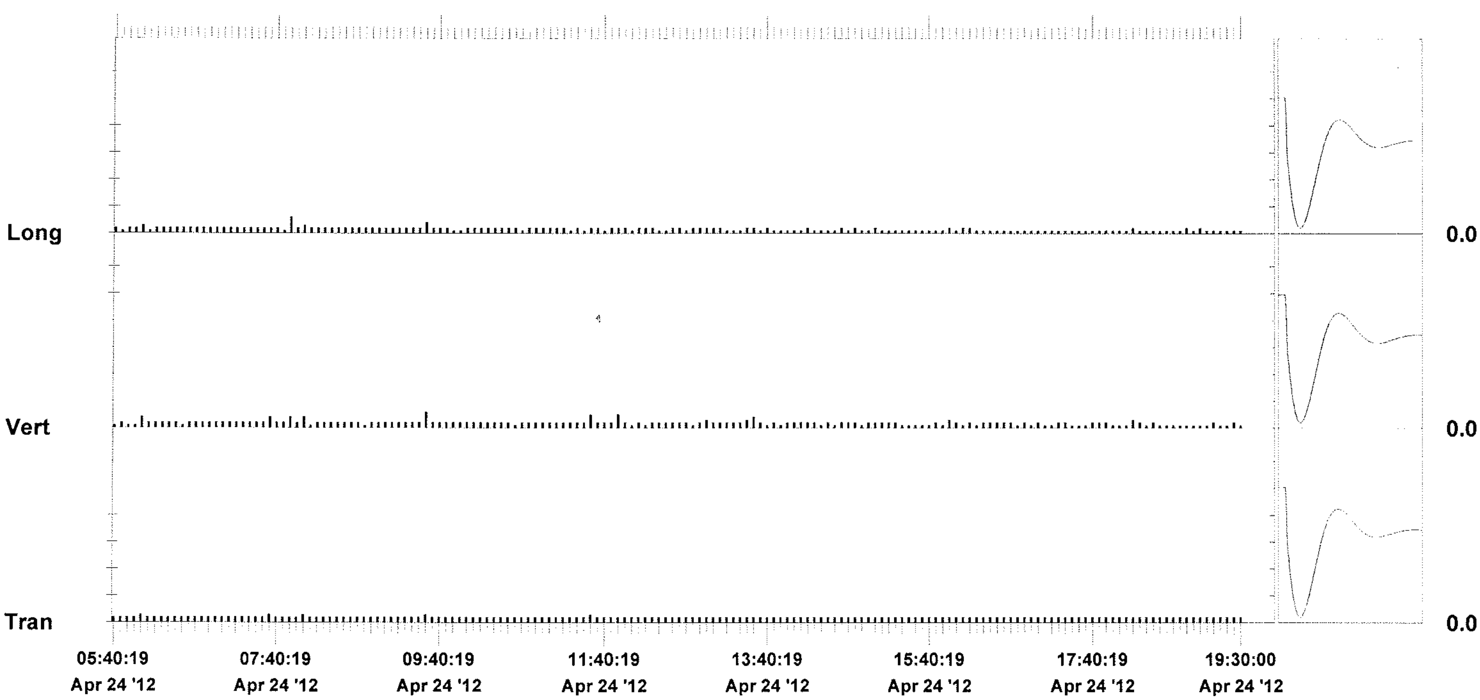
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0150	0.0300	0.0300	in/s
ZC Freq	51	73	19	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	05:56:19	09:26:19	07:50:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0320 in/s on April 24, 2012 at 09:26:19

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 24, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	20:00:00 April 24, 2012	**Battery Level**	6.8 Volts
Number of Intervals	25 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E95Q.EV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

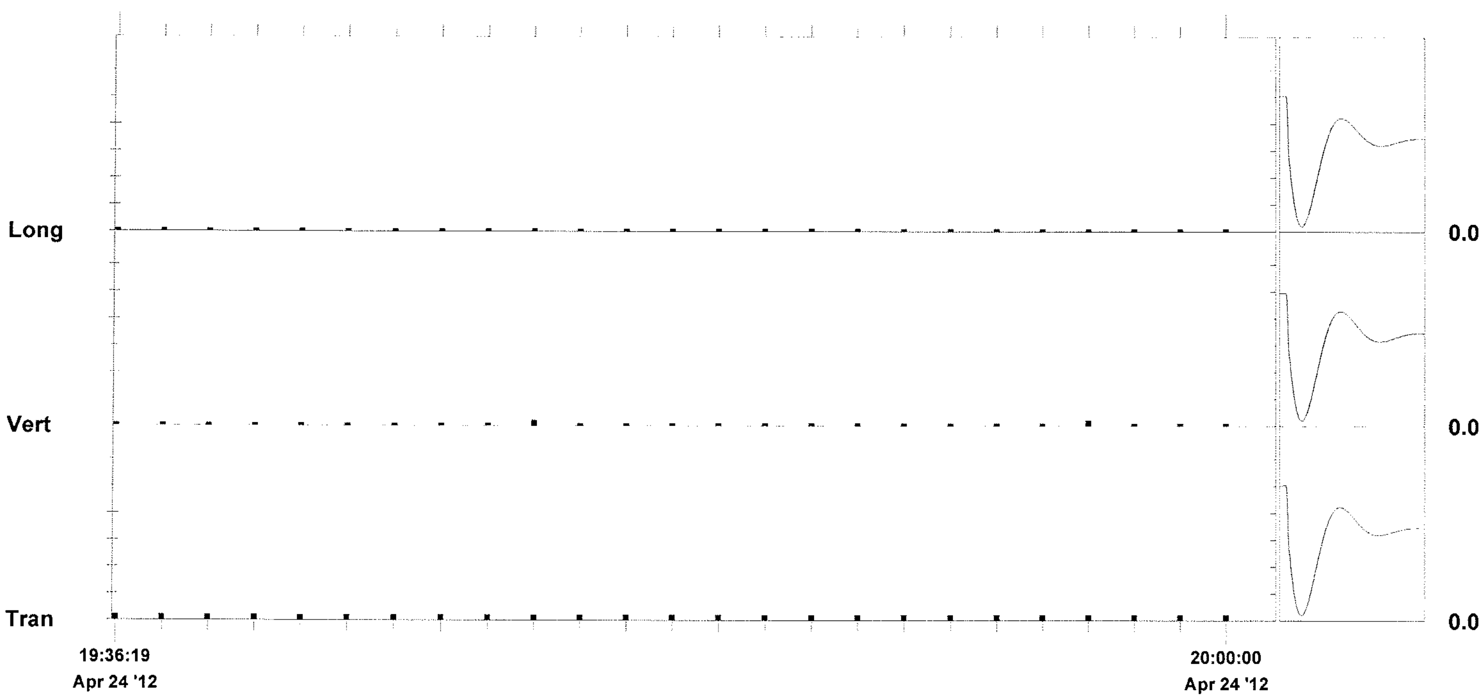
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.00500	in/s
ZC Freq	>100	>100	N/A	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	19:36:19	19:45:19	19:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0122 in/s on April 24, 2012 at 19:36:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 24, 2012
Histogram Finish Time	23:59:00 April 24, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E95R.SV1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

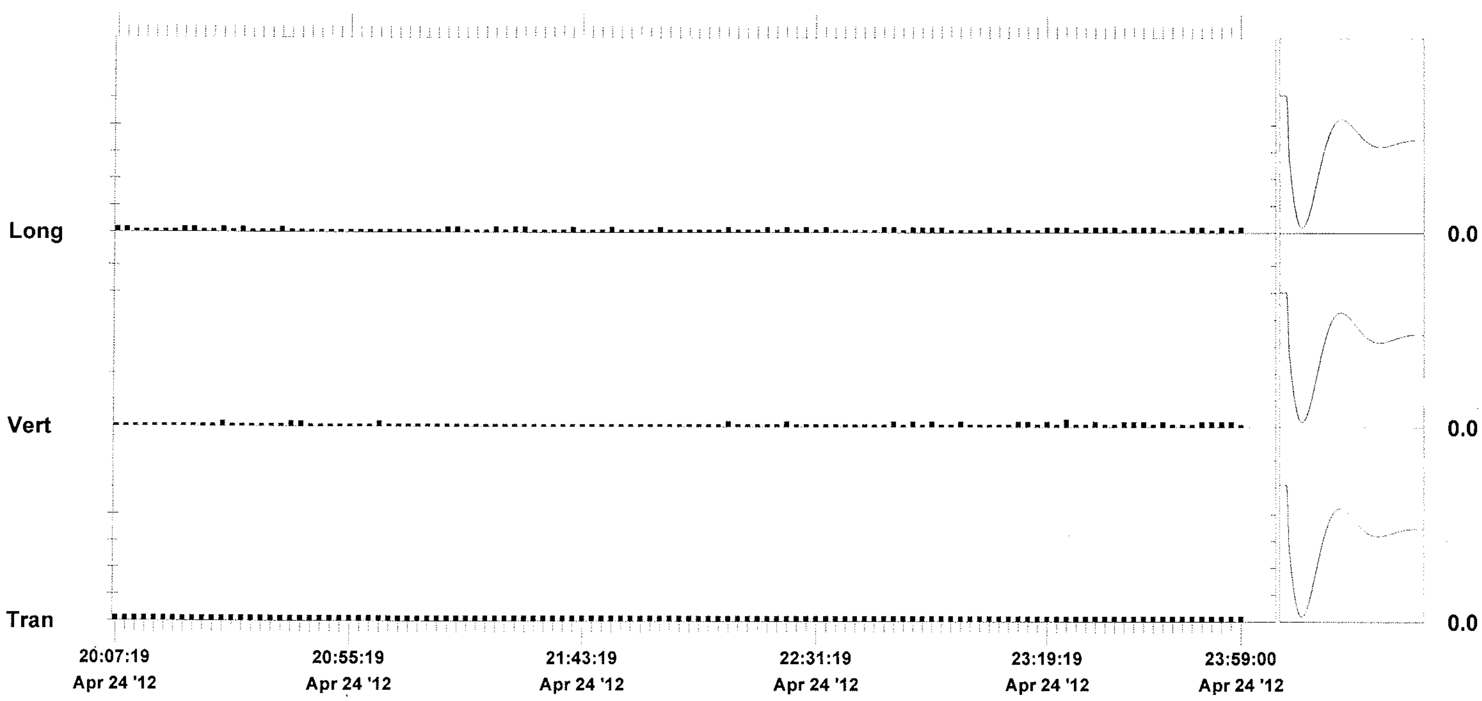
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.0150	0.01000	in/s
ZC Freq	>100	64	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	20:06:19	23:22:19	20:07:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0187 in/s on April 24, 2012 at 23:22:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

Vibra-Tech
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 25, 2012
Histogram Finish Time	05:30:00 April 25, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E962.OA1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

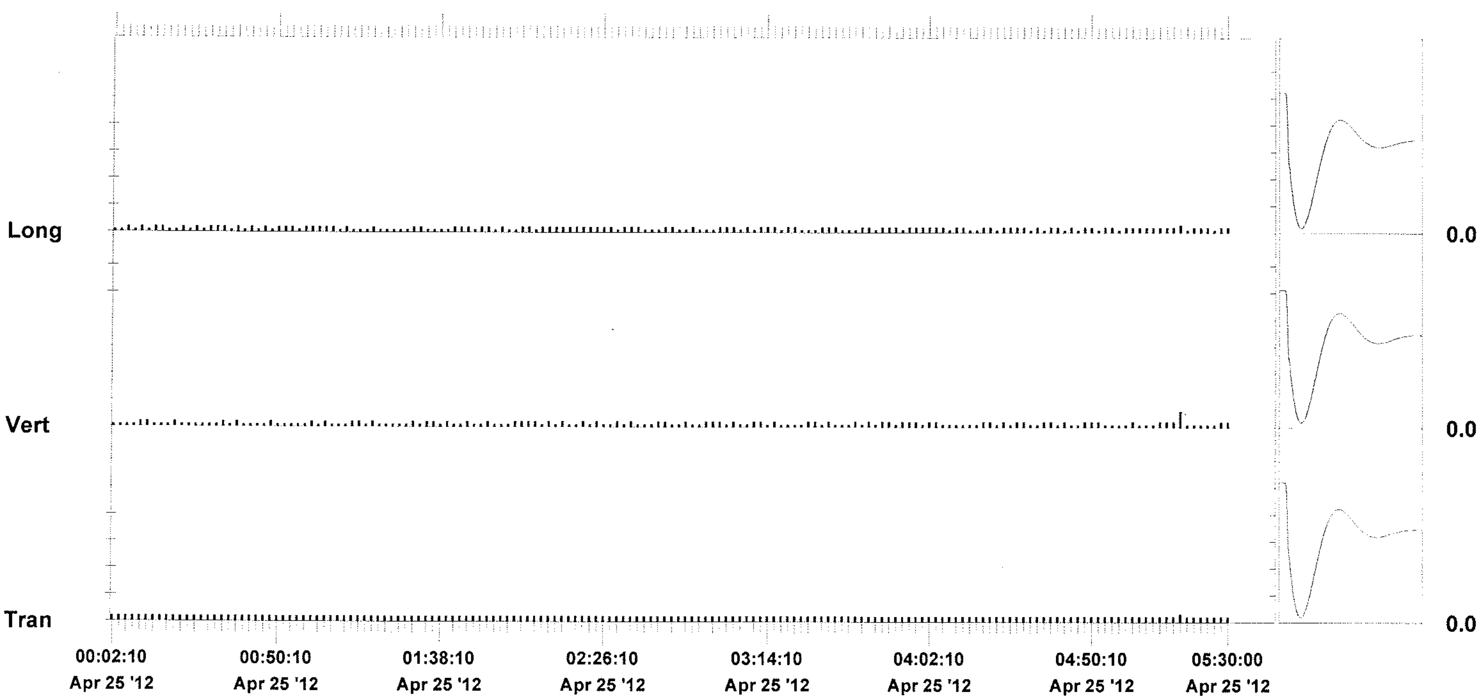
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0300	0.0150	in/s
ZC Freq	57	73	43	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	05:15:10	05:15:10	05:15:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0320 in/s on April 25, 2012 at 05:15:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:20 April 25, 2012
Histogram Finish Time	19:30:00 April 25, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E96I.6W1

Notes

Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

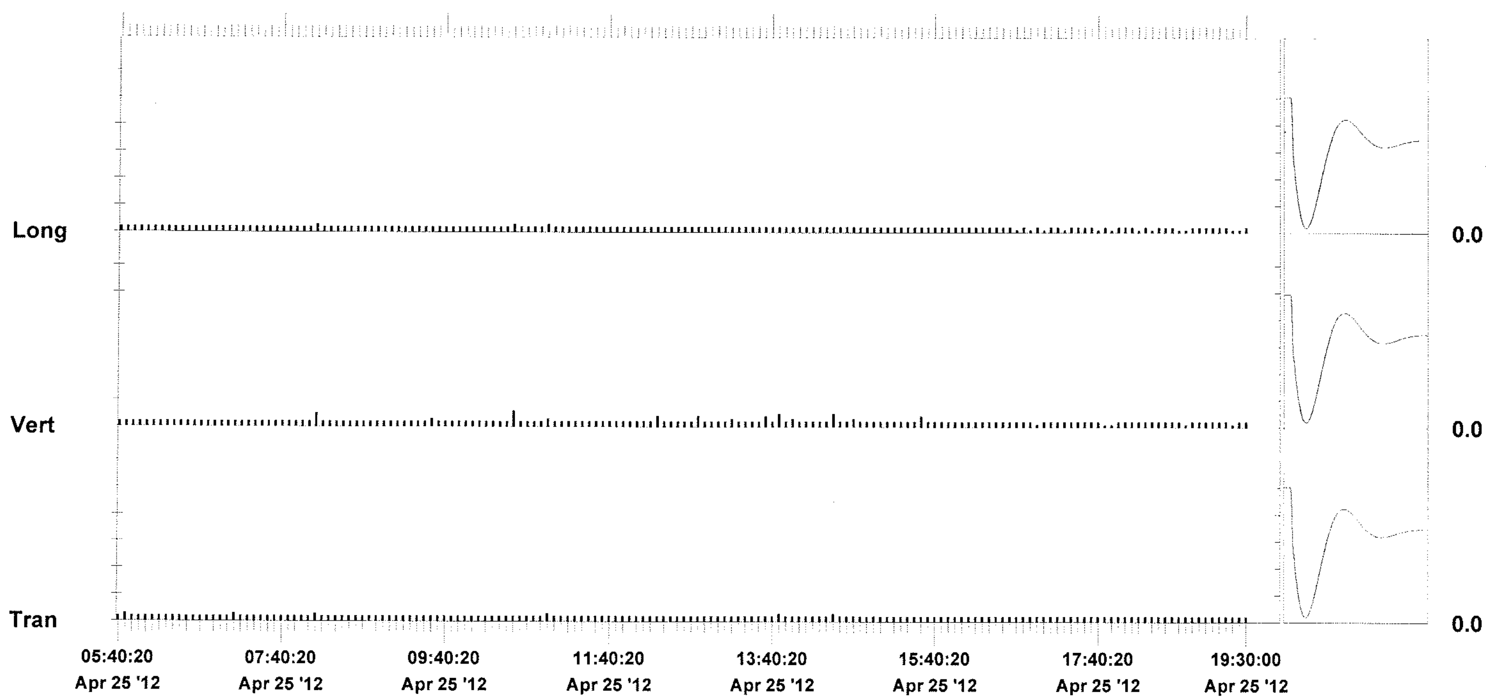
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0300	0.0150	in/s
ZC Freq	>100	57	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	05:43:20	10:28:20	08:04:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0320 in/s on April 25, 2012 at 10:28:20

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 25, 2012
Histogram Finish Time	20:00:00 April 25, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E97L.2V1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

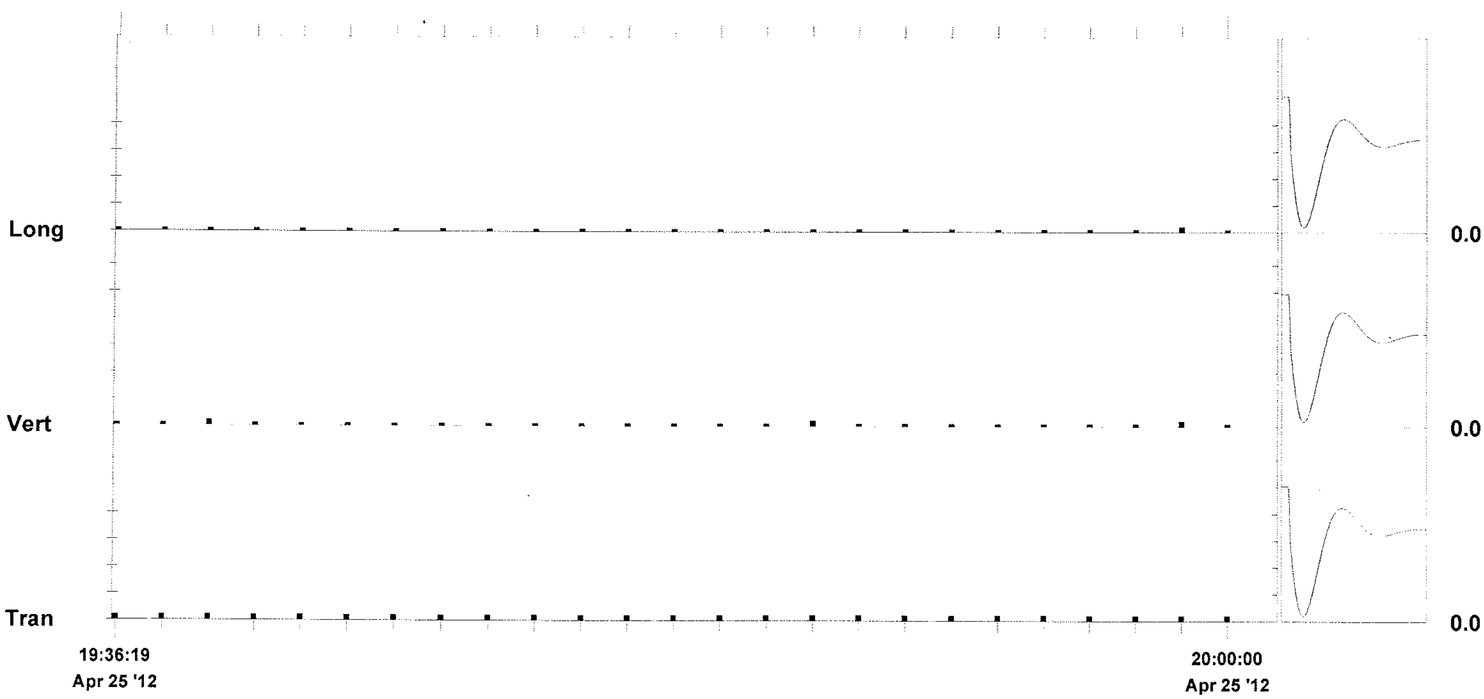
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	19:36:19	19:38:19	19:59:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0122 in/s on April 25, 2012 at 19:36:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA - TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:20 April 25, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 25, 2012	**Battery Level**	6.8 Volts
Number of Intervals	233 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E97M.GW1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

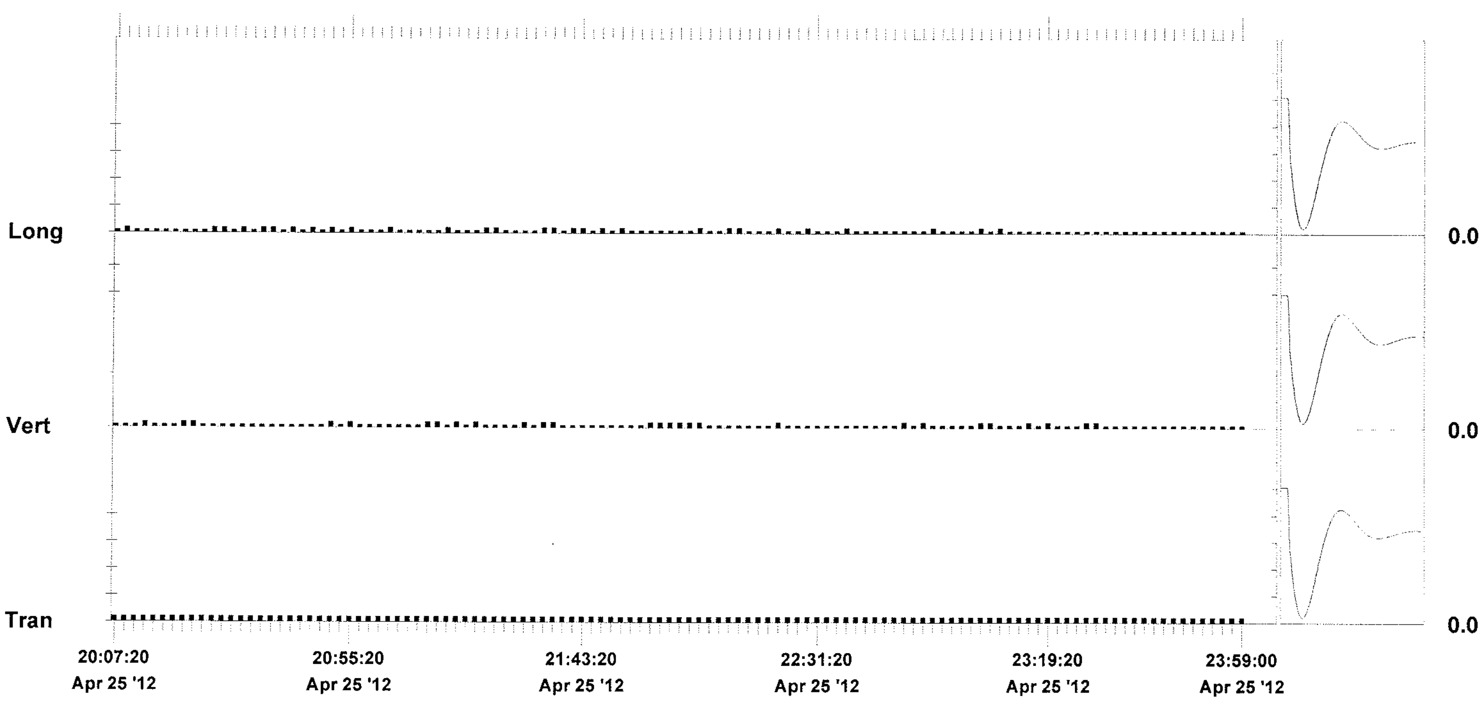
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	20:06:20	20:13:20	20:08:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0150 in/s on April 25, 2012 at 21:12:20

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 26, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	05:30:00 April 26, 2012	**Battery Level**	6.8 Volts
Number of Intervals	330 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E97X.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

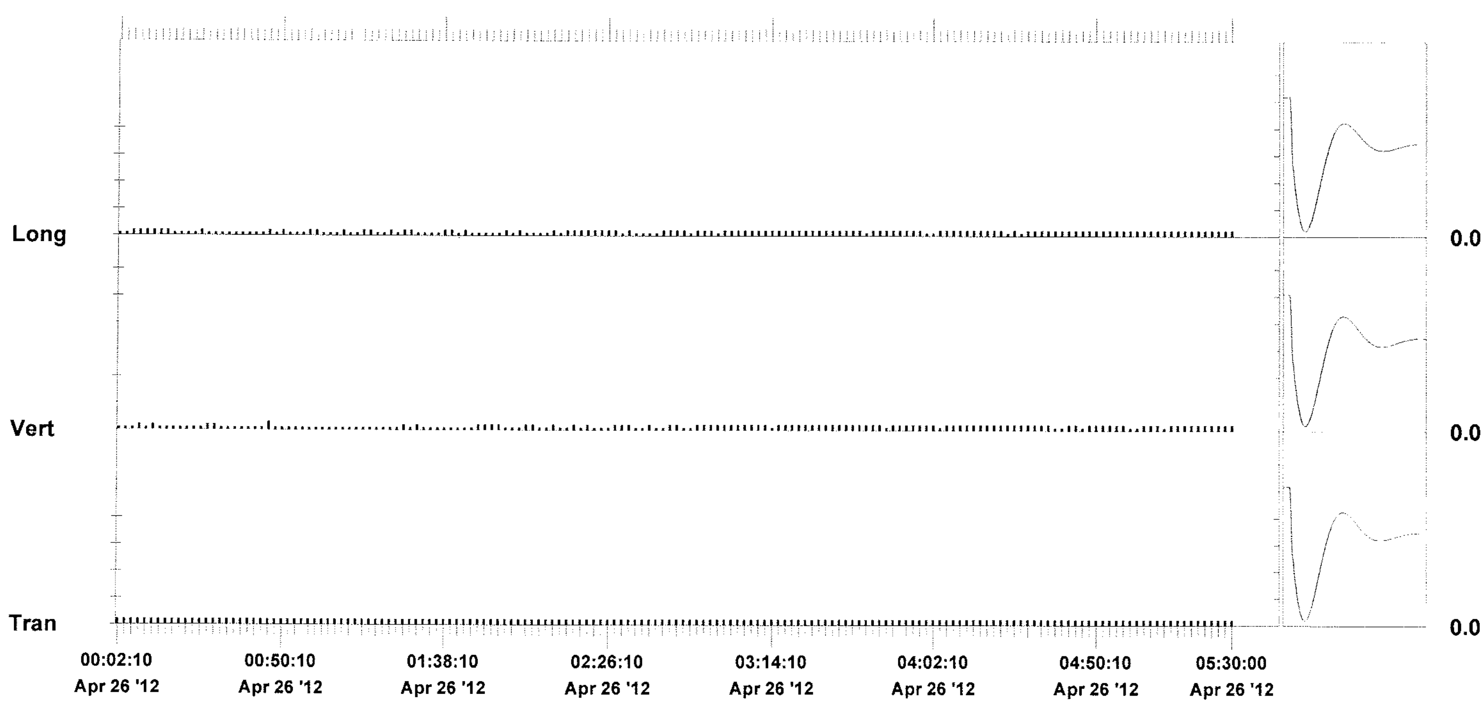
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.0150	0.01000	in/s
ZC Freq	>100	73	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	00:01:10	00:45:10	00:06:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0187 in/s on April 26, 2012 at 00:45:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:19 April 26, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	19:30:00 April 26, 2012	**Battery Level**	6.8 Volts
Number of Intervals	835 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E98C.UV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

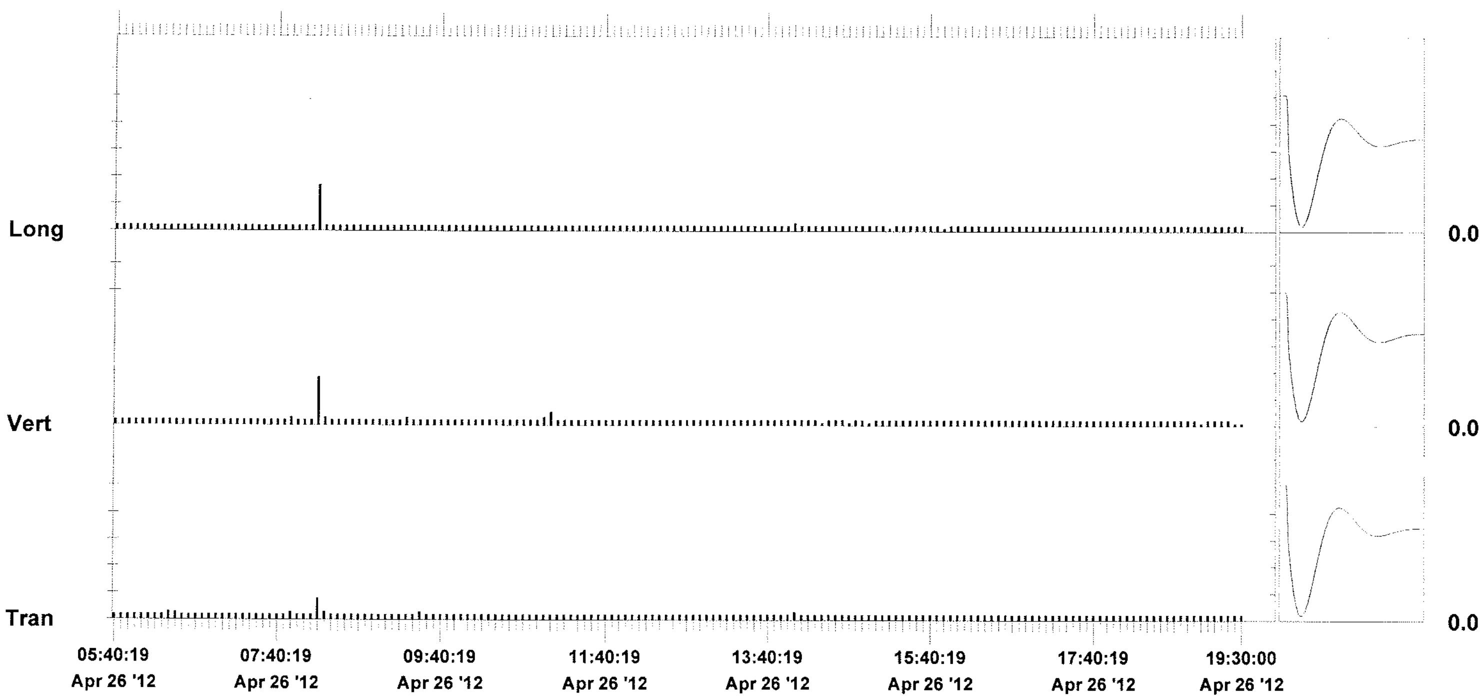
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0400	0.0900	0.0850	in/s
ZC Freq	39	39	34	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	08:08:19	08:09:19	08:08:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0951 in/s on April 26, 2012 at 08:08:19

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 26, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	20:00:00 April 26, 2012	**Battery Level**	6.8 Volts
Number of Intervals	25 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E99F.QV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

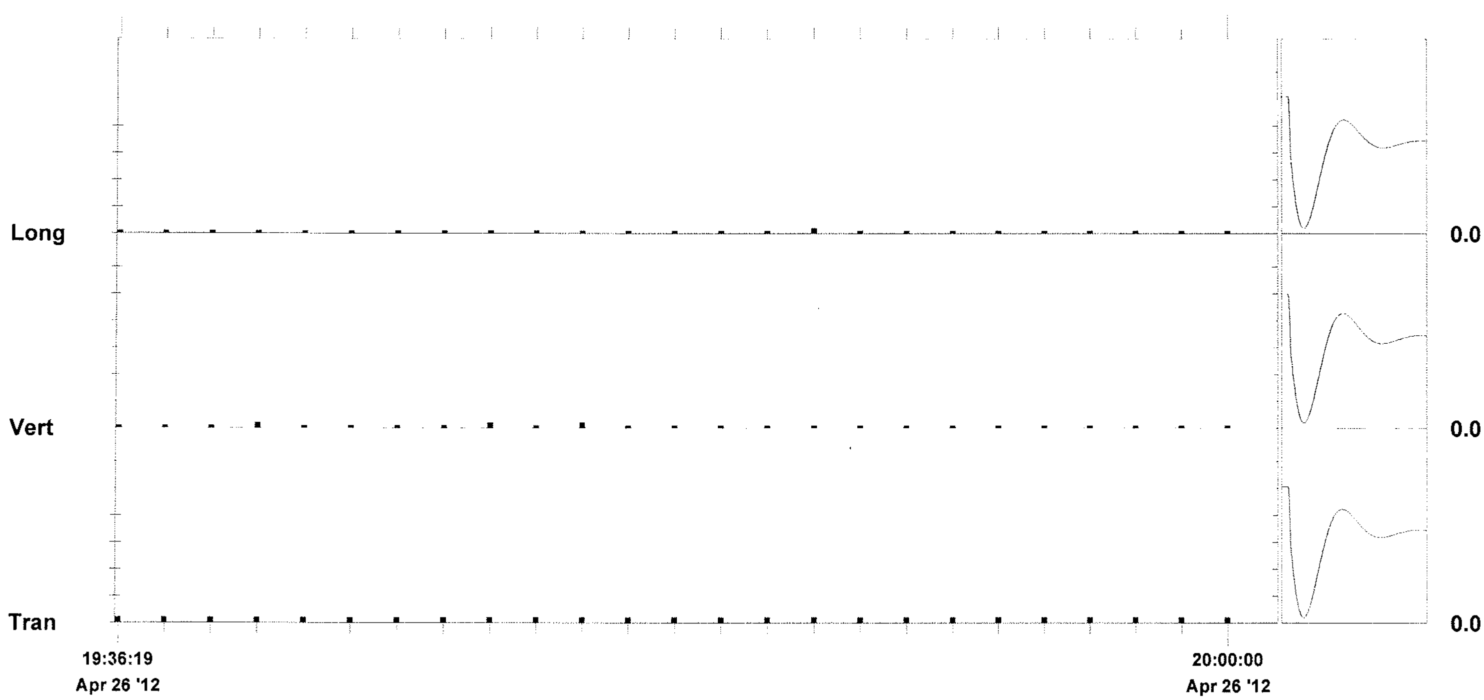
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	19:36:19	19:39:19	19:51:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0150 in/s on April 26, 2012 at 19:46:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:20 April 26, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 26, 2012	**Battery Level**	6.8 Volts
Number of Intervals	233 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E99H.4W1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

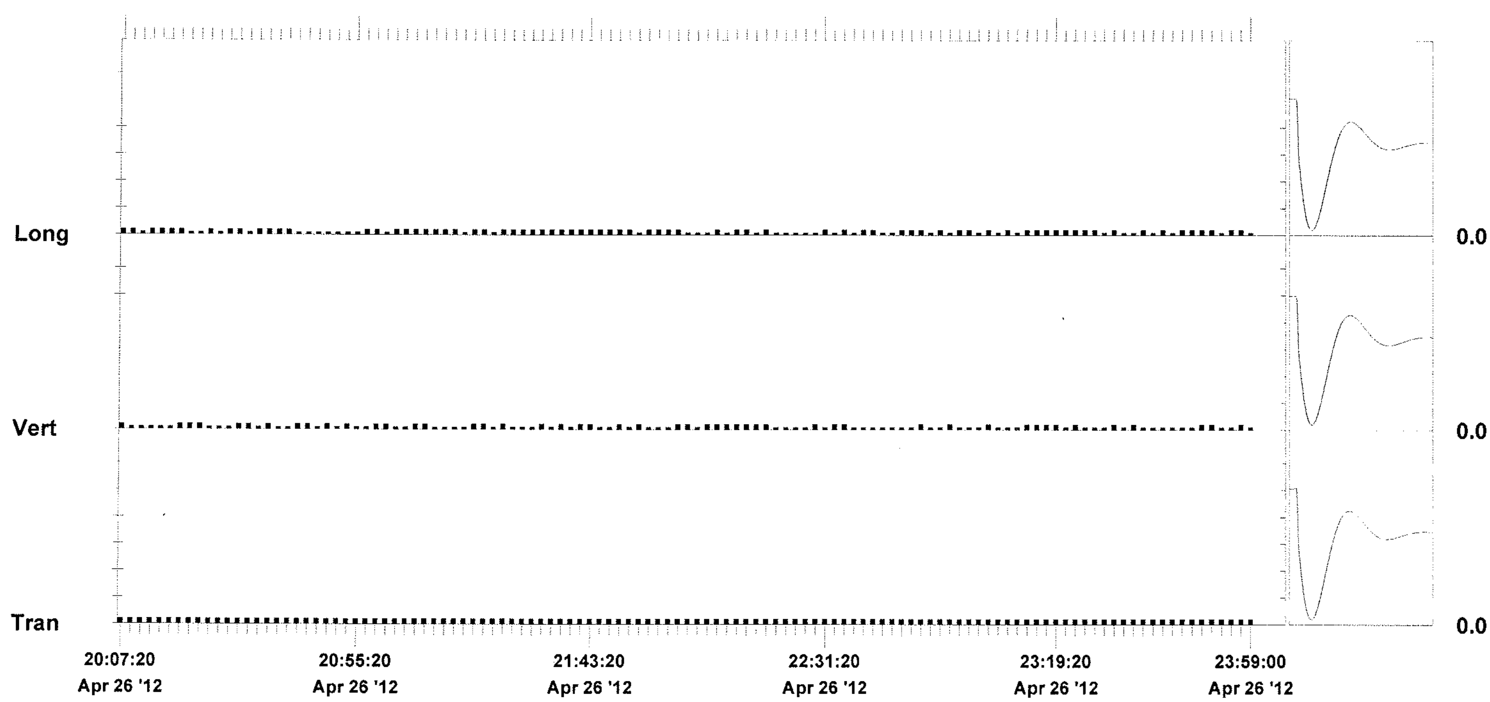
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	20:06:20	20:06:20	20:06:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0150 in/s on April 26, 2012 at 20:17:20

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 27, 2012
Histogram Finish Time	05:30:00 April 27, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E99S.0A1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

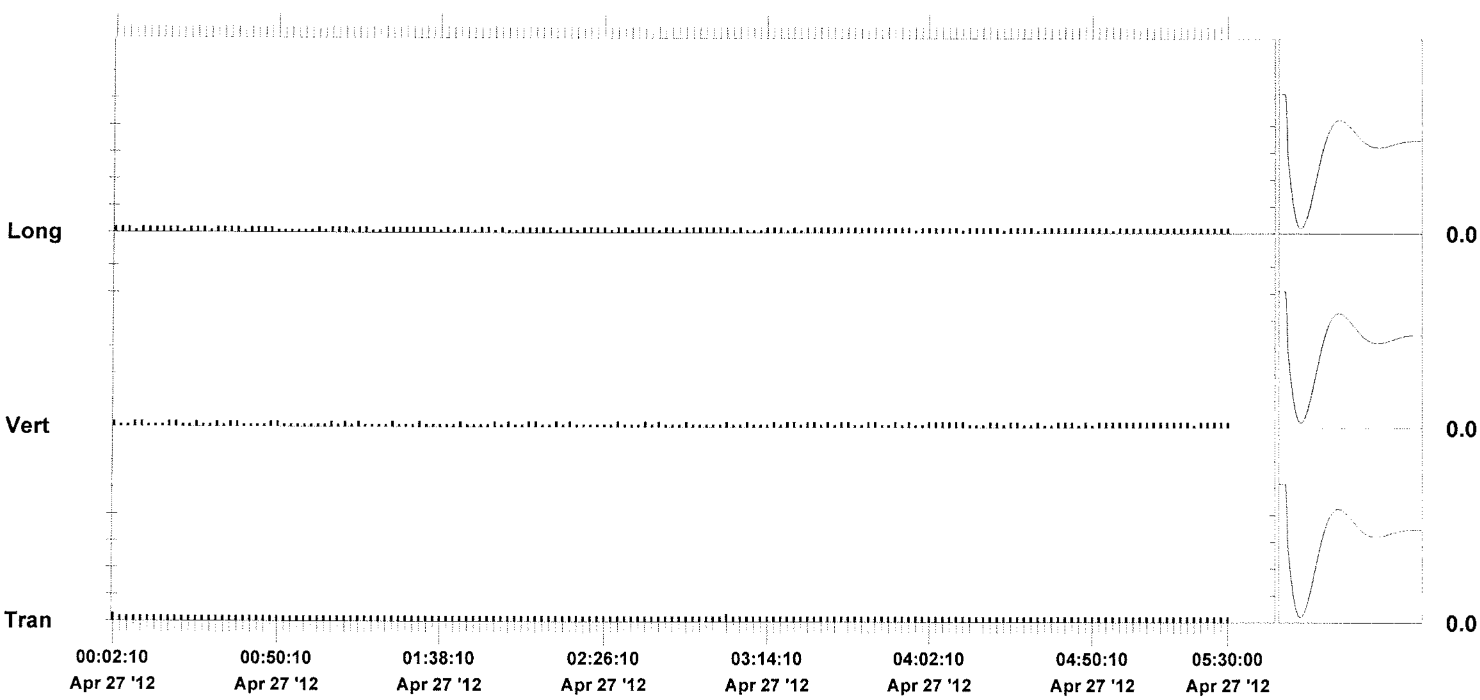
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	00:01:10	00:02:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0158 in/s on April 27, 2012 at 00:01:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:18 April 27, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	19:30:00 April 27, 2012	**Battery Level**	6.8 Volts
Number of Intervals	835 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E9A7.IU1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

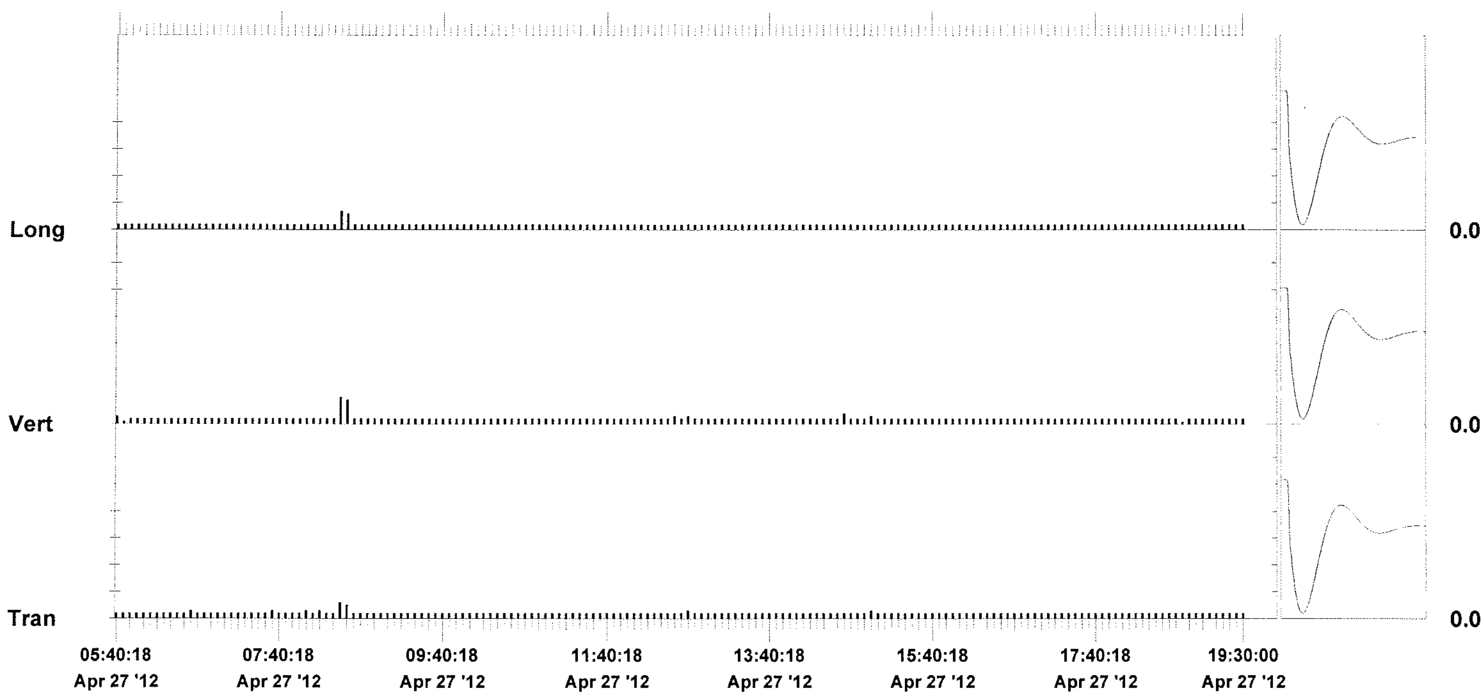
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0300	0.0500	0.0350	in/s
ZC Freq	57	85	64	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	08:24:18	08:24:18	08:24:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0524 in/s on April 27, 2012 at 08:24:18

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:18 April 27, 2012
Histogram Finish Time	20:00:00 April 27, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9BA.EU1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

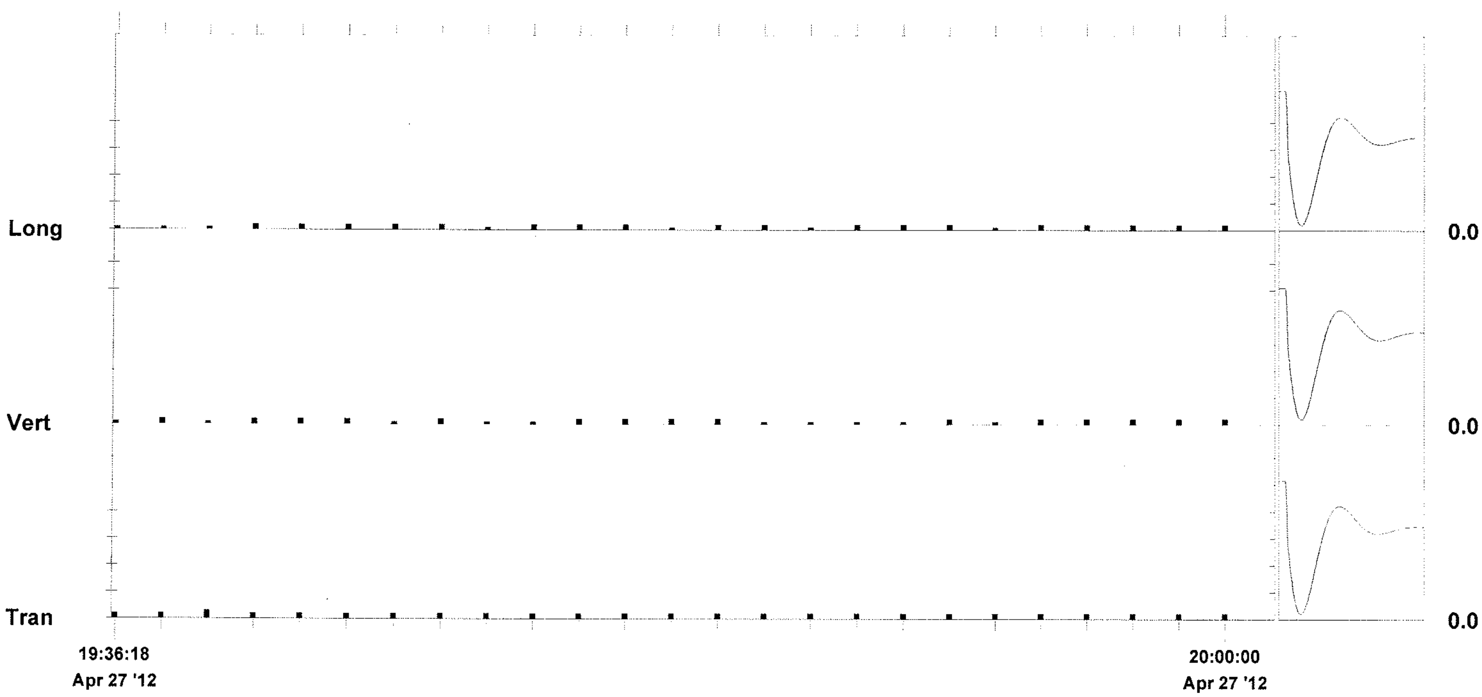
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	19:38:18	19:37:18	19:39:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0166 in/s on April 27, 2012 at 19:38:18

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 27, 2012
Histogram Finish Time	23:59:00 April 27, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9BB.SV1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

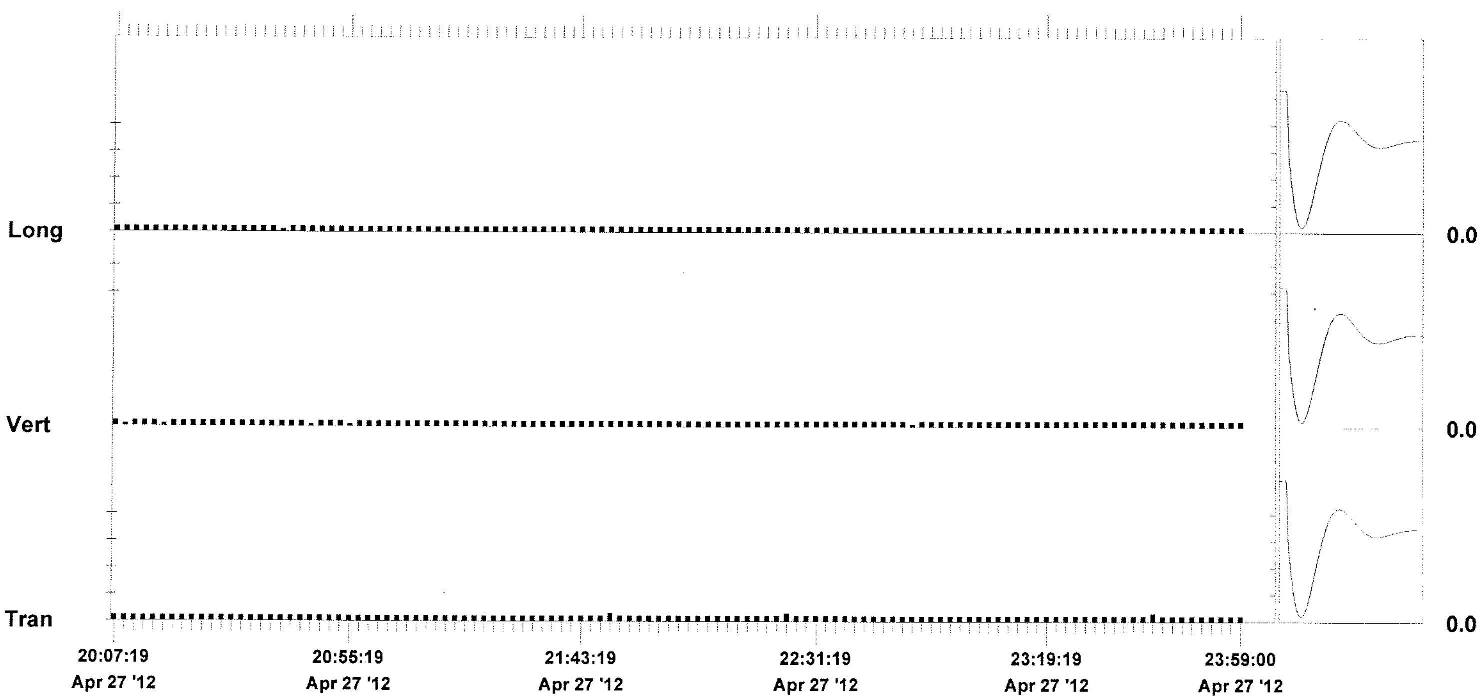
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	24	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	21:48:19	20:07:19	20:07:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0166 in/s on April 27, 2012 at 21:48:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 28, 2012
Histogram Finish Time	05:30:00 April 28, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9BM.OA1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

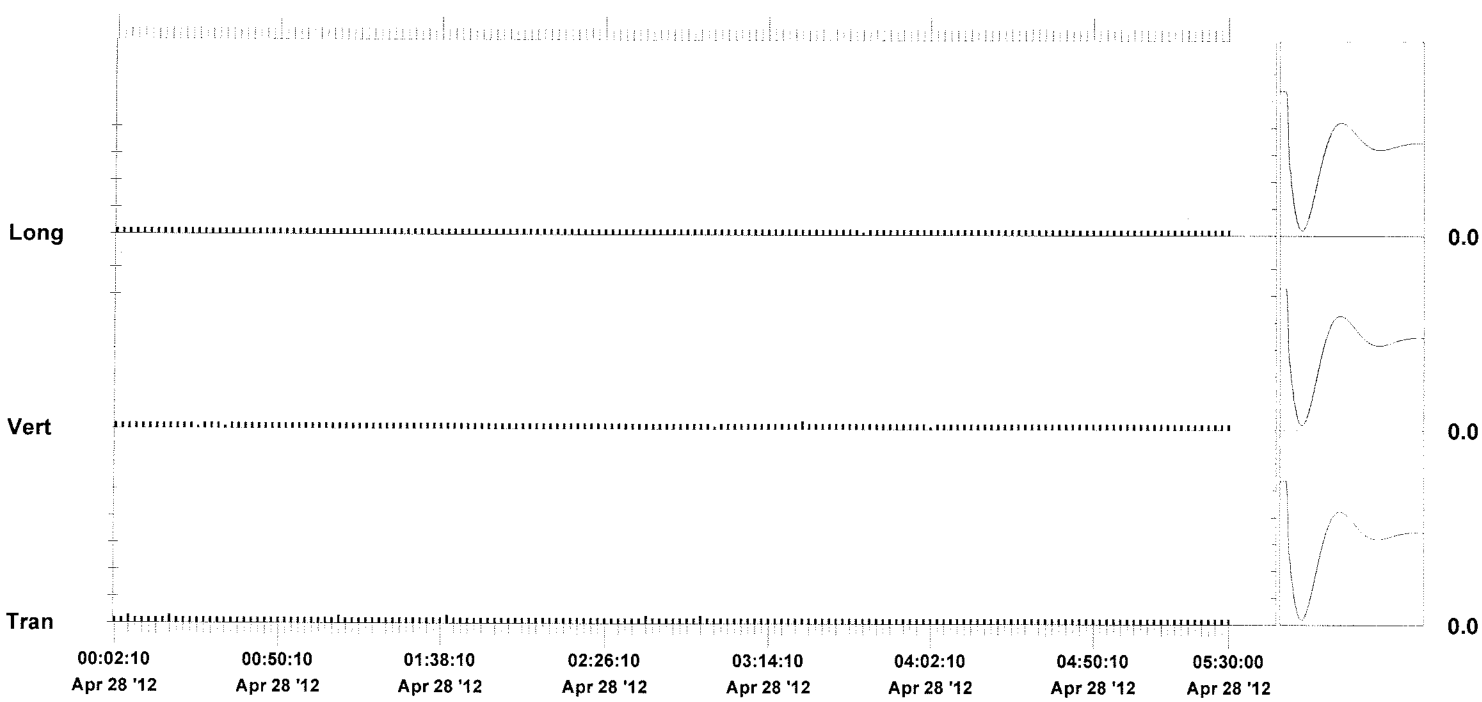
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	57	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	00:06:10	03:23:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.6	Hz
Overswing Ratio	3.9	3.7	4.0	

Peak Vector Sum 0.0187 in/s on April 28, 2012 at 03:23:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA - TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:18 April 28, 2012
Histogram Finish Time	19:30:00 April 28, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9C2.6U1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

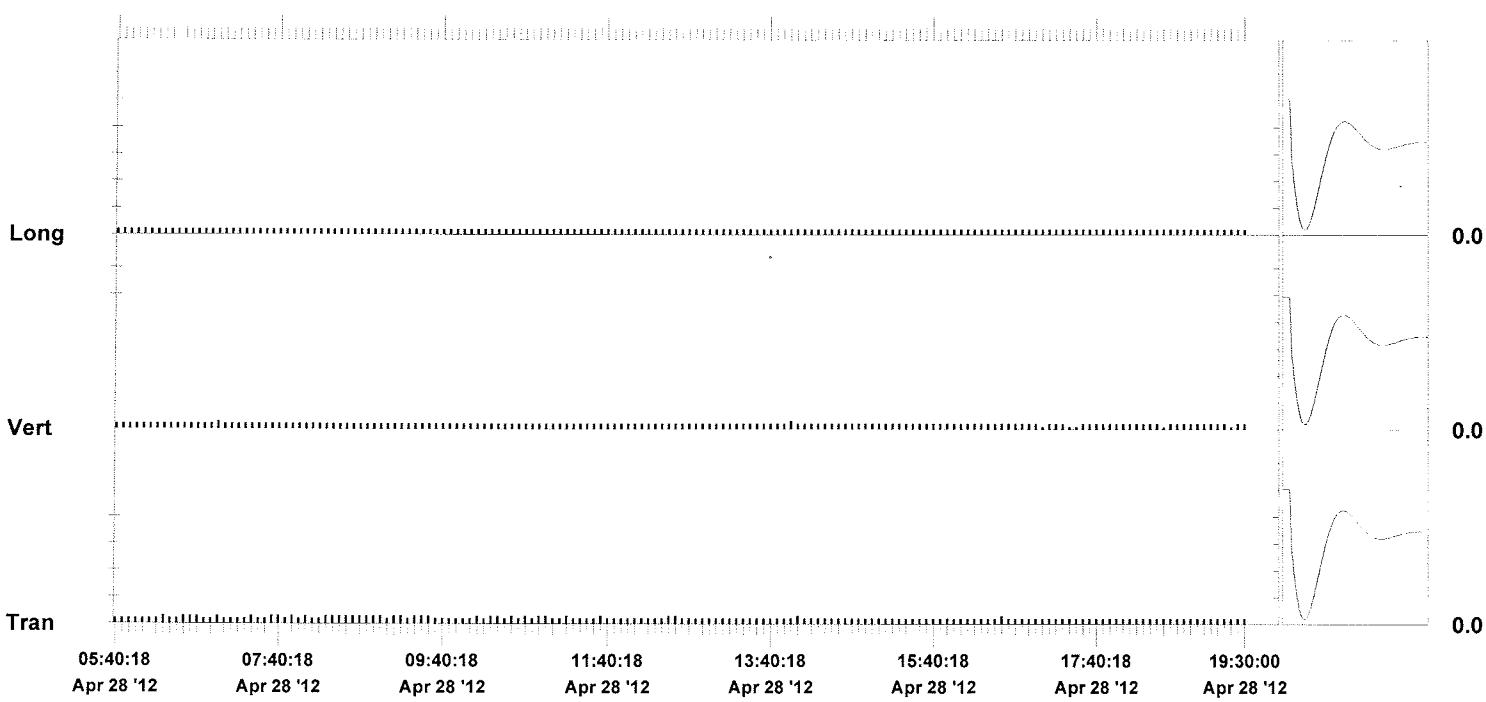
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	30	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	06:11:18	06:55:18	05:36:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0187 in/s on April 28, 2012 at 06:55:18

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 28, 2012
Histogram Finish Time	20:00:00 April 28, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9D5.2V1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

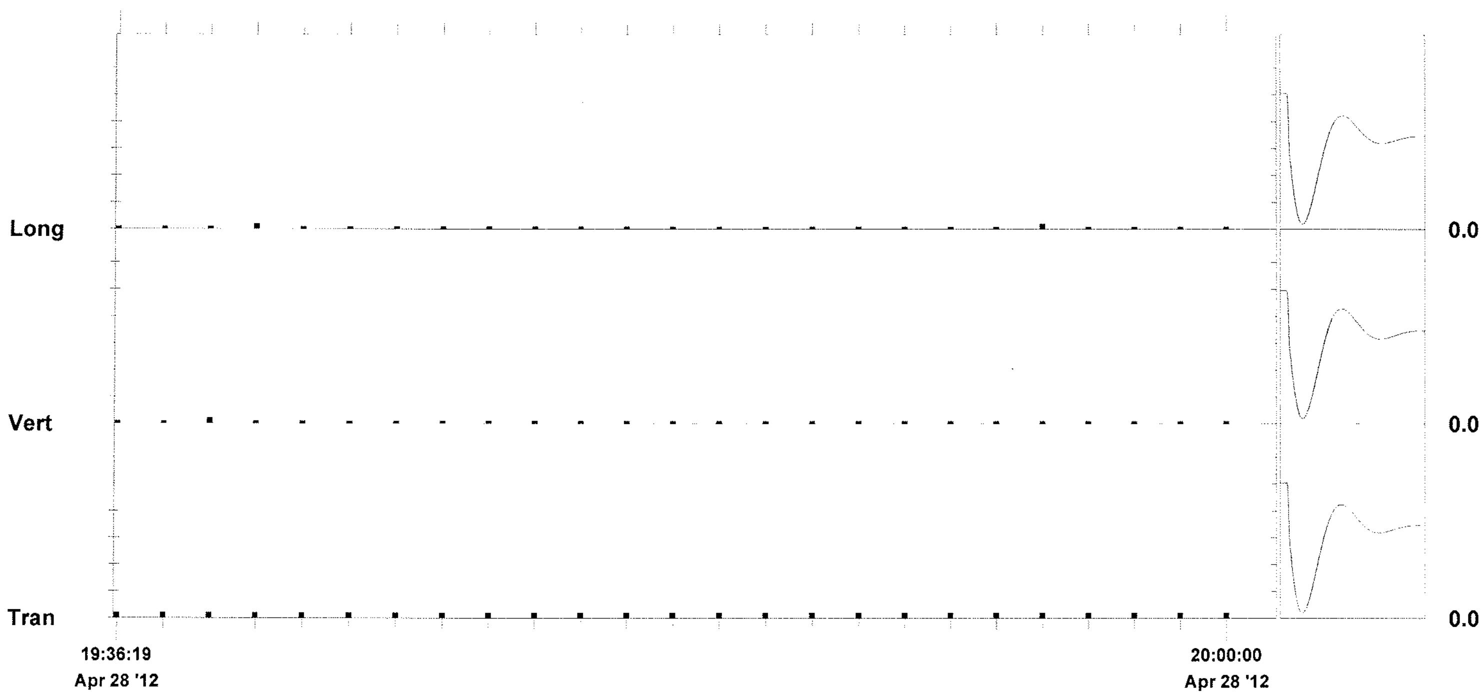
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	19:36:19	19:38:19	19:39:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0122 in/s on April 28, 2012 at 19:36:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 28, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 28, 2012	**Battery Level**	6.8 Volts
Number of Intervals	233 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E9D6.GV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

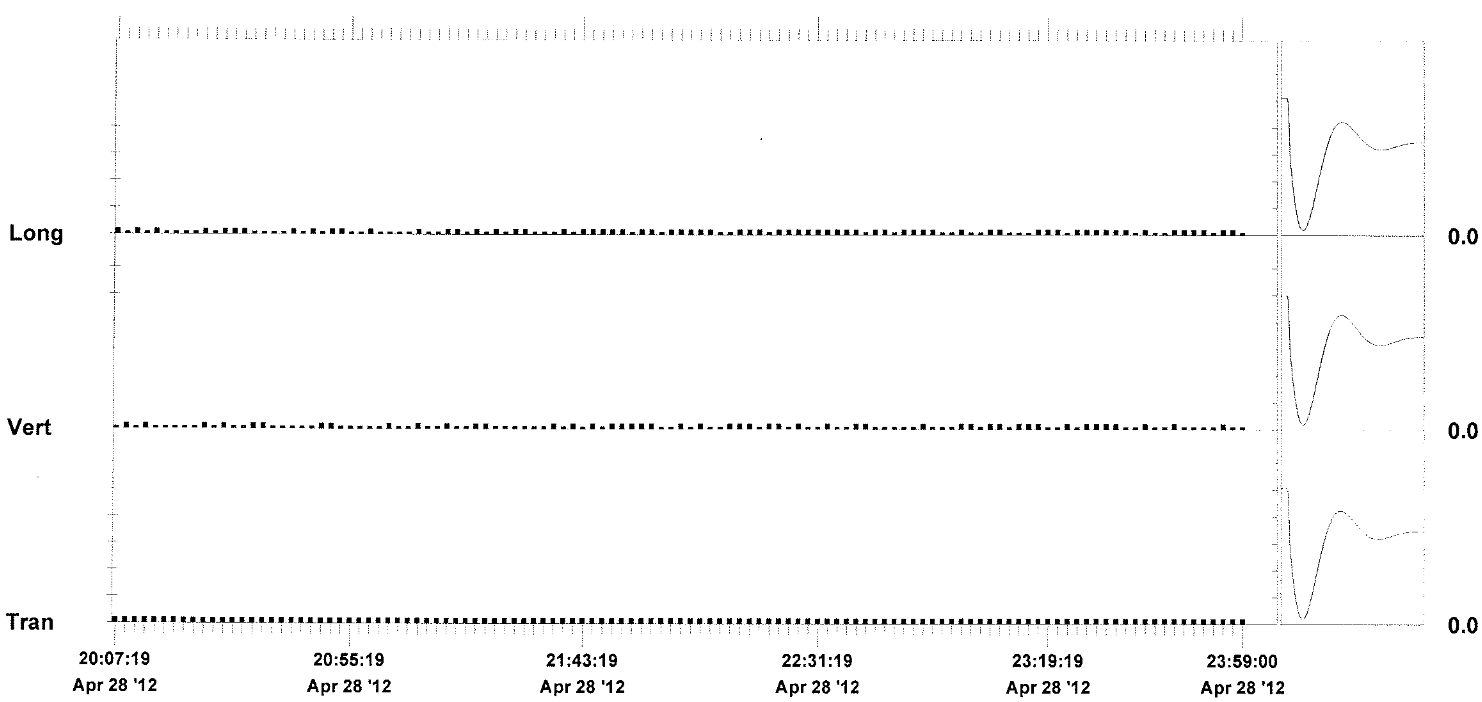
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	20:06:19	20:09:19	20:06:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.6	3.9	

Peak Vector Sum 0.0150 in/s on April 28, 2012 at 21:42:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 29, 2012
Histogram Finish Time	05:30:00 April 29, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9DH.CA1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

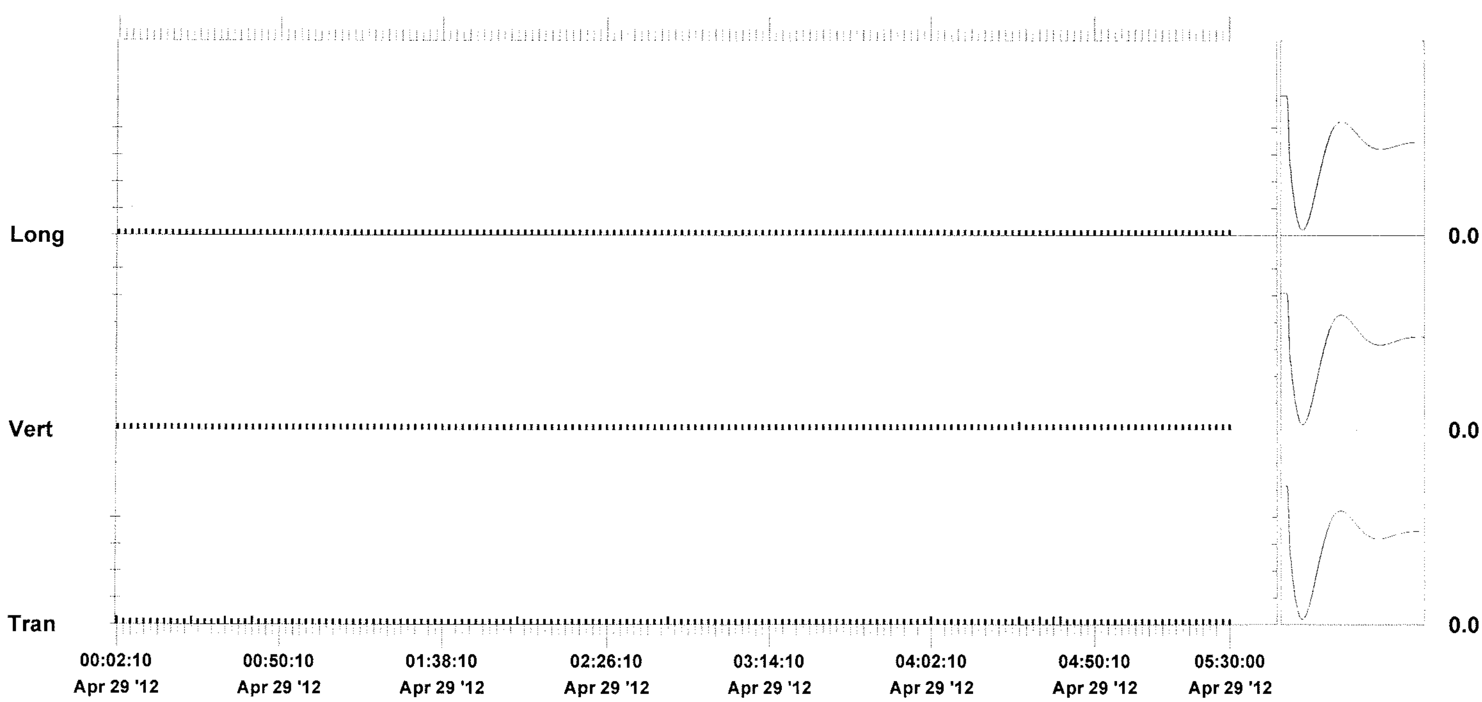
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	47	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	00:01:10	04:28:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0180 in/s on April 29, 2012 at 02:00:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:18 April 29, 2012
Histogram Finish Time	19:30:00 April 29, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9DW.UU1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

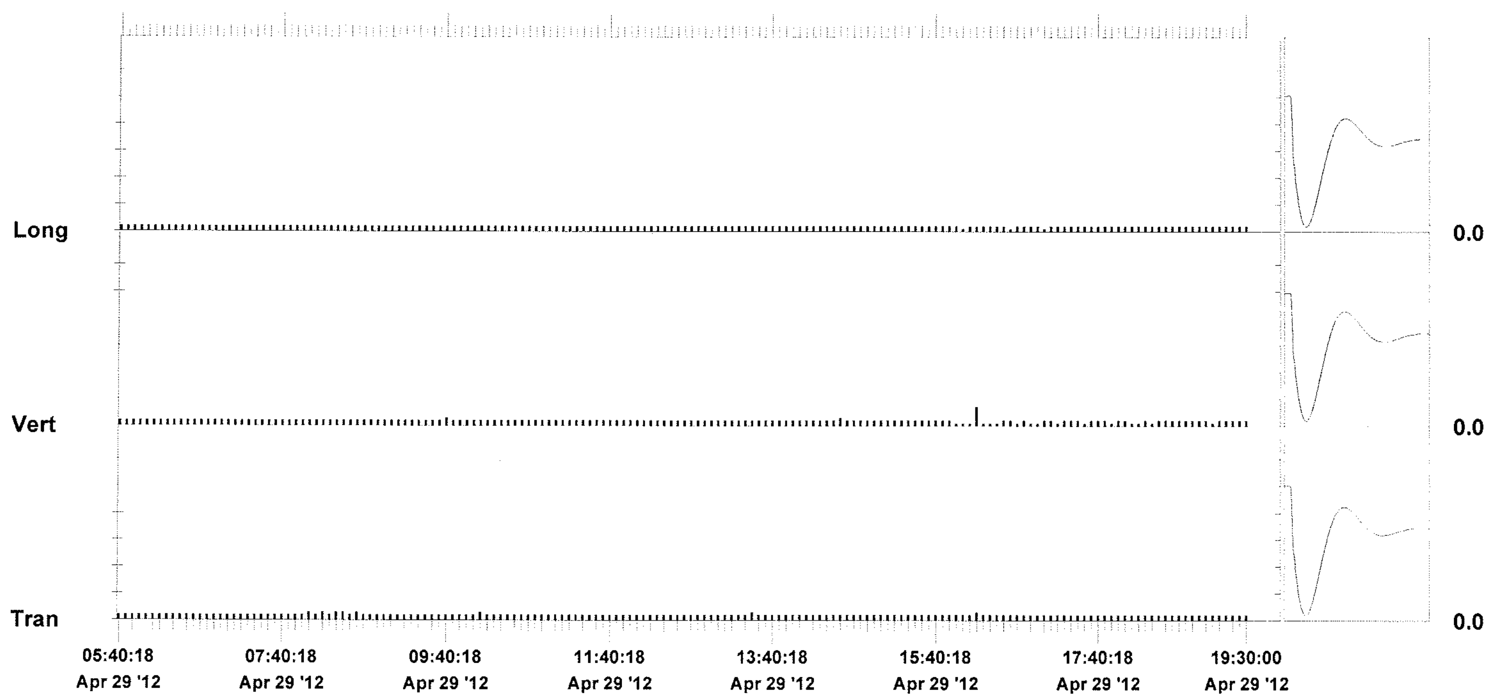
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0350	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	08:00:18	16:07:18	05:36:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.8	7.7	7.6	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0367 in/s on April 29, 2012 at 16:07:18

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 29, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	20:00:00 April 29, 2012	**Battery Level**	6.8 Volts
Number of Intervals	25 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E9EZ.QV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

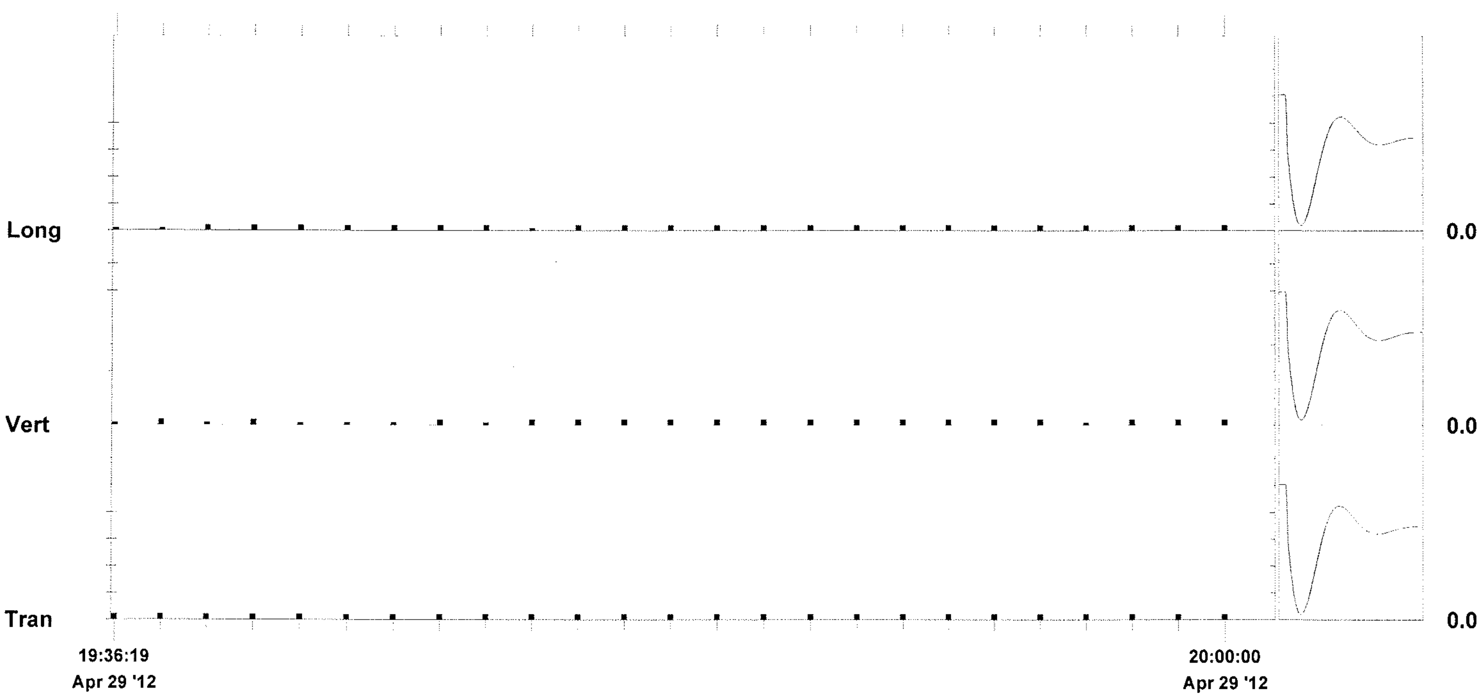
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	19:36:19	19:37:19	19:38:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0150 in/s on April 29, 2012 at 19:38:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 29, 2012
Histogram Finish Time	23:59:00 April 29, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9F1.4V1

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

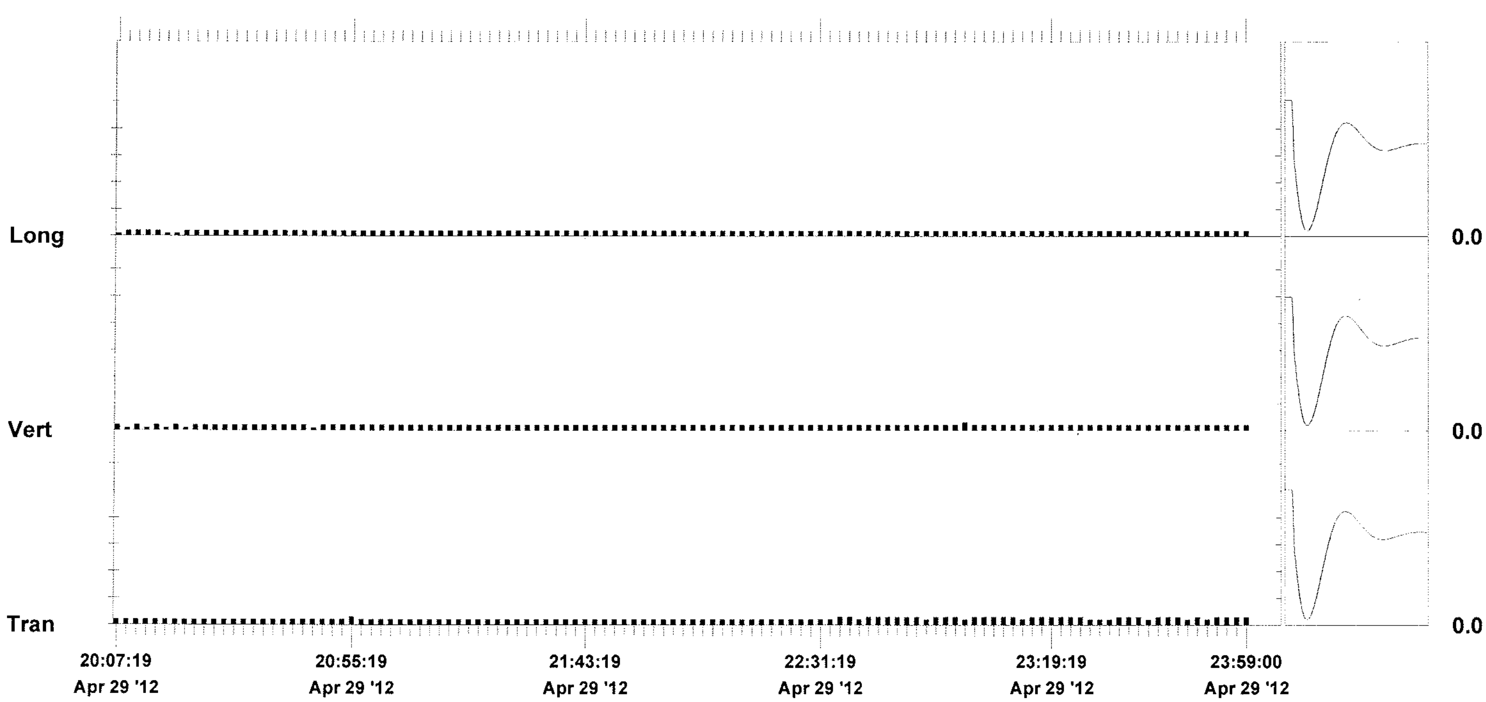
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0150	0.01000	in/s
ZC Freq	>100	73	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	20:55:19	23:00:19	20:09:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.6	7.5	Hz
Overswing Ratio	3.9	3.6	3.9	

Peak Vector Sum 0.0206 in/s on April 29, 2012 at 22:34:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 30, 2012
Histogram Finish Time	05:30:00 April 30, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD6674 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	June 27, 2011 by Vibra-Tech Inc.
File Name	H674E9FC.0A1

Notes

Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

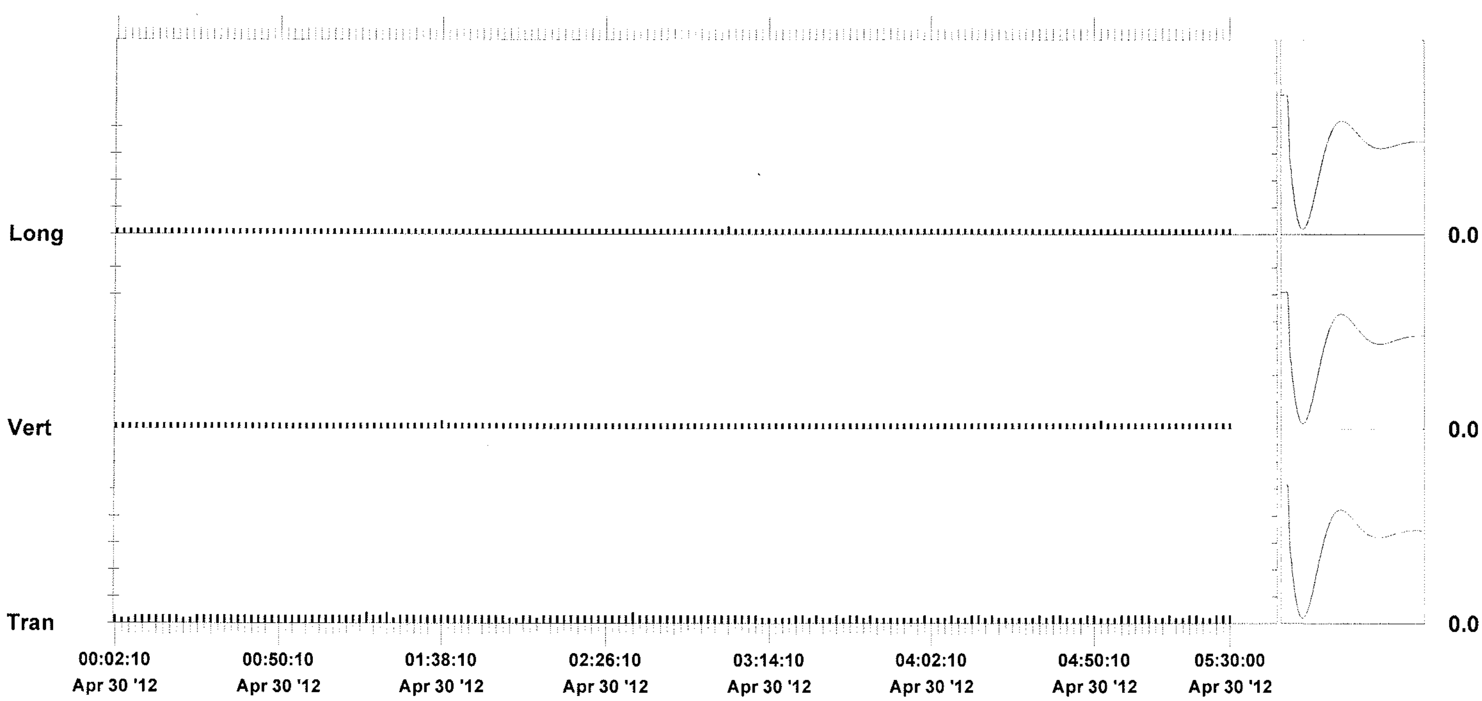
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0150	0.0150	in/s
ZC Freq	>100	57	27	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	01:15:10	01:38:10	03:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.7	7.7	7.5	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.0229 in/s on April 30, 2012 at 02:34:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:18 April 30, 2012	**Serial Number**	BD6674 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	11:10:38 April 30, 2012	**Battery Level**	6.8 Volts
Number of Intervals	335 at 1 minute	**Calibration**	June 27, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	H674E9FR.IU1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #3
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

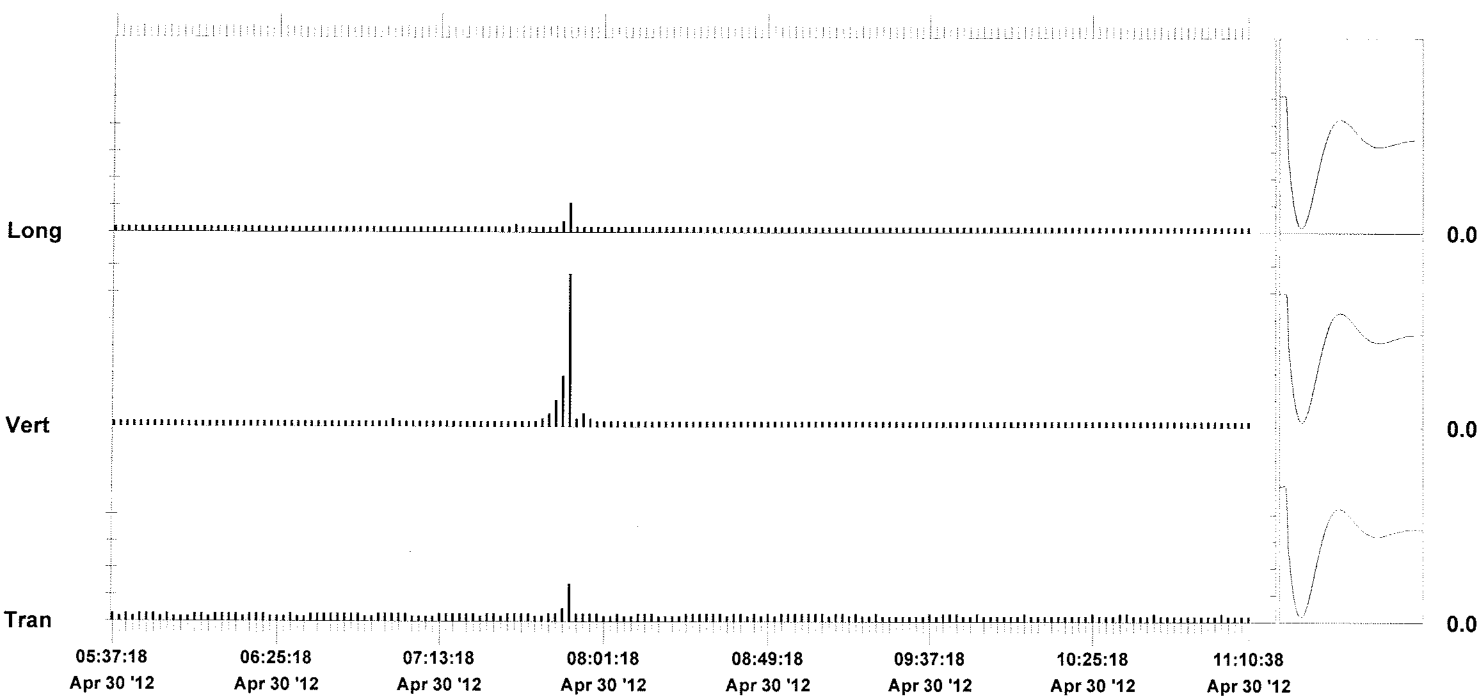
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0700	0.285	0.0550	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	07:51:18	07:51:18	07:51:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.8	7.7	7.6	Hz
Overswing Ratio	3.9	3.7	3.9	

Peak Vector Sum 0.299 in/s on April 30, 2012 at 07:51:18

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	13:36:39 April 22, 2012
Histogram Finish Time	23:59:00 April 22, 2012
Number of Intervals	622 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8340 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	January 31, 2012 by Vibra-Tech Inc.
File Name	J340E91K.H31

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

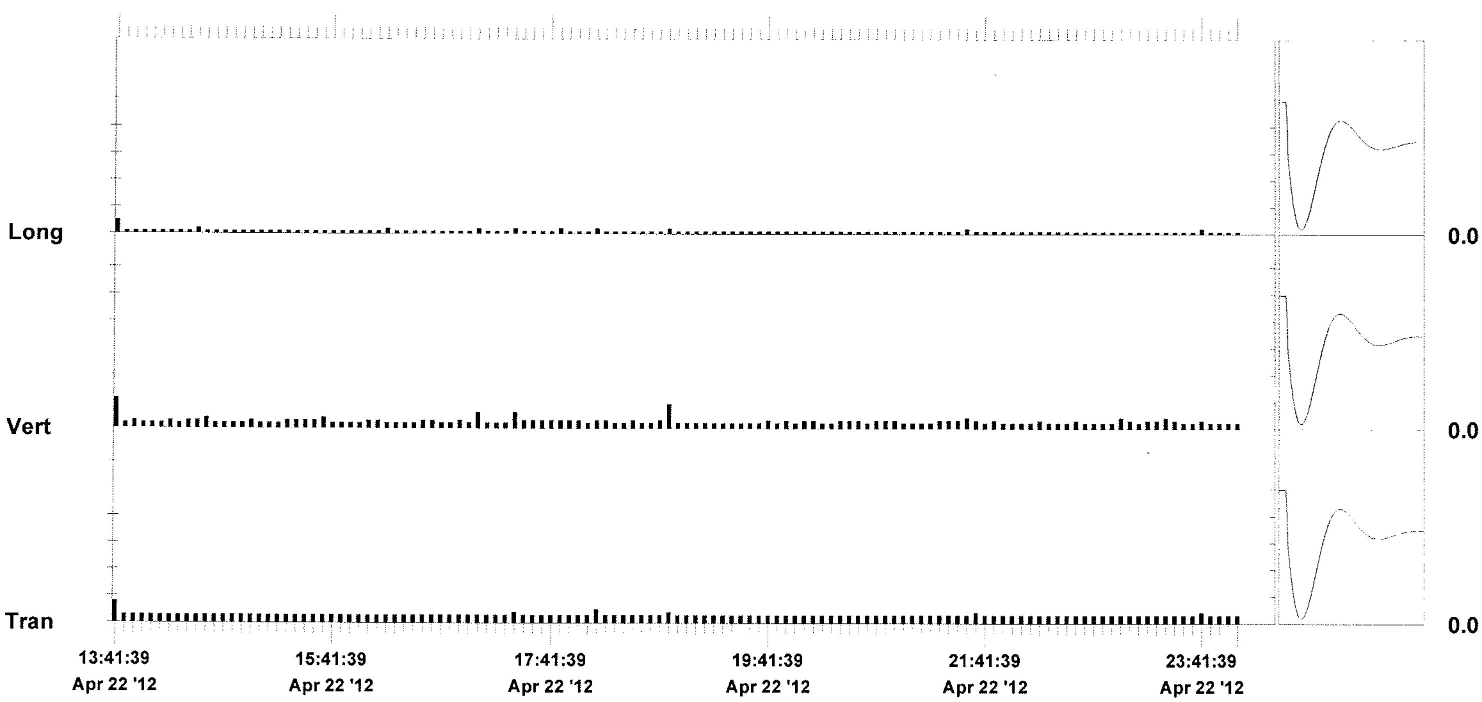
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0400	0.0550	0.0250	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	13:39:39	13:39:39	13:39:39	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.6	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0709 in/s on April 22, 2012 at 13:39:39

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 23, 2012	**Serial Number**	BD8340 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 23, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	January 31, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J340E92D.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

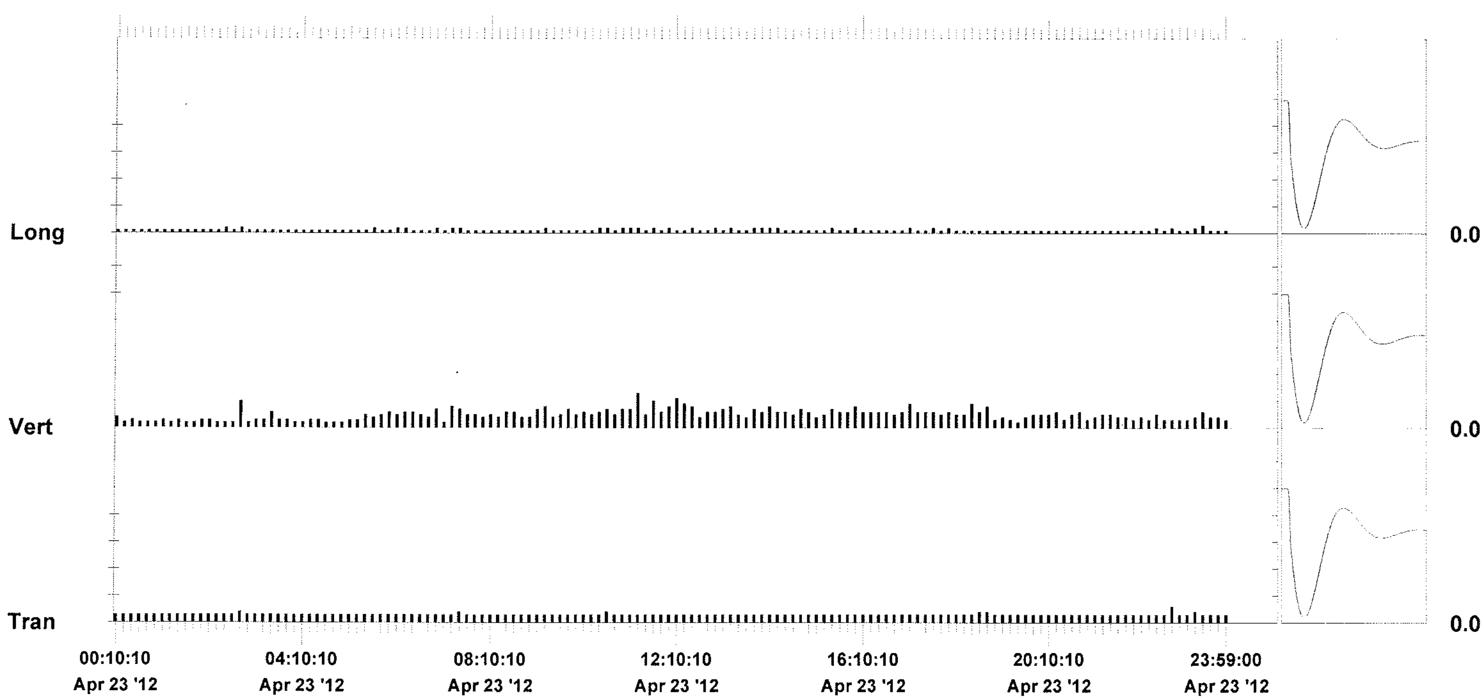
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0300	0.0650	0.0150	in/s
ZC Freq	73	15	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	22:41:10	11:11:10	23:21:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.6	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0660 in/s on April 23, 2012 at 11:11:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 24, 2012	**Serial Number**	BD8340 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 24, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	January 31, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J340E948.0A1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

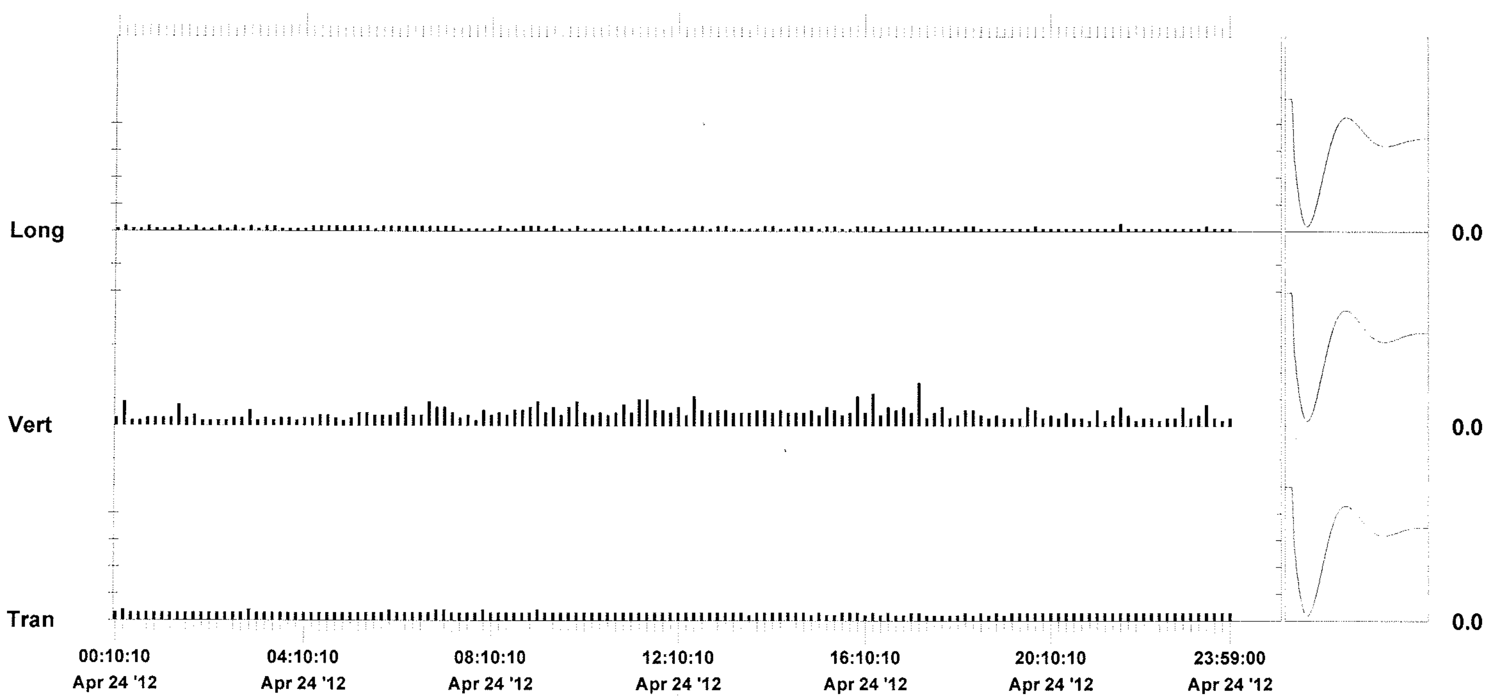
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0800	0.0150	in/s
ZC Freq	21	15	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	00:19:10	17:12:10	21:34:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.6	7.5	Hz
Overswing Ratio	3.7	3.5	3.8	

Peak Vector Sum 0.0803 in/s on April 24, 2012 at 17:12:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 25, 2012
Histogram Finish Time	23:59:00 April 25, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8340 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	January 31, 2012 by Vibra-Tech Inc.
File Name	J340E962.OA1

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

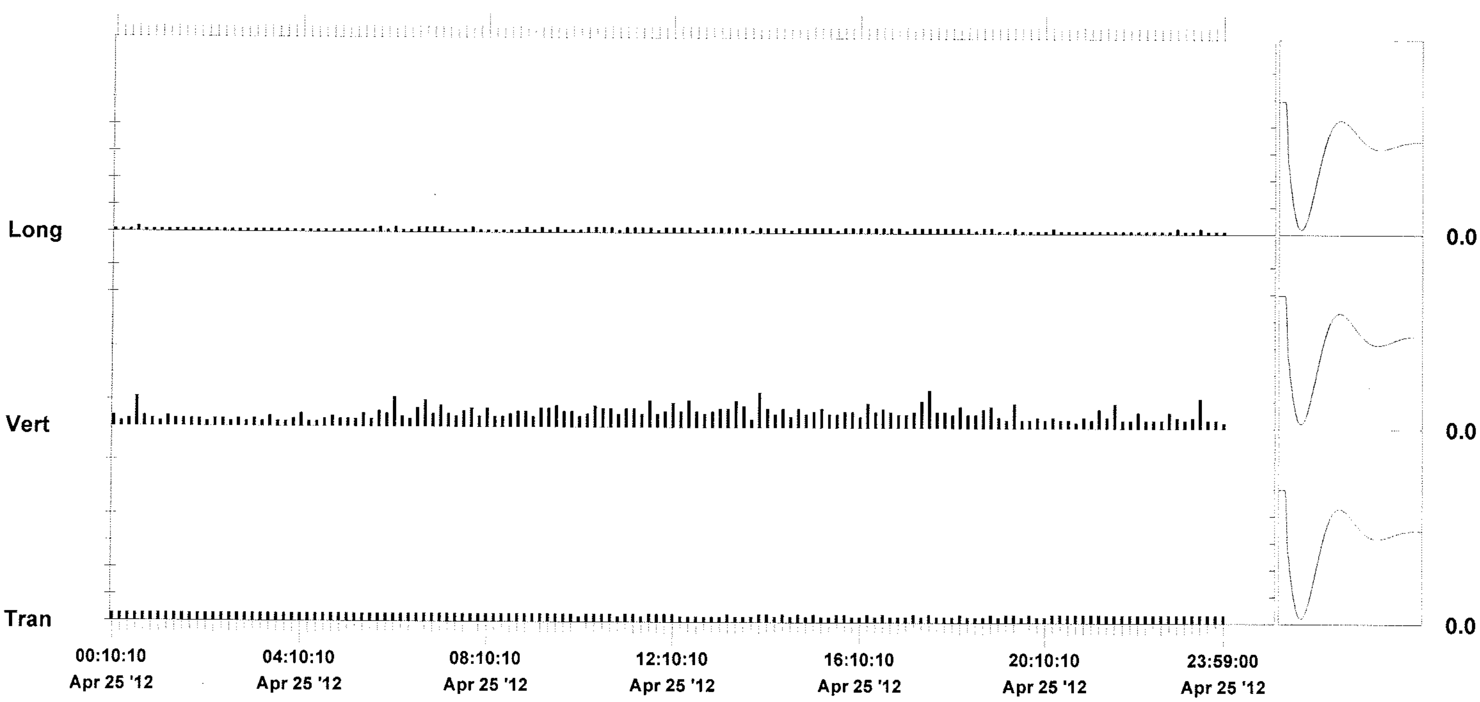
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0700	0.01000	in/s
ZC Freq	5.2	14	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	00:01:10	17:35:10	00:33:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.6	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0707 in/s on April 25, 2012 at 17:35:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 26, 2012	**Serial Number**	BD8340 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 26, 2012	**Battery Level**	6.8 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	January 31, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J340E97X.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

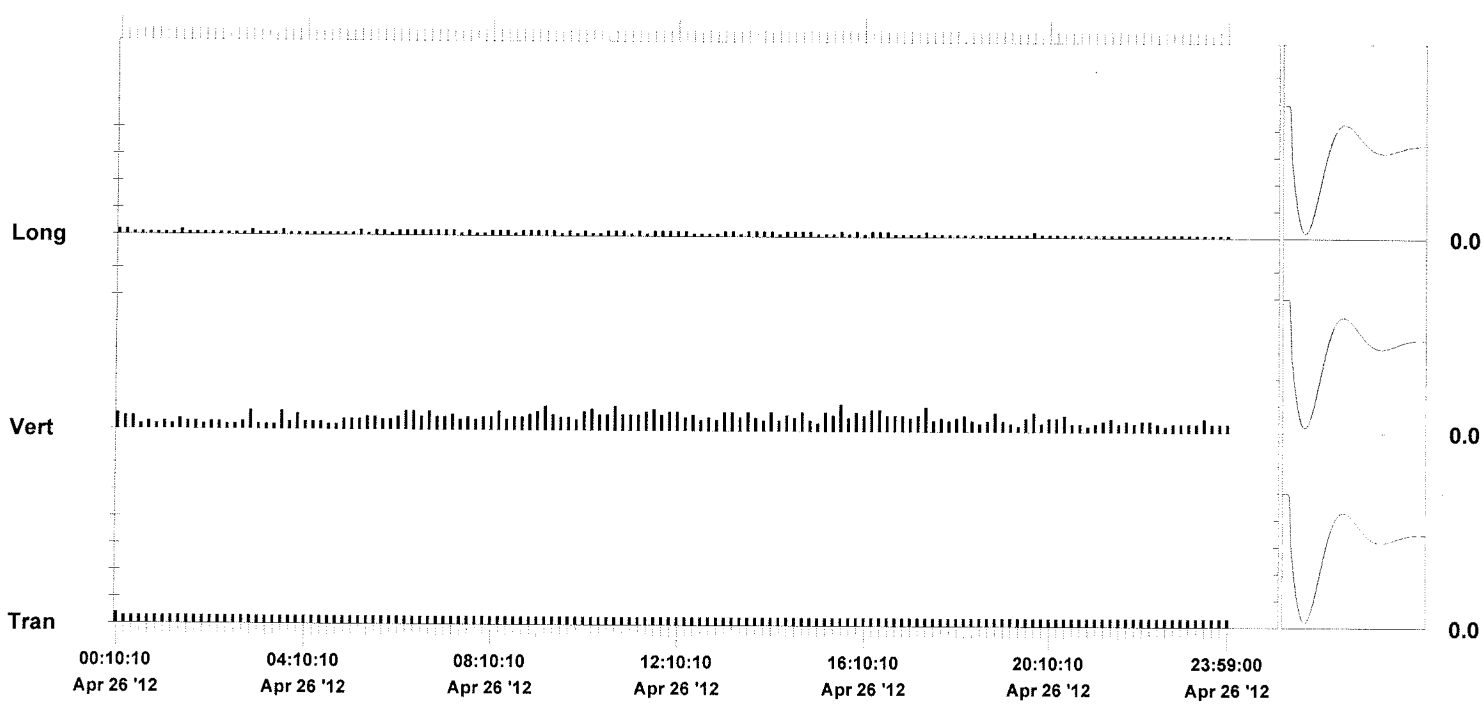
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0200	0.0500	0.01000	in/s
ZC Freq	>100	18	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	00:02:10	15:38:10	00:02:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.6	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0505 in/s on April 26, 2012 at 15:38:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 27, 2012
Histogram Finish Time	23:59:00 April 27, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8340 V 7.04-8.0 MultiSeis Plus
Battery Level	6.1 Volts
Calibration	January 31, 2012 by Vibra-Tech Inc.
File Name	J340E99S.0A1

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

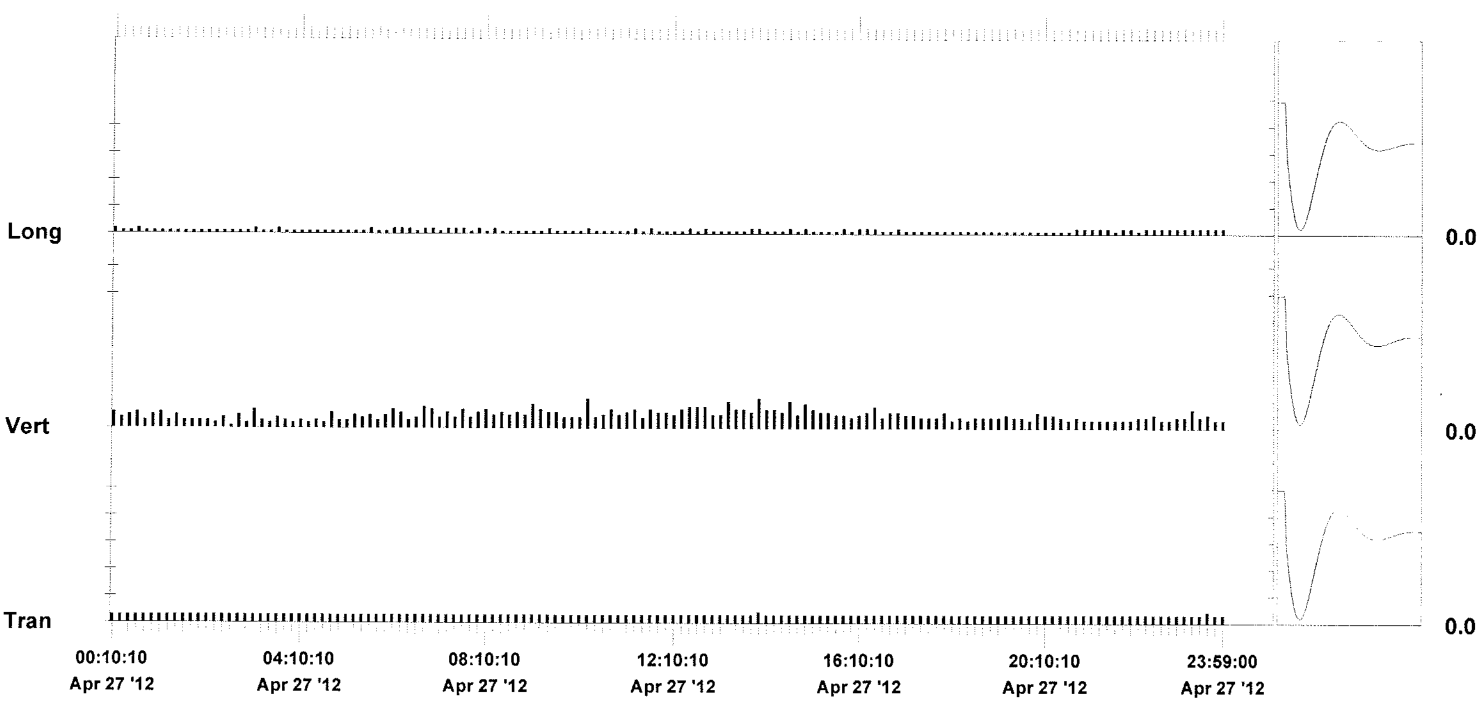
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0550	0.01000	in/s
ZC Freq	28	18	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	13:55:10	10:13:10	00:04:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.6	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0555 in/s on April 27, 2012 at 10:13:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 28, 2012	**Serial Number**	BD8340 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 28, 2012	**Battery Level**	5.8 Volts (Battery Low)
Number of Intervals	1438 at 1 minute	**Calibration**	January 31, 2012 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	J340E9BM.OA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

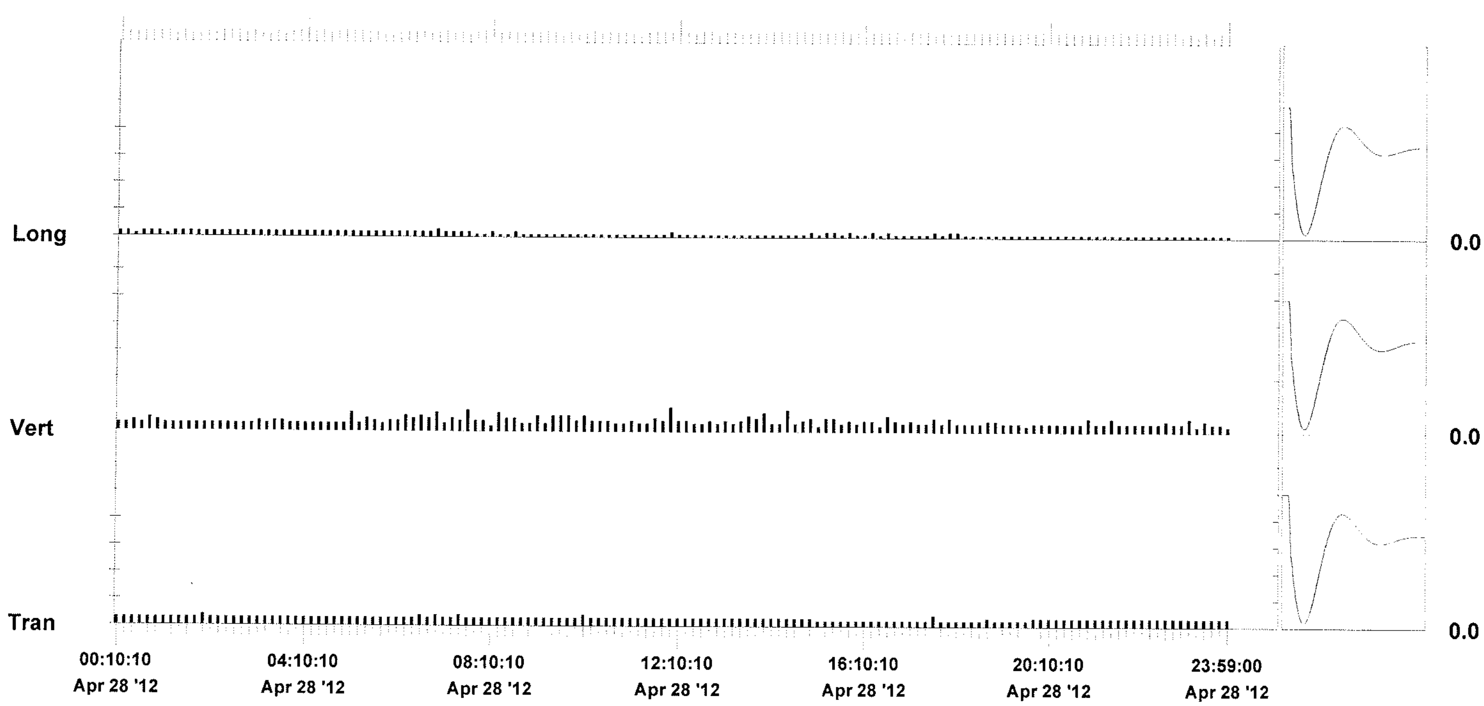
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0450	0.0150	in/s
ZC Freq	<1.0	20	34	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	01:58:10	11:55:10	06:55:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.7	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0456 in/s on April 28, 2012 at 11:55:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 29, 2012
Histogram Finish Time	06:29:10 April 29, 2012
Number of Intervals	389 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BD8340 V 7.04-8.0 MultiSeis Plus
Battery Level	5.7 Volts (Battery Very Low)
Calibration	January 31, 2012 by Vibra-Tech Inc.
File Name	J340E9DH.CA1

Notes
Location: Location #4
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

Post Event Notes

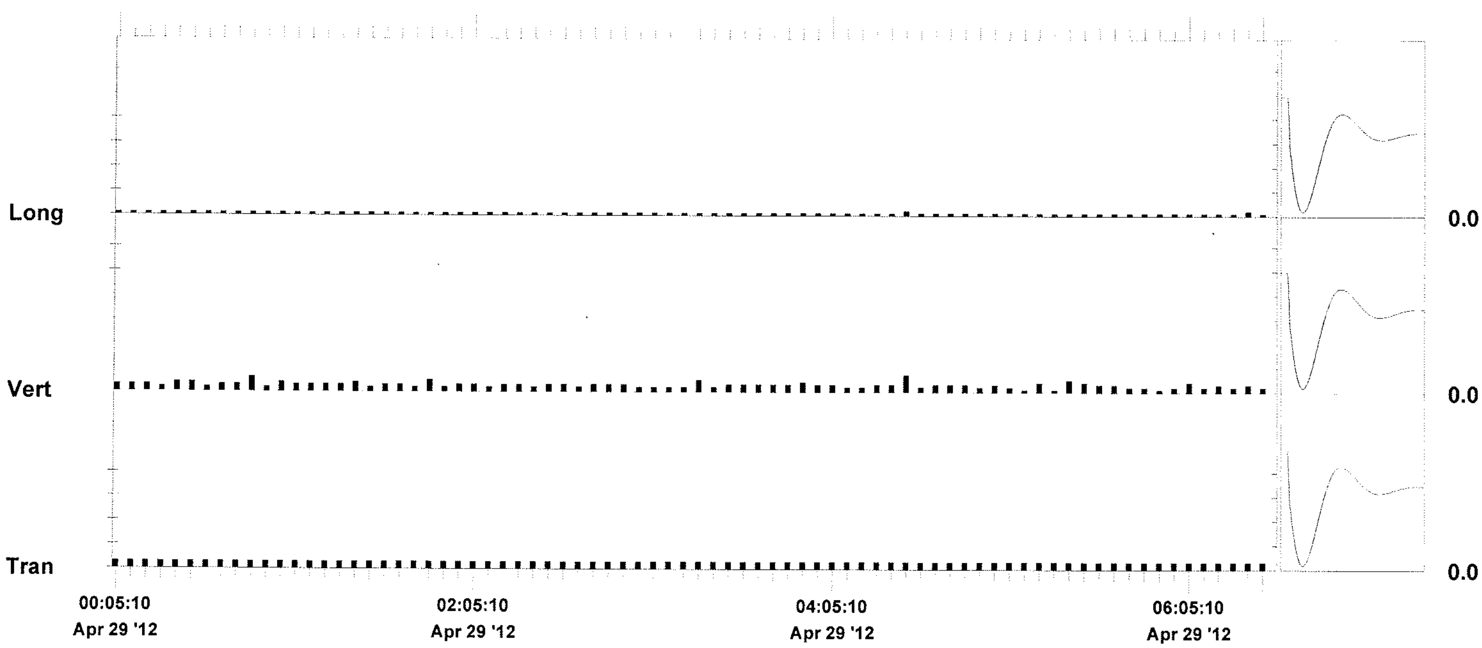
Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0350	0.01000	in/s
ZC Freq	5.8	15	73	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	00:01:10	04:28:10	04:28:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.6	7.7	7.5	Hz
Overswing Ratio	3.6	3.5	3.8	

Peak Vector Sum 0.0364 in/s on April 29, 2012 at 04:28:10

N/A: Not Applicable

Monitor Log
Apr 29 '12 00:00:10 Apr 29 '12 06:29:10 Event recorded. (Battery Low Exit)



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	14:01:00 April 22, 2012
Histogram Finish Time	23:59:00 April 22, 2012
Number of Intervals	598 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF14209 V 7.04-8.0 MultiSeis Plus
Battery Level	7.0 Volts
Calibration	September 1, 2011 by Vibra-Tech Inc.
File Name	P209E91L.LO1

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

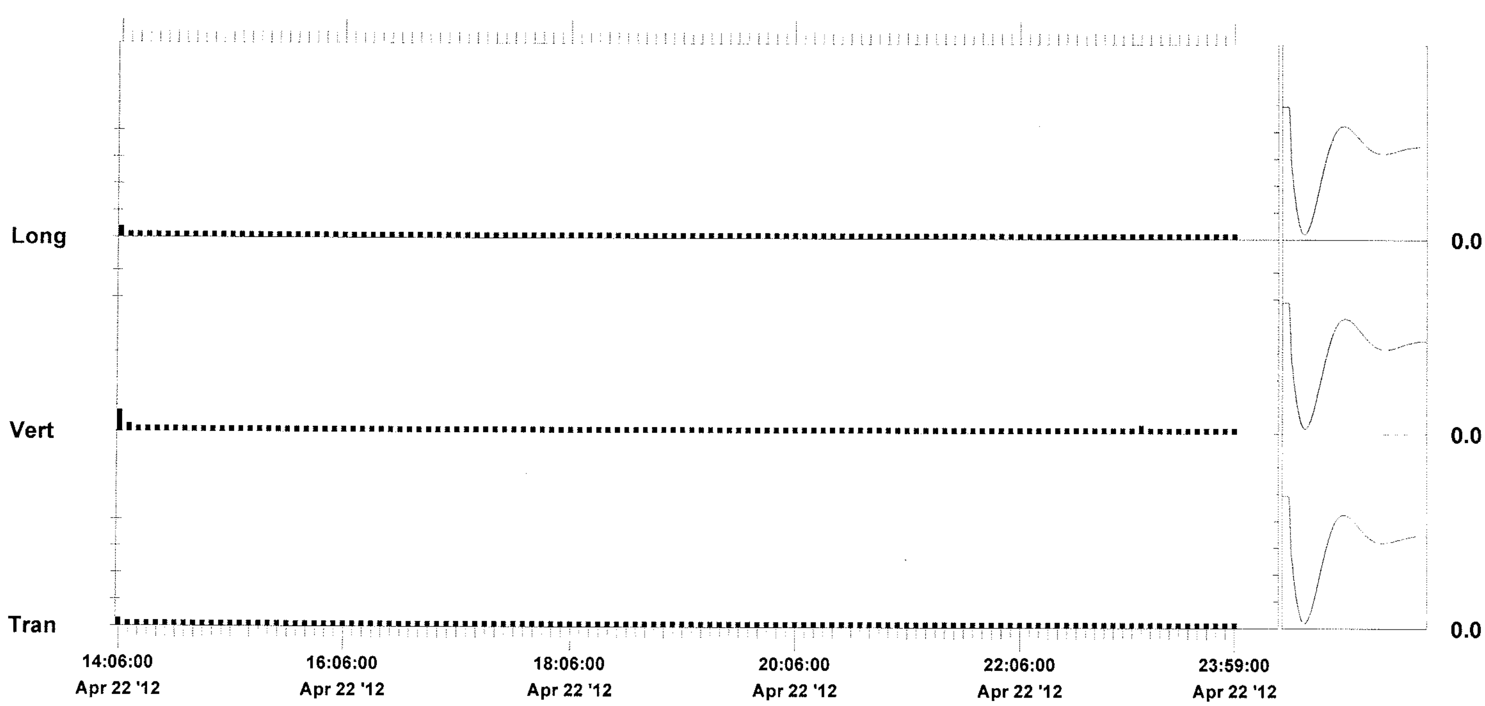
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0400	0.0200	in/s
ZC Freq	>100	>100	85	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	14:03:00	14:03:00	14:03:00	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.6	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0400 in/s on April 22, 2012 at 14:03:00

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 23, 2012
Histogram Finish Time	23:59:00 April 23, 2012
Number of Intervals	1438 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF14209 V 7.04-8.0 MultiSeis Plus
Battery Level	7.0 Volts
Calibration	September 1, 2011 by Vibra-Tech Inc.
File Name	P209E92D.CA1

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

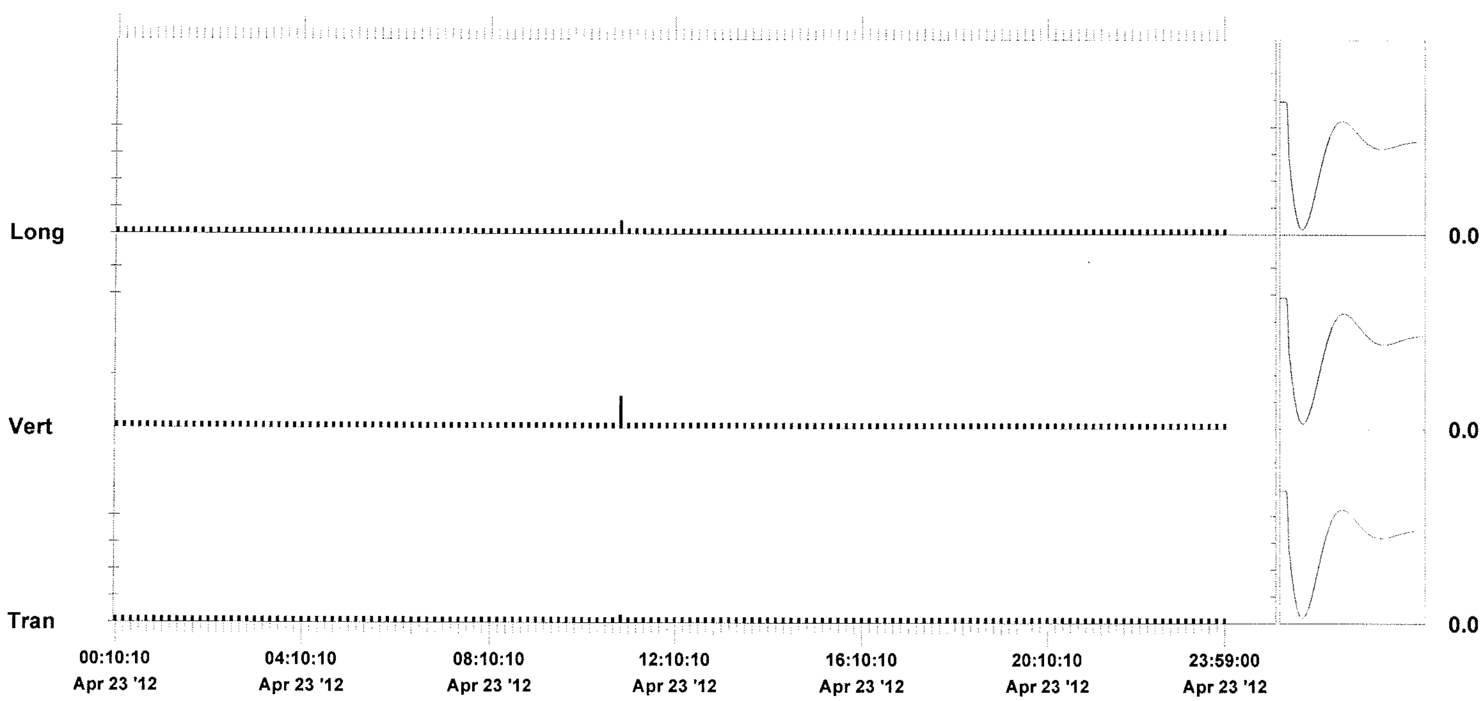
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0600	0.0250	in/s
ZC Freq	>100	16	47	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	10:56:10	10:56:10	10:56:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.5	Hz
Overswing Ratio	3.9	3.6	3.9	

Peak Vector Sum 0.0616 in/s on April 23, 2012 at 10:56:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 24, 2012	**Serial Number**	BF14209 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 24, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	September 1, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	P209E948.0A1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

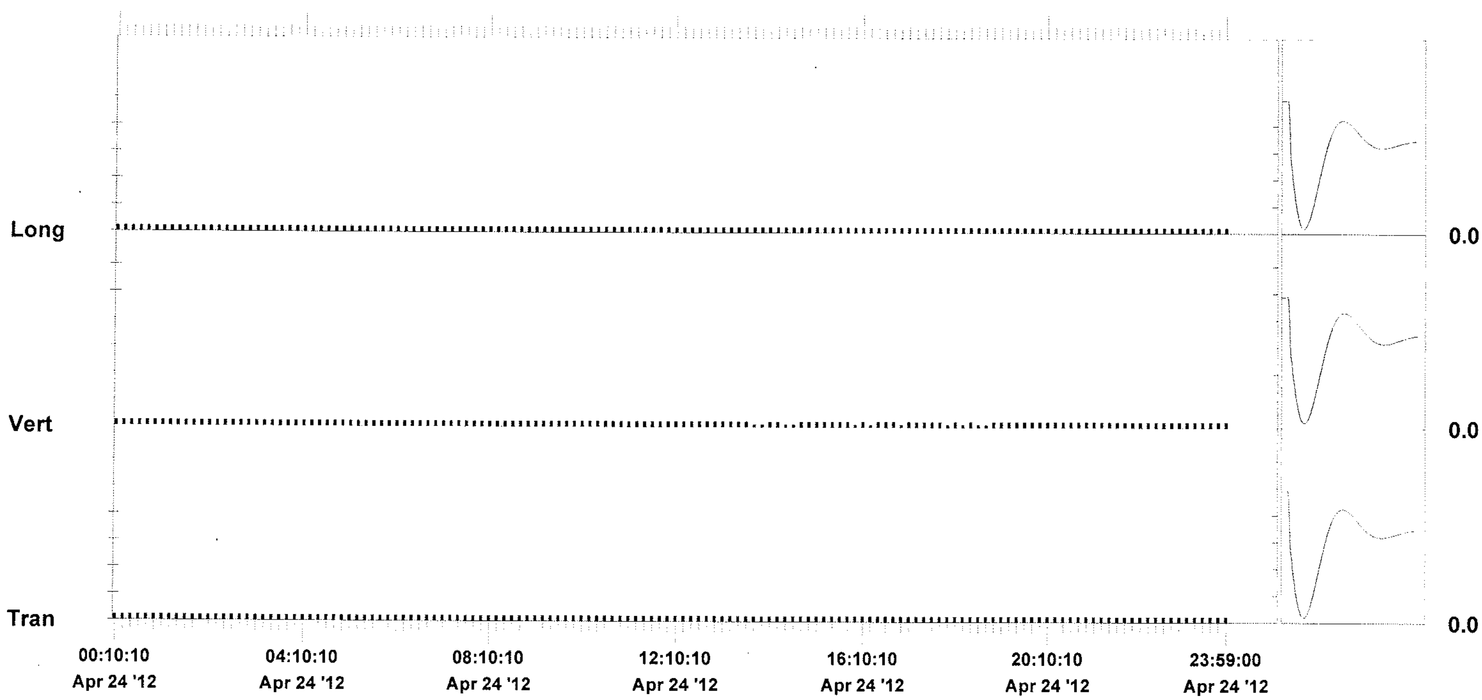
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	00:01:10	00:01:10	00:01:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.6	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0150 in/s on April 24, 2012 at 00:34:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

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VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 25, 2012	**Serial Number**	BF14209 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 25, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	September 1, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	P209E962.OA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

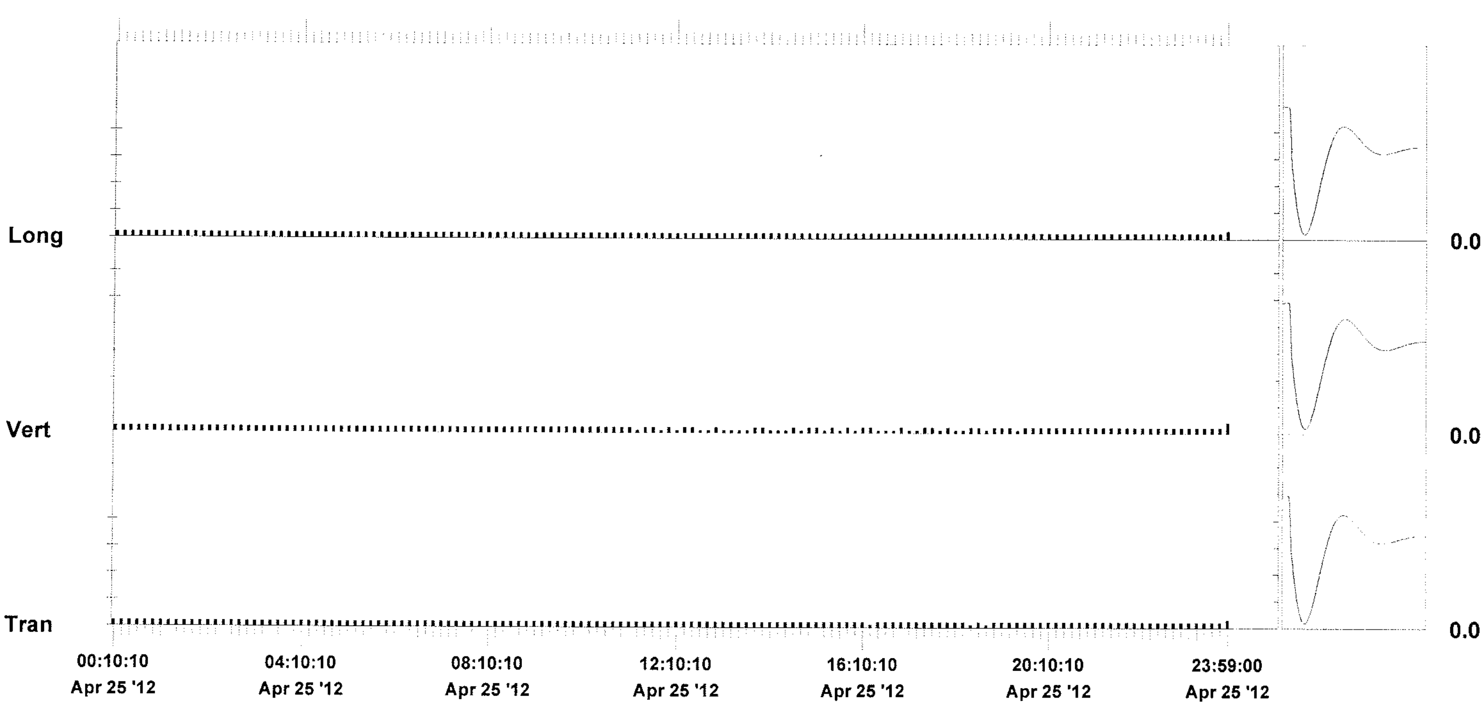
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0200	0.0150	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	23:54:10	23:54:10	23:54:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.5	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0235 in/s on April 25, 2012 at 23:54:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 26, 2012	**Serial Number**	BF14209 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 26, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	September 1, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	P209E97X.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

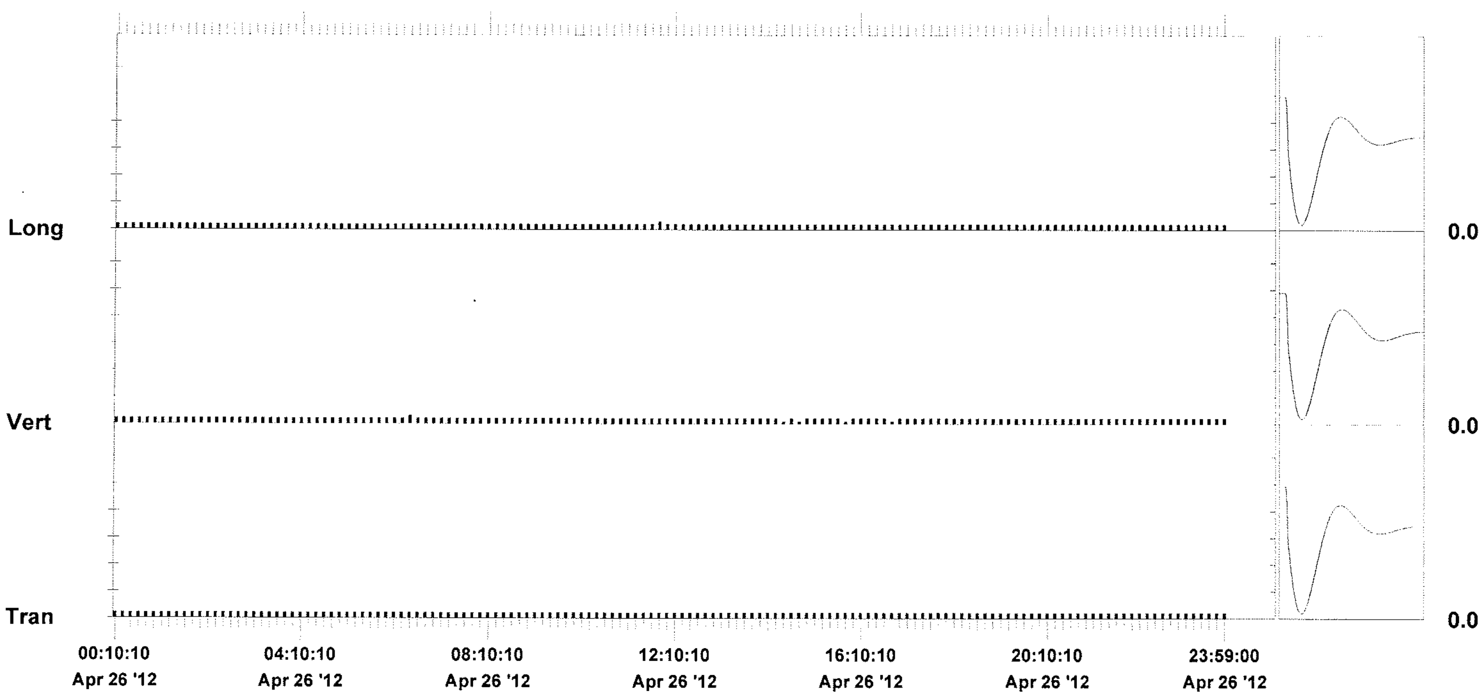
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.0150	0.0150	in/s
ZC Freq	>100	21	37	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	00:01:10	06:22:10	11:42:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.6	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0173 in/s on April 26, 2012 at 13:30:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 27, 2012	**Serial Number**	BF14209 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 27, 2012	**Battery Level**	7.0 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	September 1, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	P209E99S.0A1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

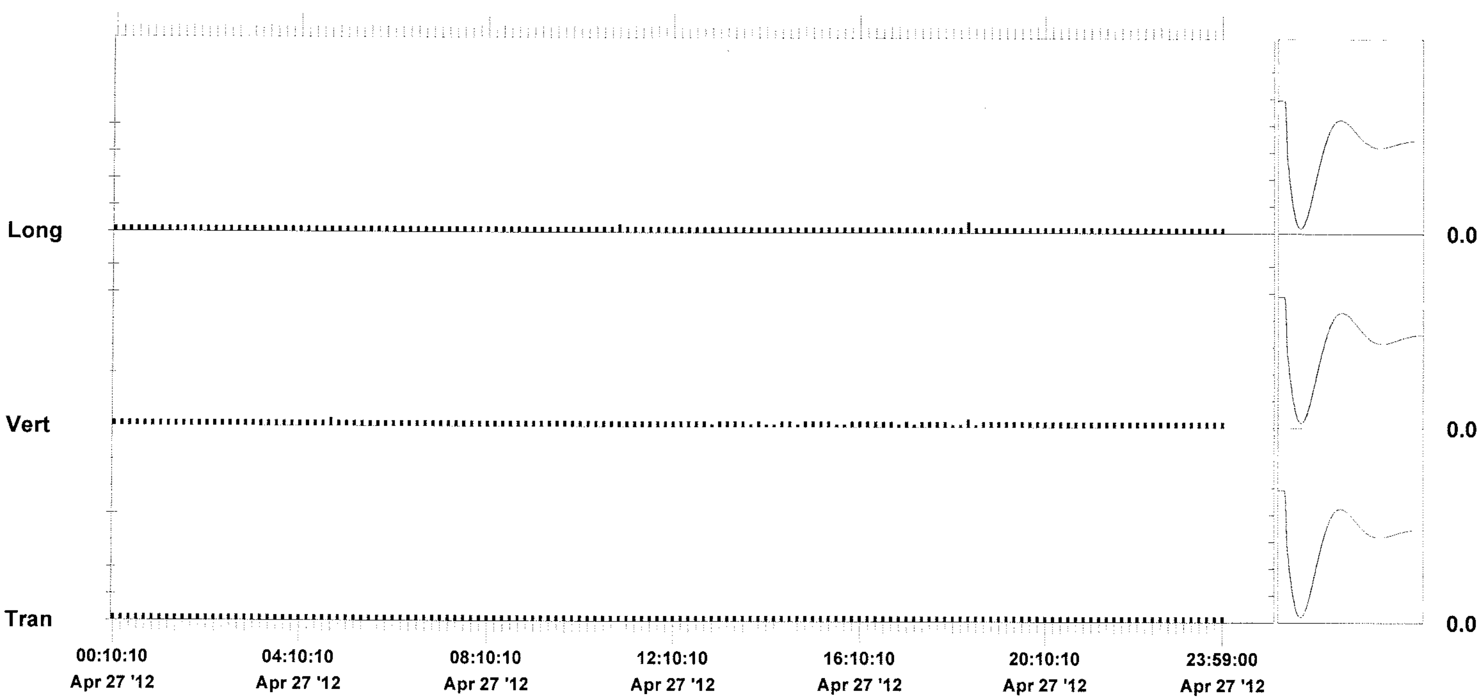
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.0150	0.0200	in/s
ZC Freq	>100	20	43	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	00:01:10	04:44:10	18:28:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.5	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0229 in/s on April 27, 2012 at 18:28:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 28, 2012	**Serial Number**	BF14209 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 28, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	September 1, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	P209E9BM.OA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

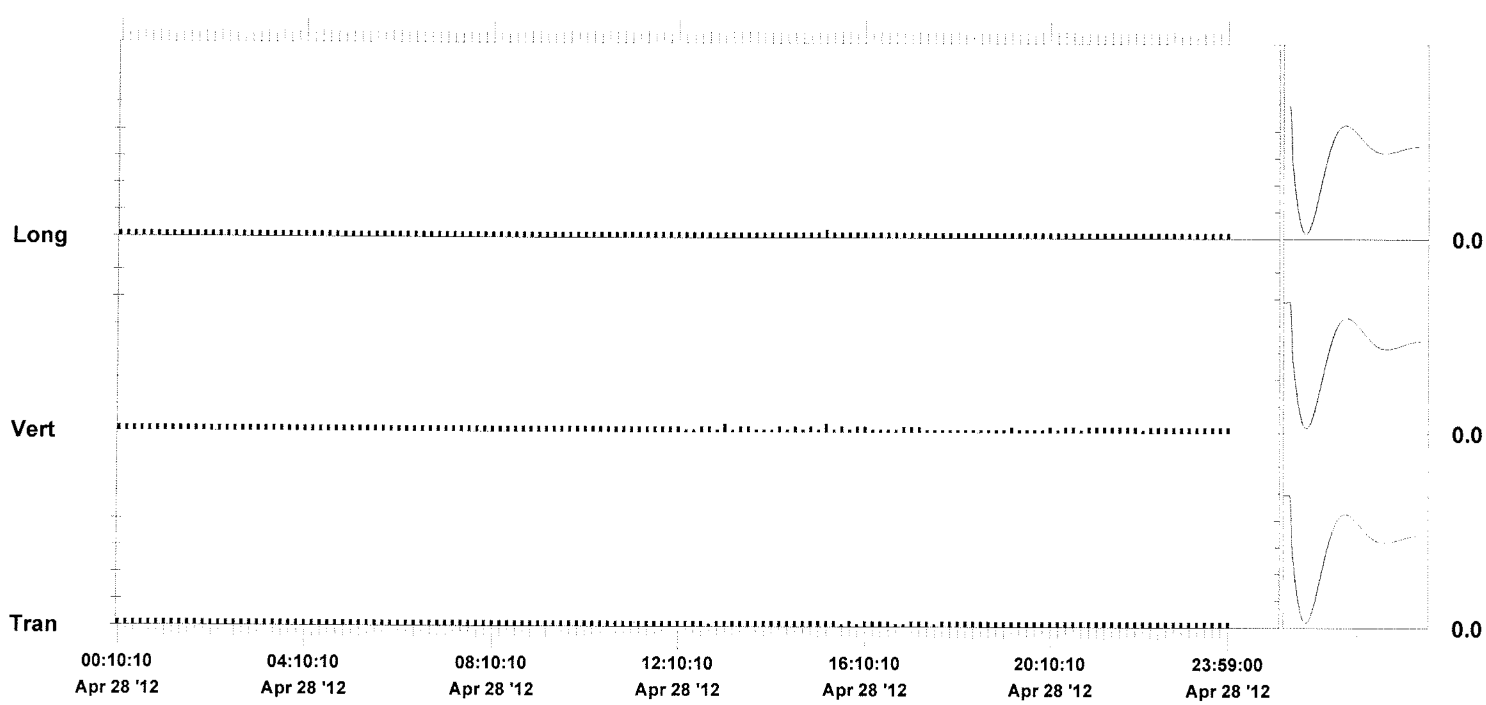
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.0150	0.0150	in/s
ZC Freq	>100	73	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	00:01:10	13:06:10	15:11:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.6	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0206 in/s on April 28, 2012 at 15:11:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

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VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 29, 2012	**Serial Number**	BF14209 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 29, 2012	**Battery Level**	6.9 Volts
Number of Intervals	1438 at 1 minute	**Calibration**	September 1, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	P209E9DH.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

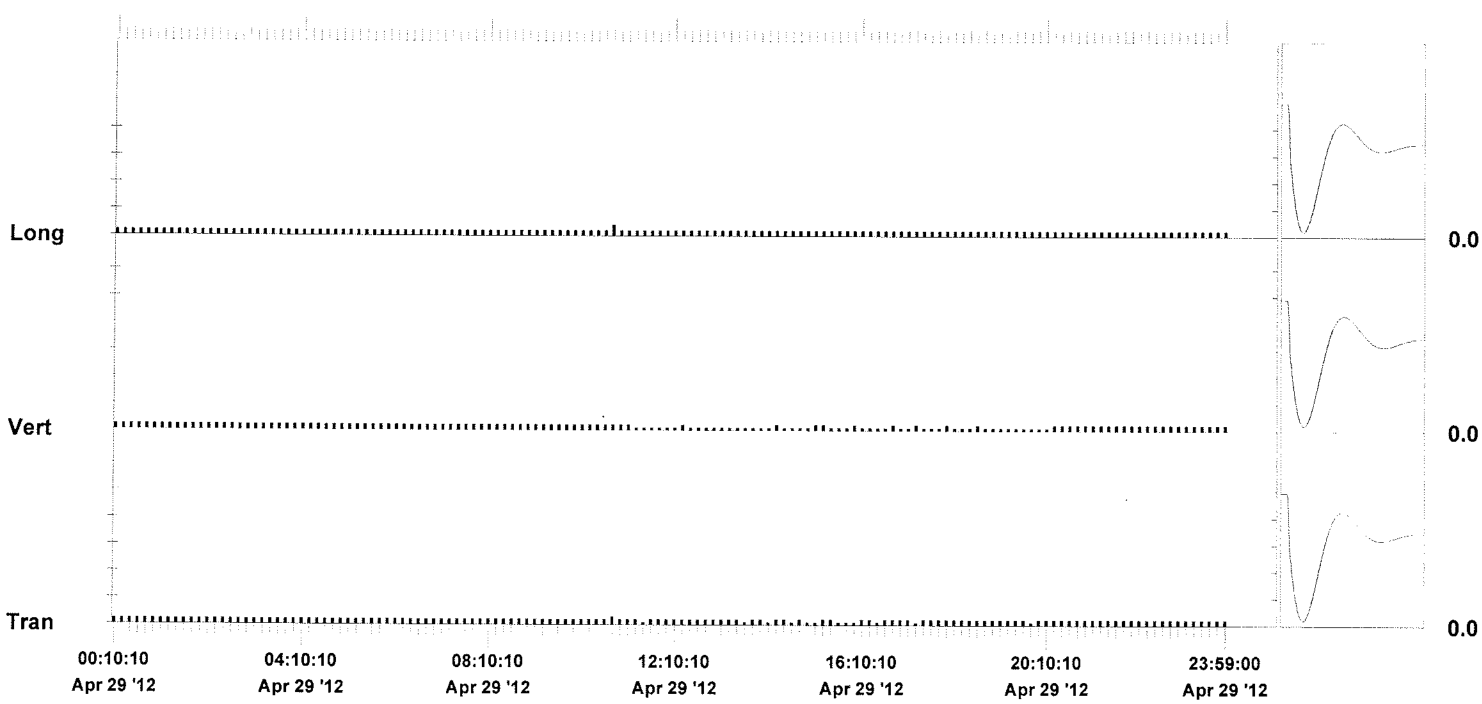
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.0200	in/s
ZC Freq	34	>100	8.4	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	10:45:10	00:02:10	10:45:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.6	Hz
Overswing Ratio	3.8	3.6	3.9	

Peak Vector Sum 0.0224 in/s on April 29, 2012 at 10:45:10

N/A: Not Applicable



Time Scale: 10 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 30, 2012
Histogram Finish Time	14:34:23 April 30, 2012
Number of Intervals	874 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF14209 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	September 1, 2011 by Vibra-Tech Inc.
File Name	P209E9FC.0A1

Notes
Location: Location #5
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

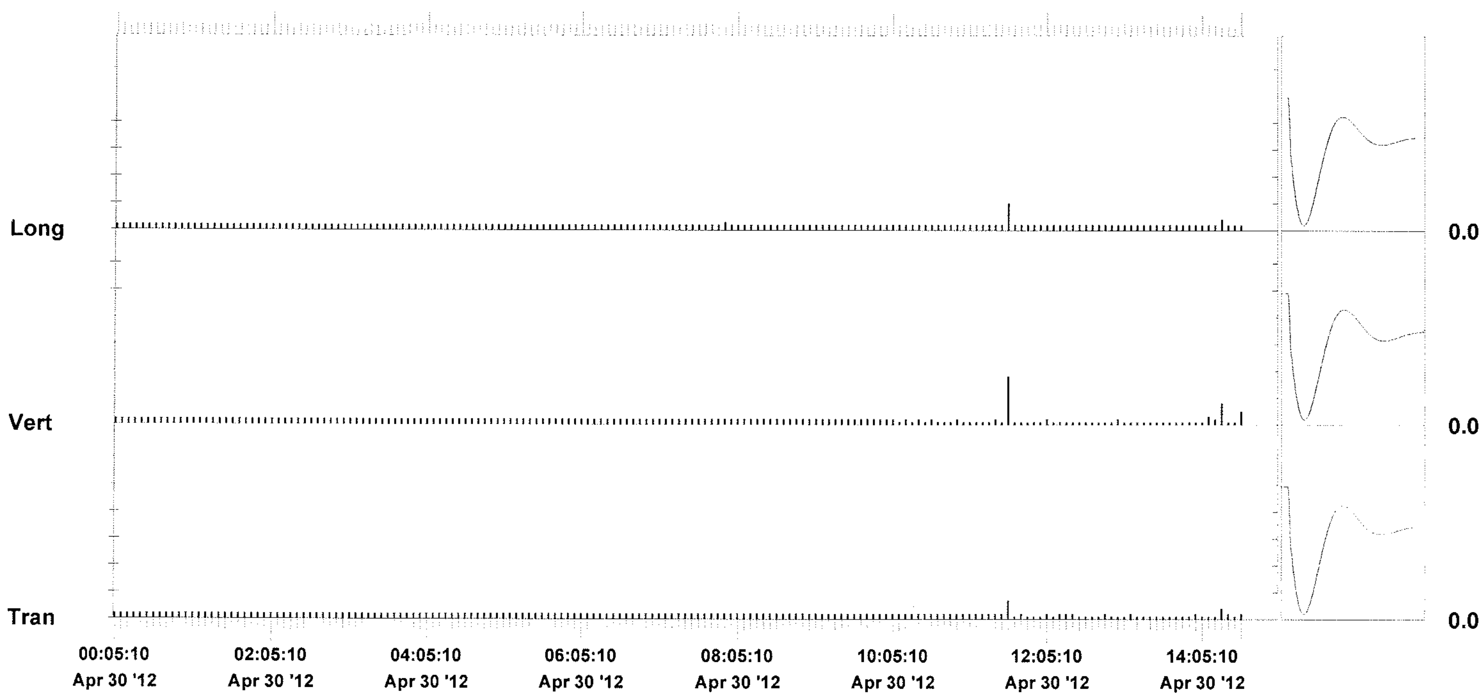
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0350	0.0900	0.0500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	11:35:10	11:35:10	11:35:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.4	7.5	Hz
Overswing Ratio	3.8	3.5	3.9	

Peak Vector Sum 0.0939 in/s on April 30, 2012 at 11:35:10

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	14:31:22 April 22, 2012
Histogram Finish Time	19:30:00 April 22, 2012
Number of Intervals	299 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E91N.0A1

Notes

Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

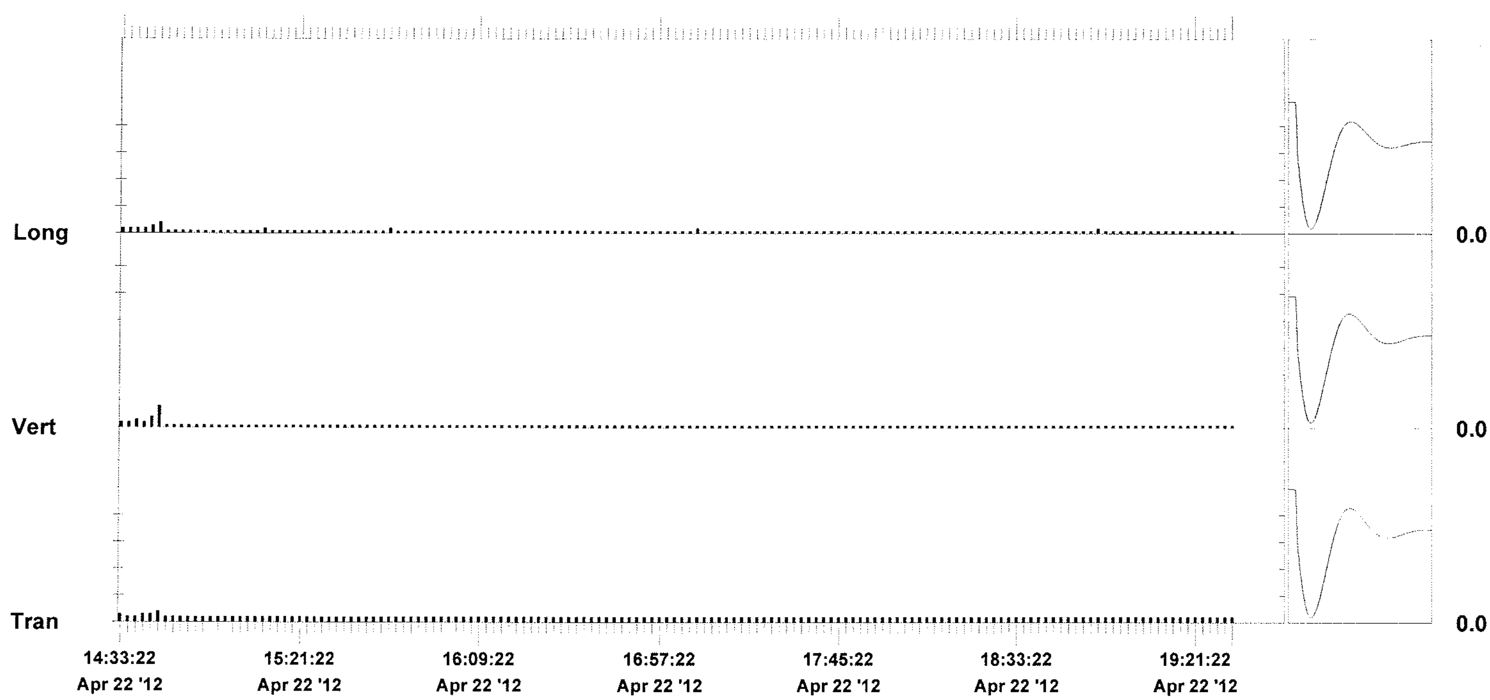
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.0400	0.0200	in/s
ZC Freq	85	64	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	14:42:22	14:42:22	14:42:22	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0406 in/s on April 22, 2012 at 14:42:22

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 22, 2012
Histogram Finish Time	20:00:00 April 22, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E921.2V1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

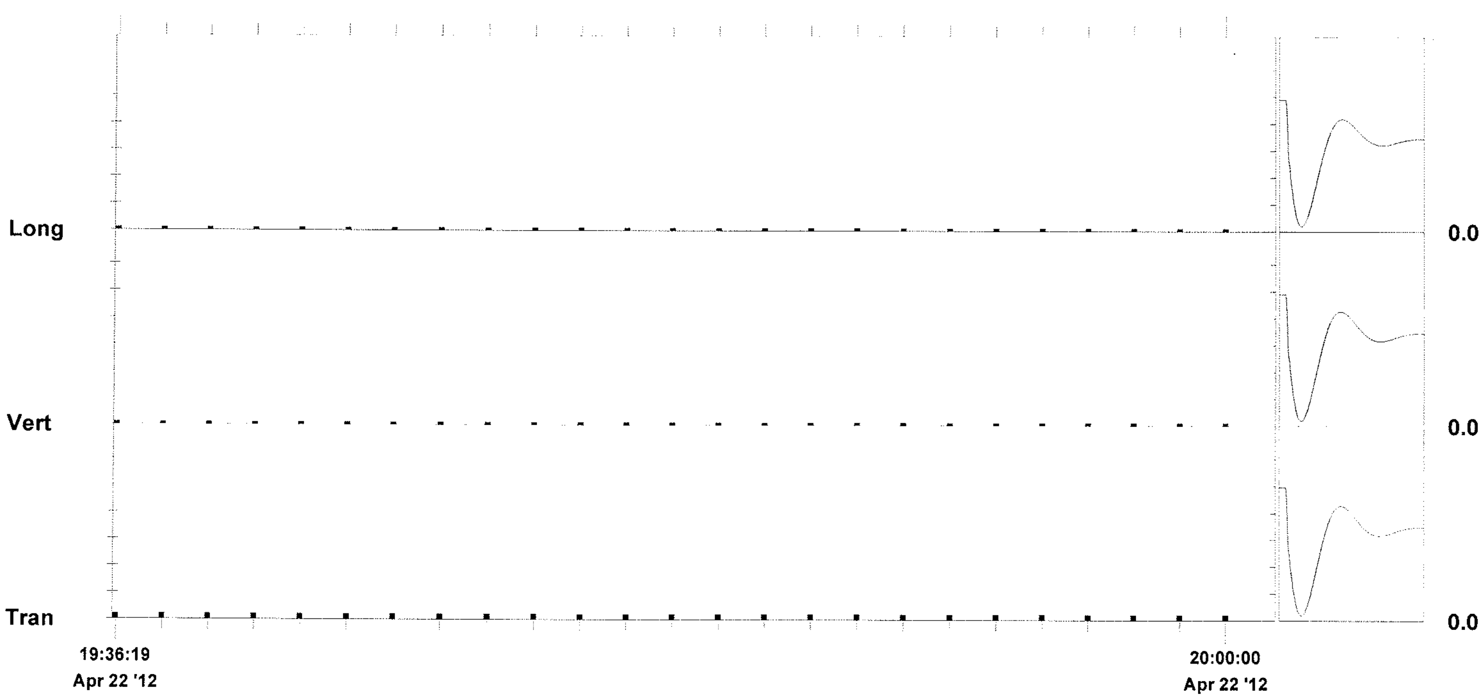
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	19:36:19	19:36:19	19:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 22, 2012 at 19:36:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 22, 2012
Histogram Finish Time	23:59:00 April 22, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E922.GV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

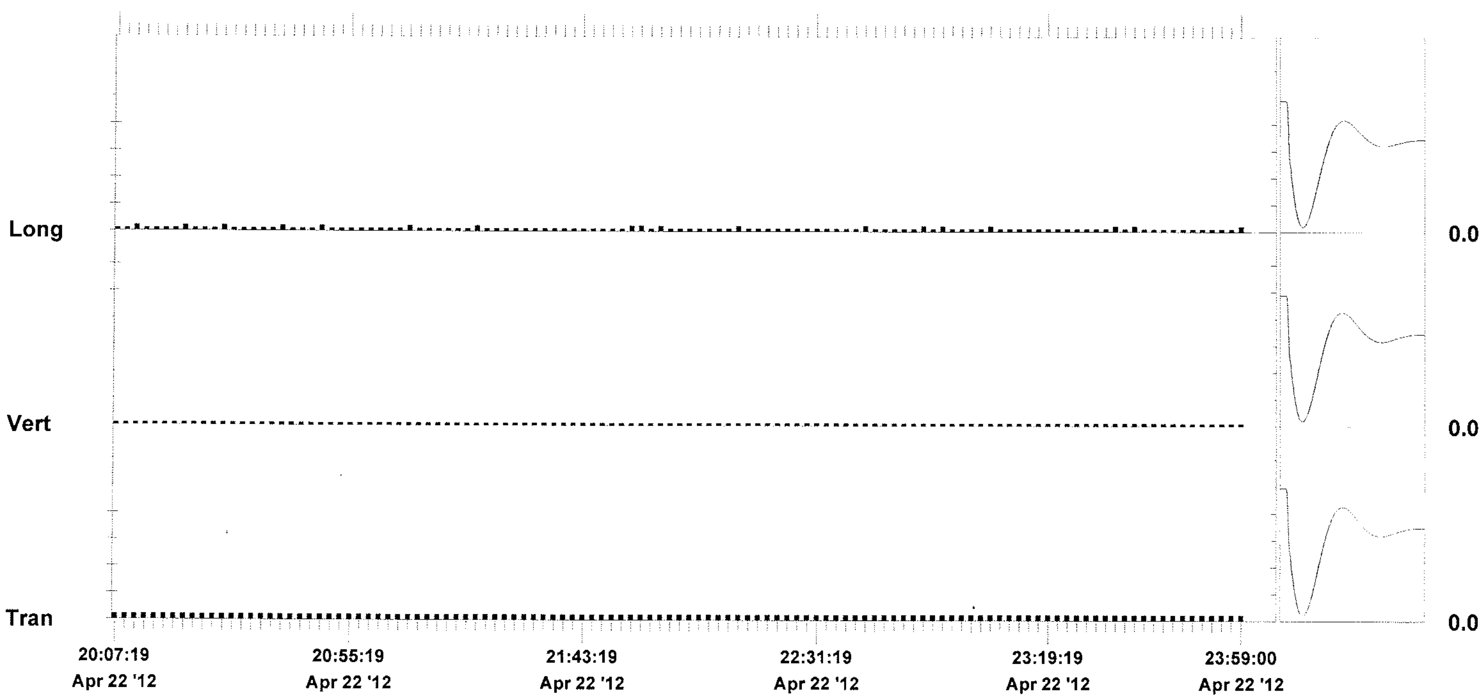
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 22 '12	Apr 22 '12	Apr 22 '12	
Time	20:06:19	20:06:19	20:10:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.8	3.8	4.2	

Peak Vector Sum 0.0122 in/s on April 22, 2012 at 20:06:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 23, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	05:30:00 April 23, 2012	**Battery Level**	6.9 Volts
Number of Intervals	330 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E92D.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

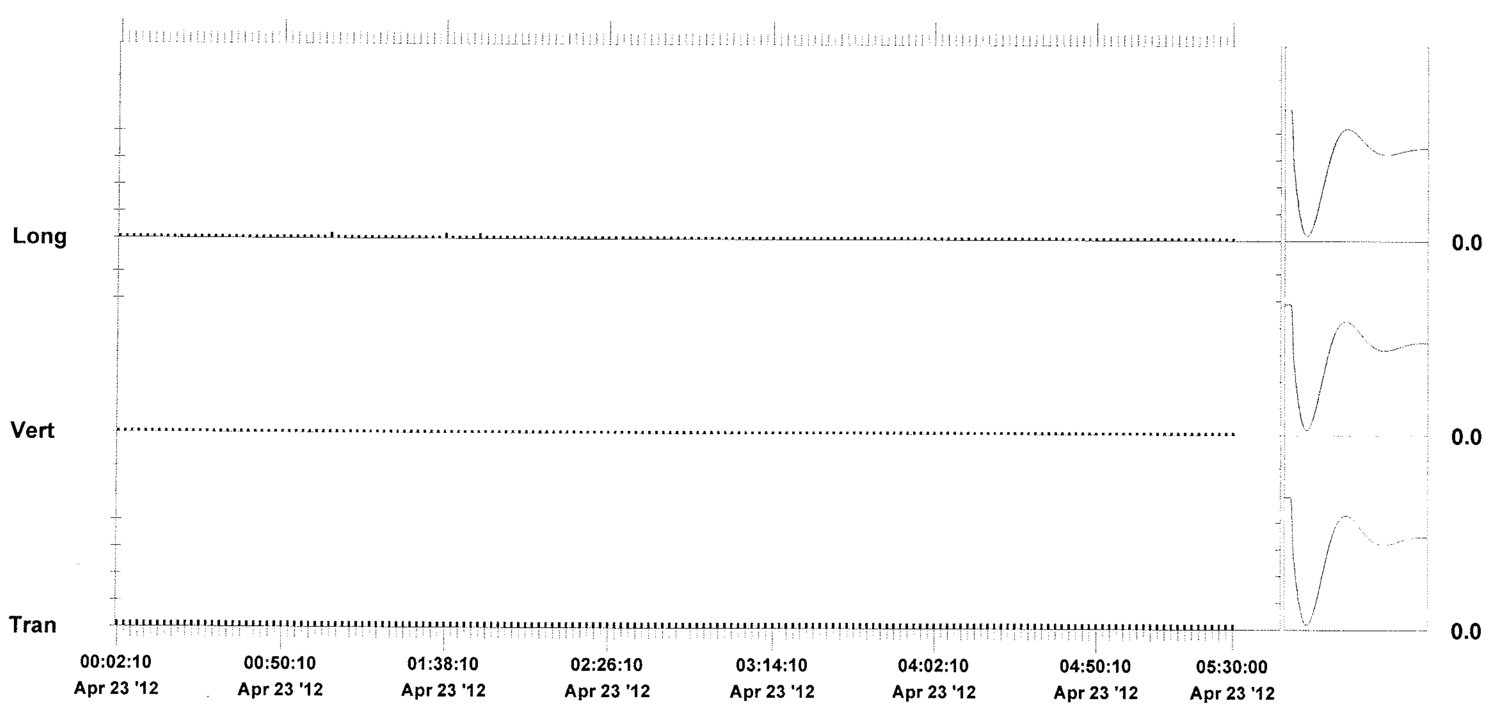
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	00:01:10	00:01:10	01:03:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.8	4.2	

Peak Vector Sum 0.0122 in/s on April 23, 2012 at 00:01:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:19 April 23, 2012
Histogram Finish Time	19:30:00 April 23, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E92S.UV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

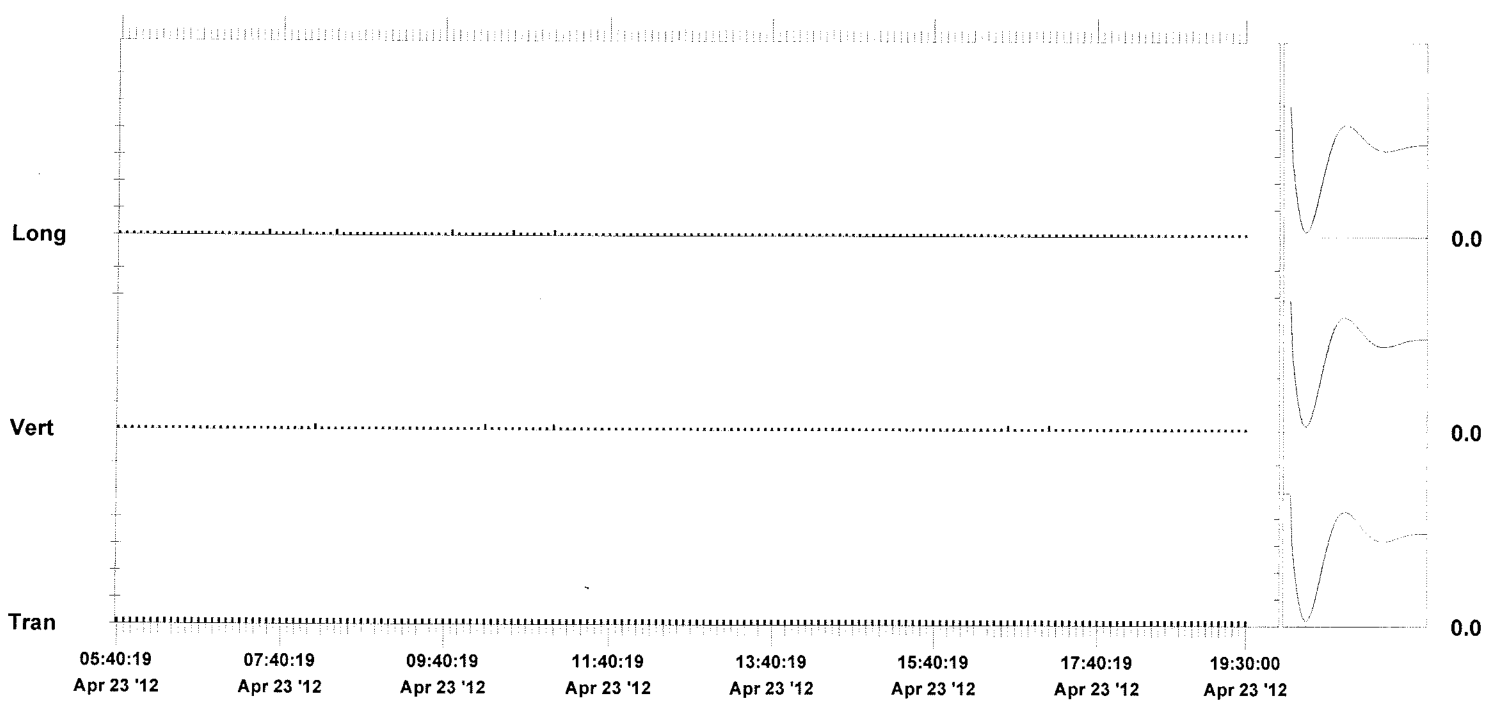
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	05:36:19	08:05:19	07:30:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.2	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 23, 2012 at 05:36:19

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 23, 2012
Histogram Finish Time	20:00:00 April 23, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E93V.QV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

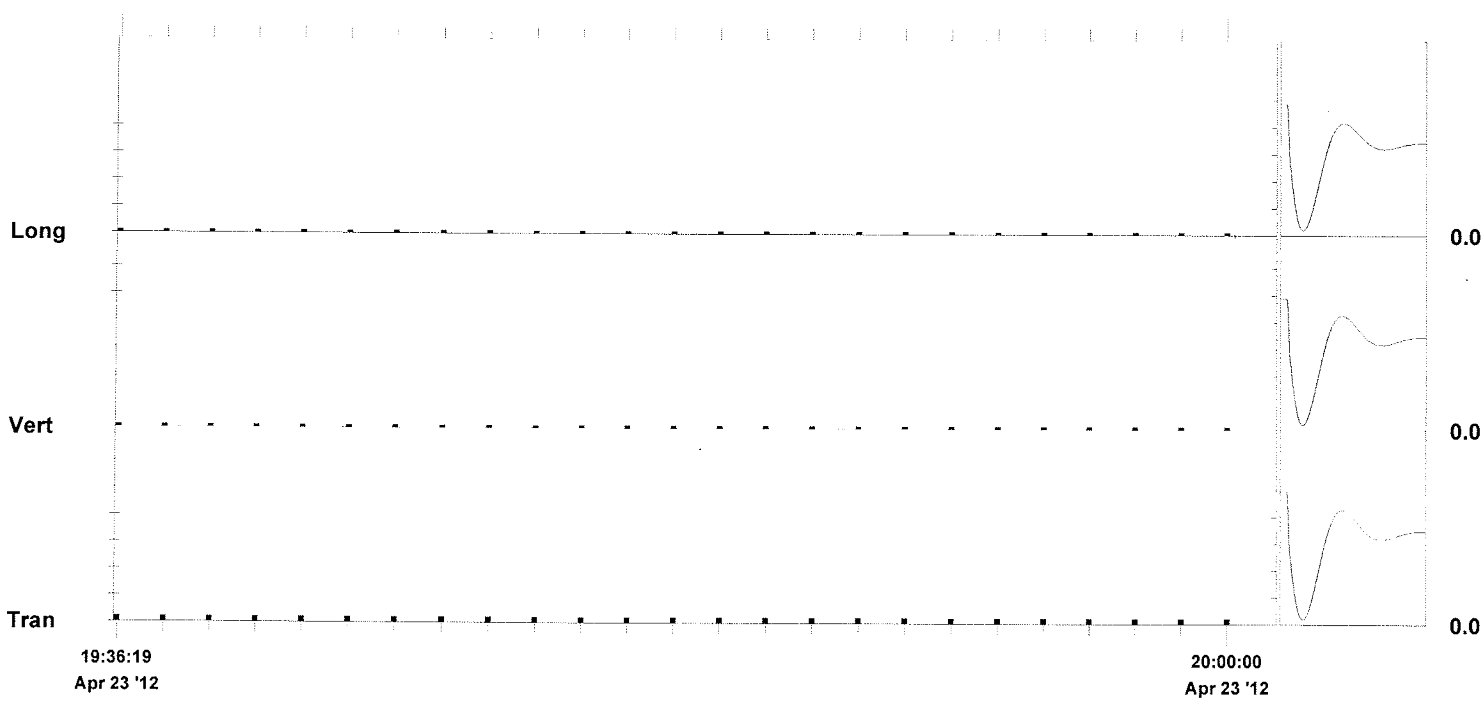
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	19:36:19	19:36:19	19:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 23, 2012 at 19:36:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 23, 2012
Histogram Finish Time	23:59:00 April 23, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E93X.4V1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

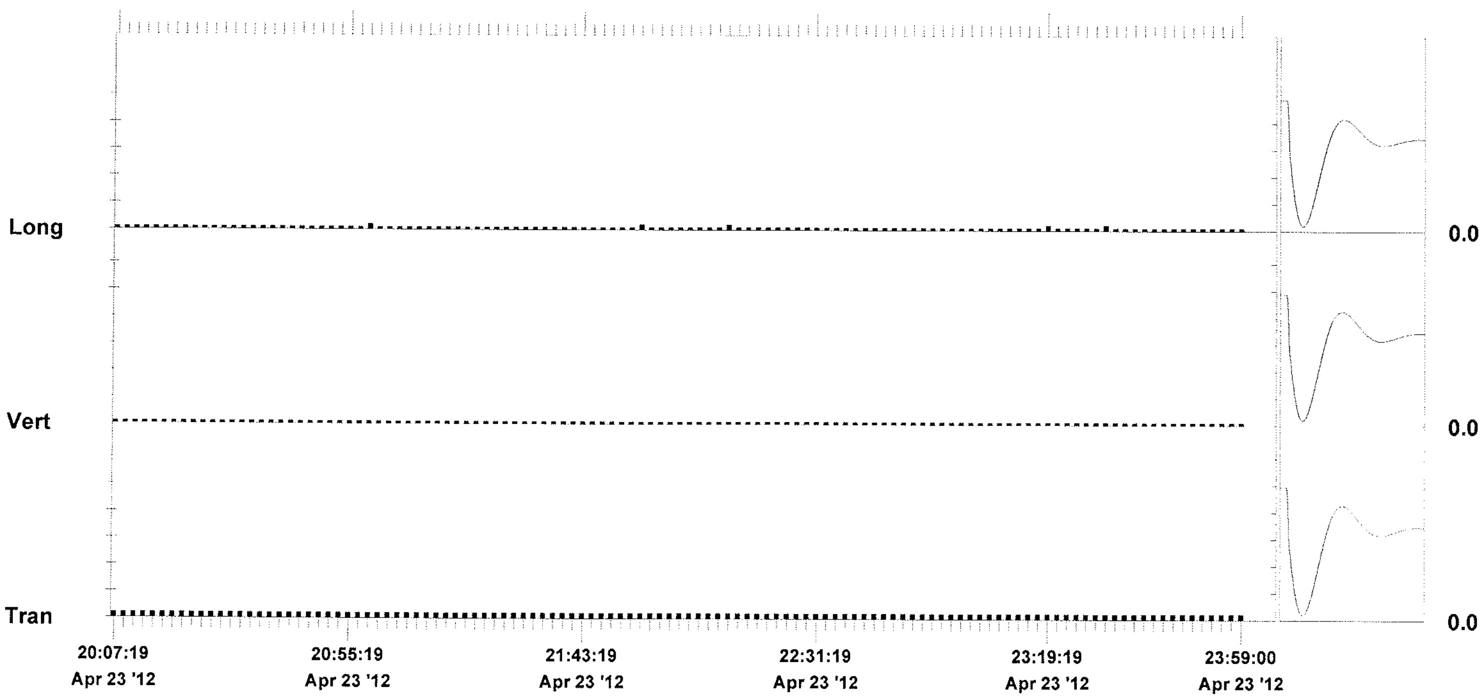
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 23 '12	Apr 23 '12	Apr 23 '12	
Time	20:06:19	20:06:19	20:59:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 23, 2012 at 20:06:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 24, 2012
Histogram Finish Time	05:30:00 April 24, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E948.0A1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

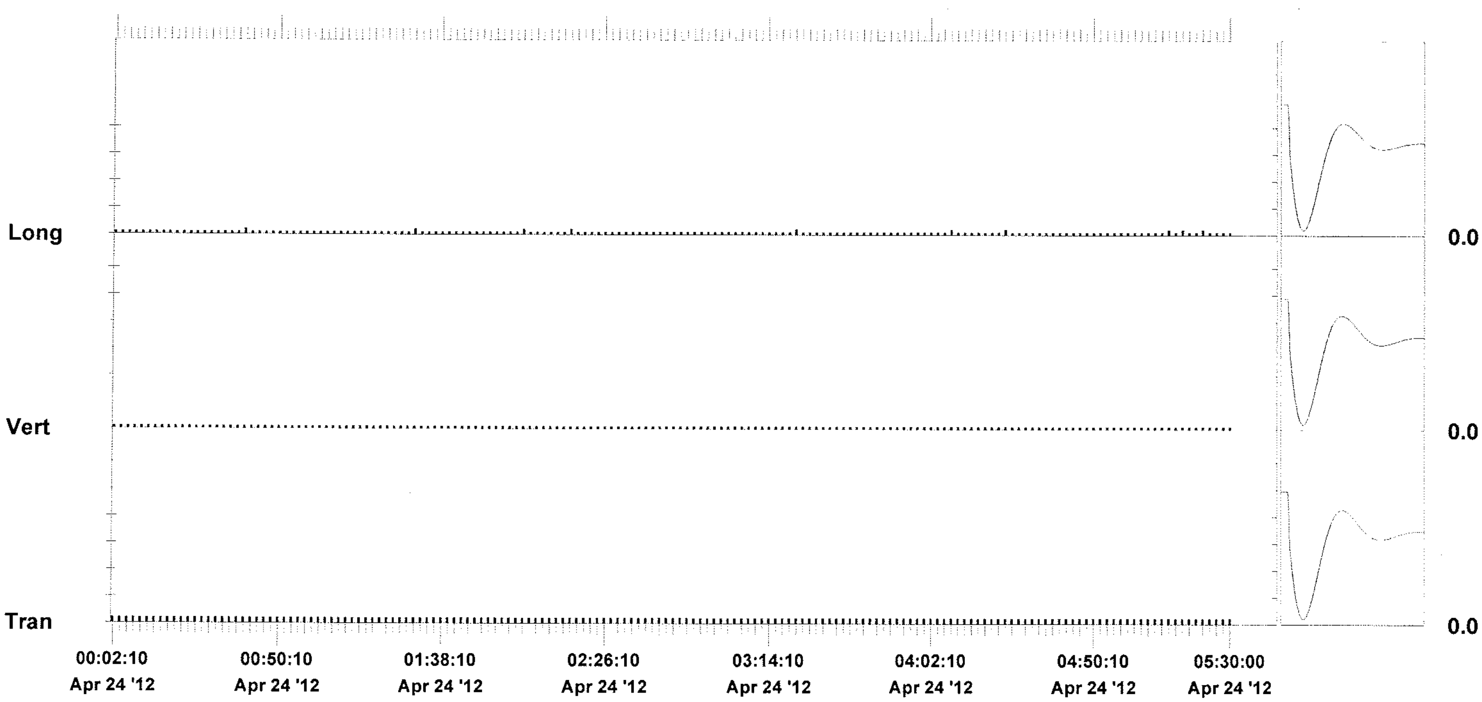
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	00:01:10	00:01:10	00:40:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 24, 2012 at 00:01:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:20 April 24, 2012
Histogram Finish Time	19:30:00 April 24, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1
Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E94N.IW1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

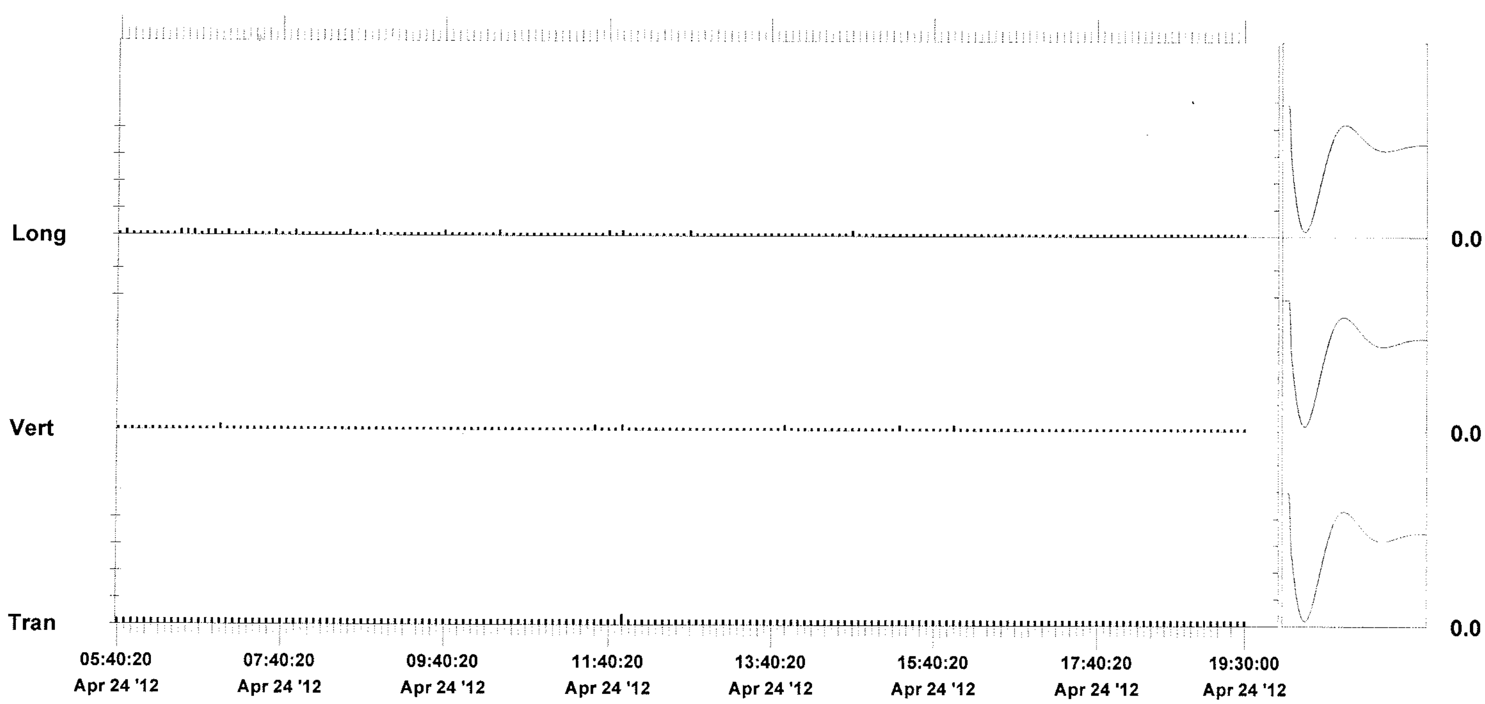
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0200	0.01000	0.01000	in/s
ZC Freq	64	85	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	11:50:20	06:51:20	05:45:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0206 in/s on April 24, 2012 at 11:50:20

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 24, 2012
Histogram Finish Time	20:00:00 April 24, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E95Q.EV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

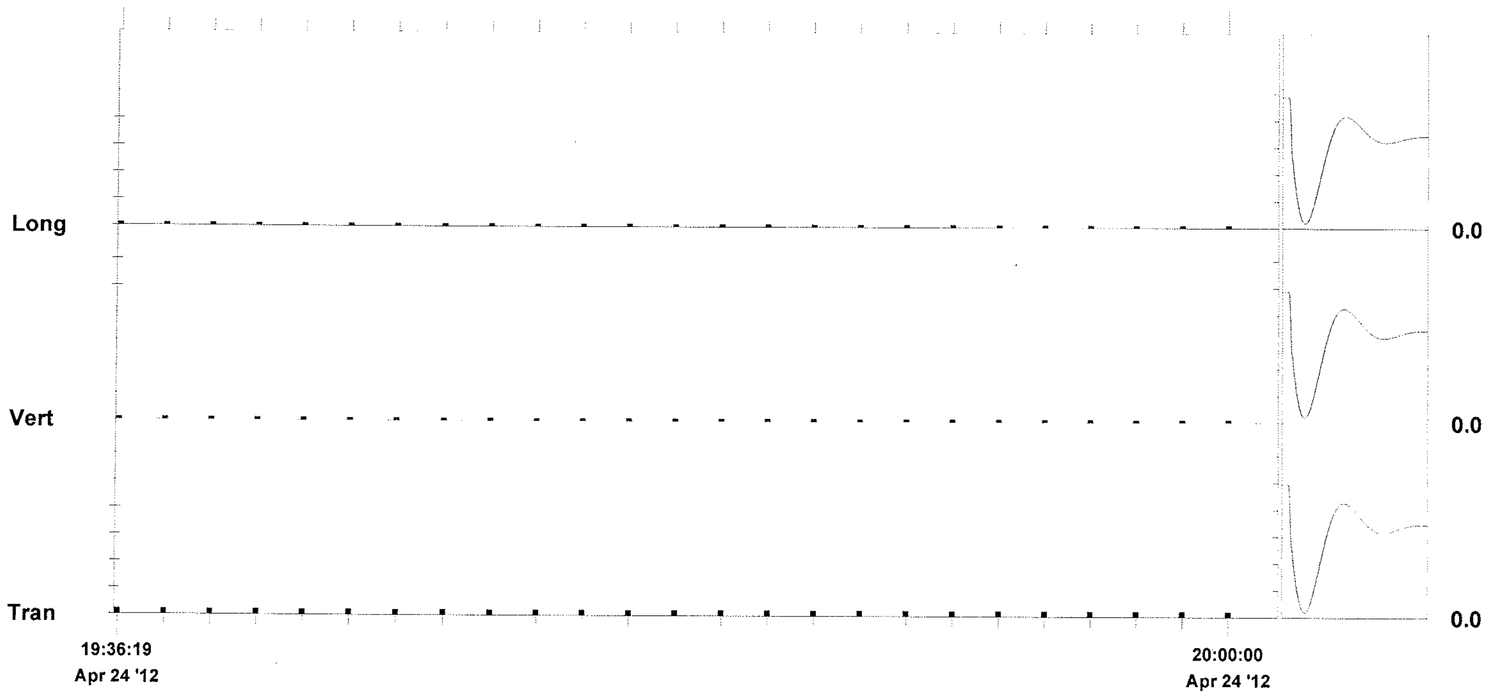
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	19:36:19	19:36:19	19:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 24, 2012 at 19:40:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 24, 2012
Histogram Finish Time	23:59:00 April 24, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E95R.SV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

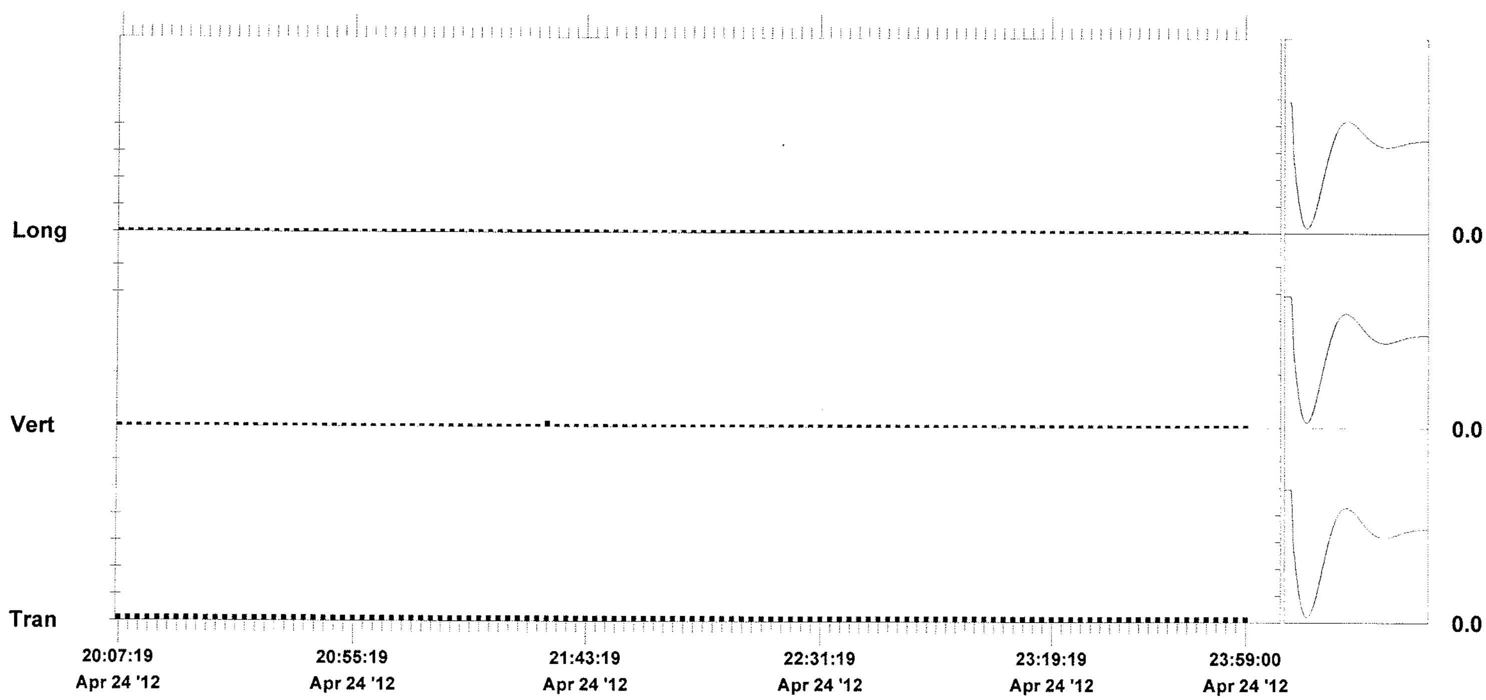
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.00500	in/s
ZC Freq	>100	>100	N/A	Hz
Date	Apr 24 '12	Apr 24 '12	Apr 24 '12	
Time	20:06:19	21:34:19	20:06:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 24, 2012 at 20:12:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 25, 2012
Histogram Finish Time	05:30:00 April 25, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E962.OA1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

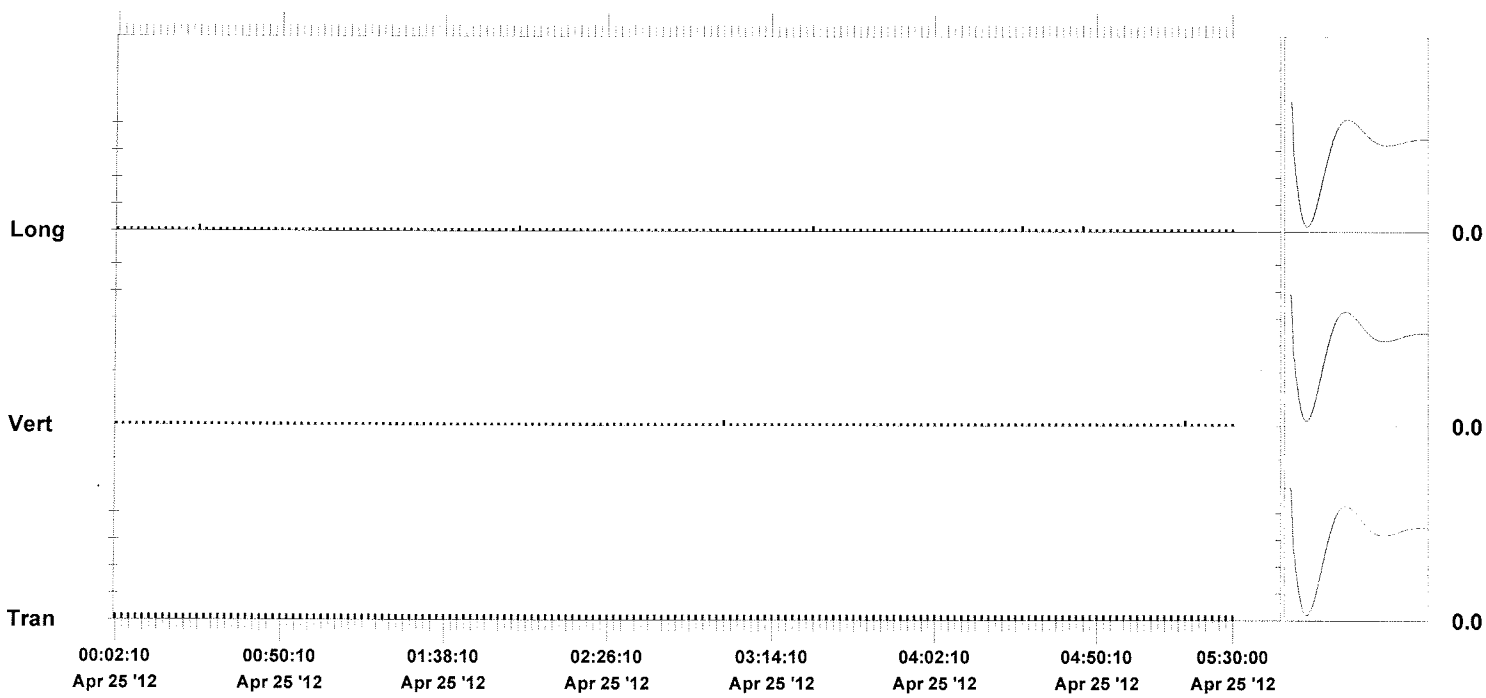
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	00:01:10	03:00:10	00:26:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 25, 2012 at 00:01:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:19 April 25, 2012
Histogram Finish Time	19:30:00 April 25, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E96I.6V1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

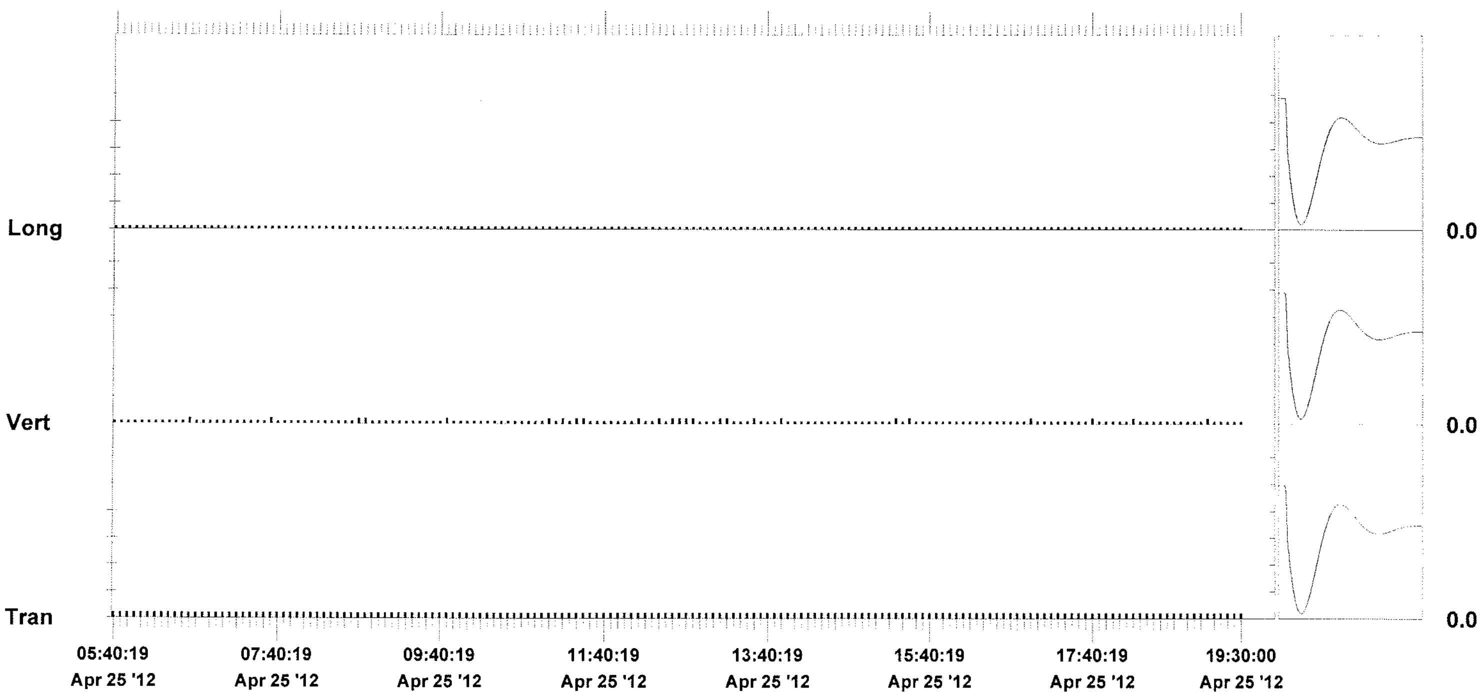
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	05:36:19	06:32:19	05:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 25, 2012 at 05:36:19

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 25, 2012
Histogram Finish Time	20:00:00 April 25, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E97L.2V1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

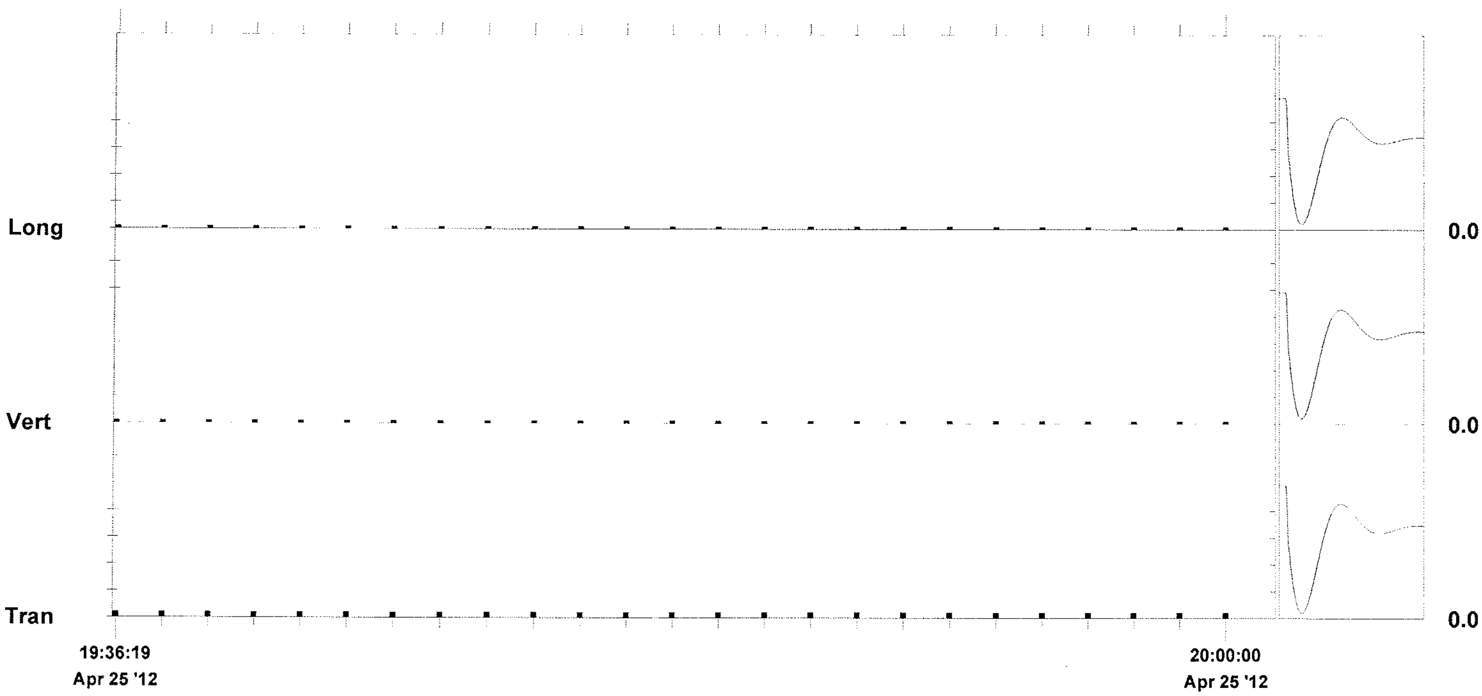
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	19:36:19	19:36:19	19:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 25, 2012 at 19:39:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 25, 2012
Histogram Finish Time	23:59:00 April 25, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E97M.GV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

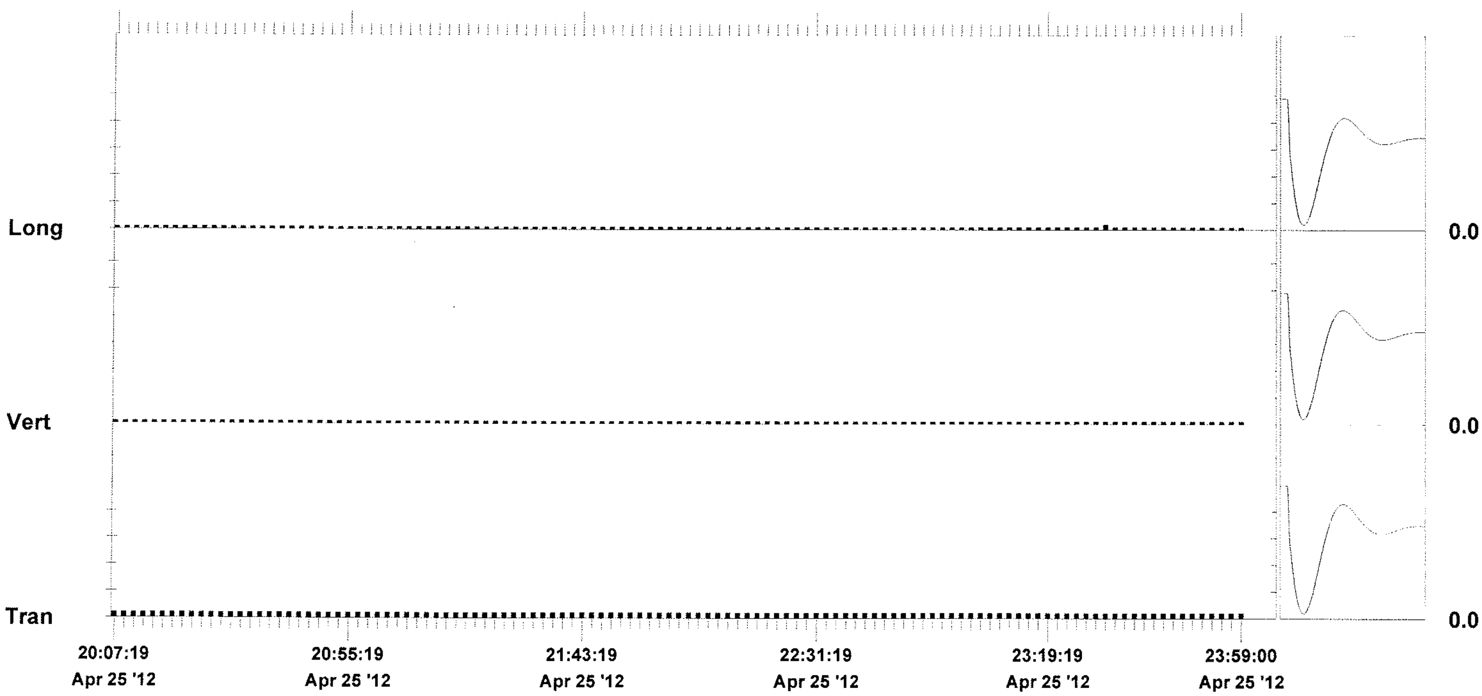
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	N/A	>100	Hz
Date	Apr 25 '12	Apr 25 '12	Apr 25 '12	
Time	20:06:19	20:06:19	23:30:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 25, 2012 at 20:08:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Event Report

Histogram Start Time	00:00:10 April 26, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	05:30:00 April 26, 2012	**Battery Level**	6.9 Volts
Number of Intervals	330 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E97X.CA1
Sample Rate	1024sps		
Job Number:	1		

Notes

Location:	Location #6
Client:	URS - Williamsburg Works
User Name:	Vibra-Tech Engineers, Inc.
General:	

Extended Notes

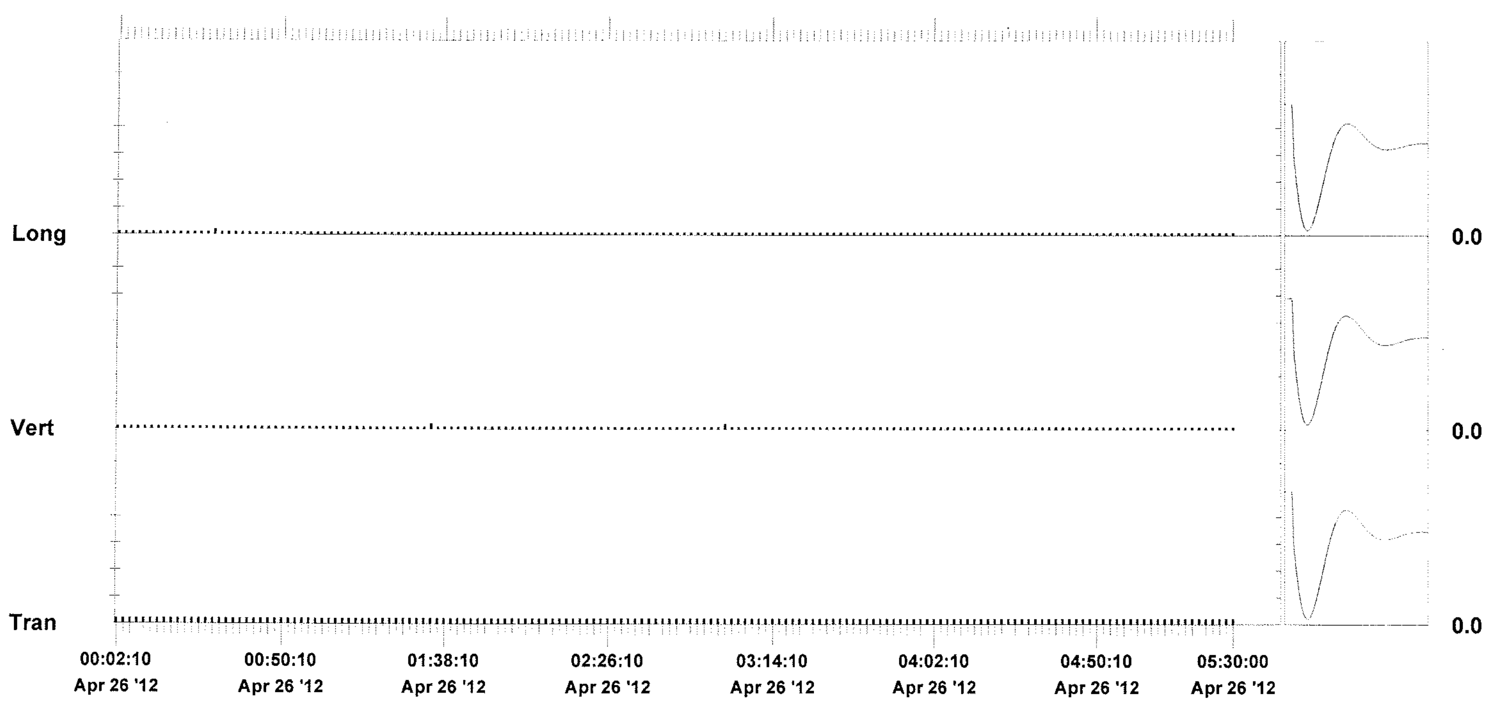
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	00:01:10	01:33:10	00:29:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 26, 2012 at 00:02:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div   Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:18 April 26, 2012
Histogram Finish Time	19:30:00 April 26, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E98C.UU1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

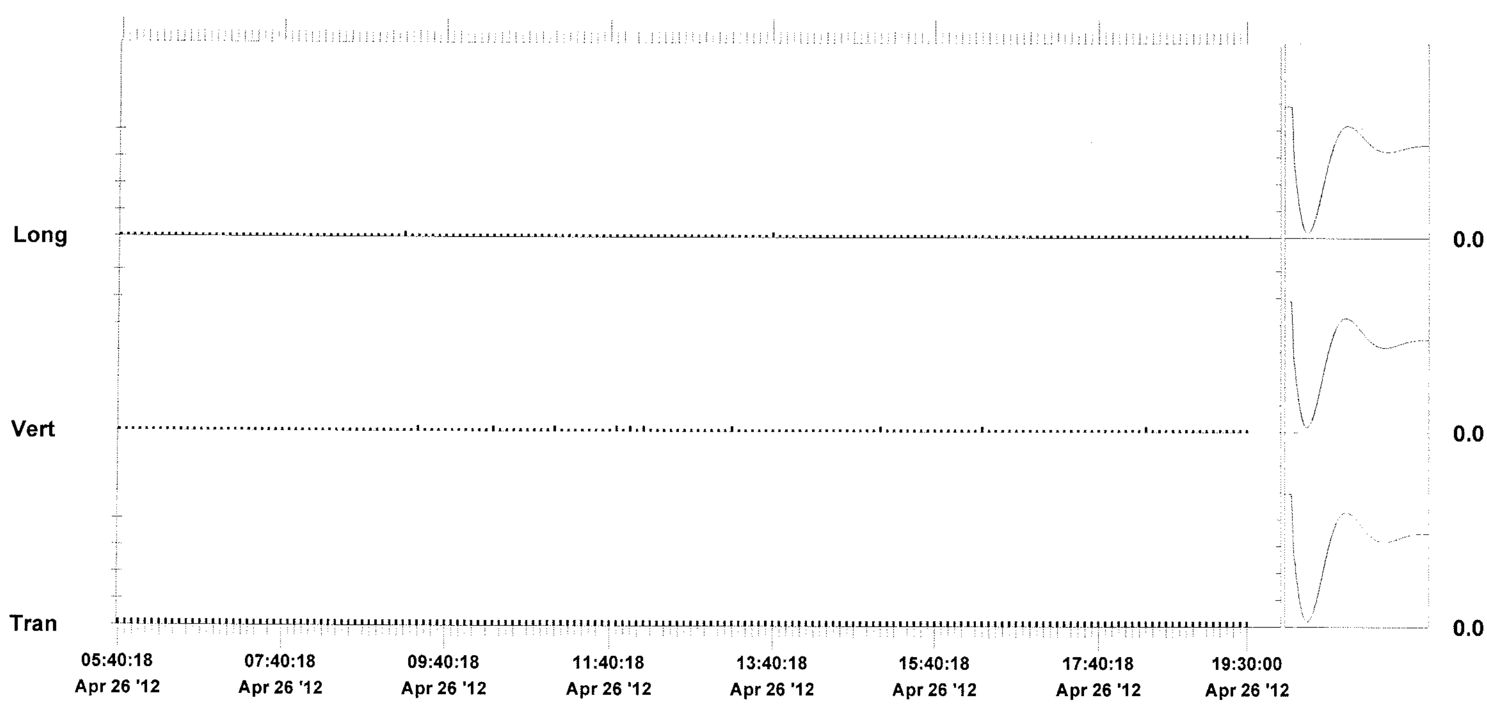
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	05:36:18	09:18:18	09:06:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0141 in/s on April 26, 2012 at 11:42:18

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:19 April 26, 2012
Histogram Finish Time	20:00:00 April 26, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E99F.QV1

Notes

Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

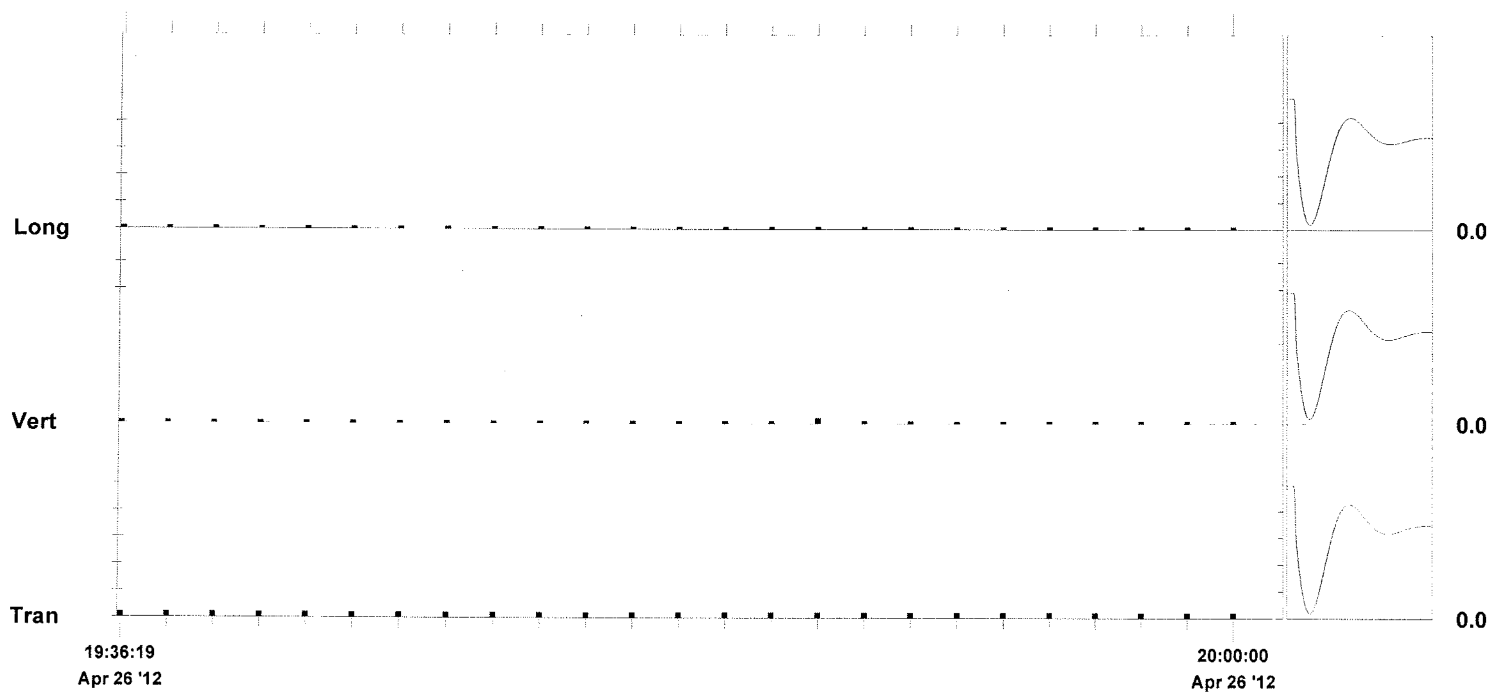
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	19:36:19	19:51:19	19:36:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 26, 2012 at 19:37:19

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:18 April 26, 2012
Histogram Finish Time	23:59:00 April 26, 2012
Number of Intervals	233 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E99H.4U1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

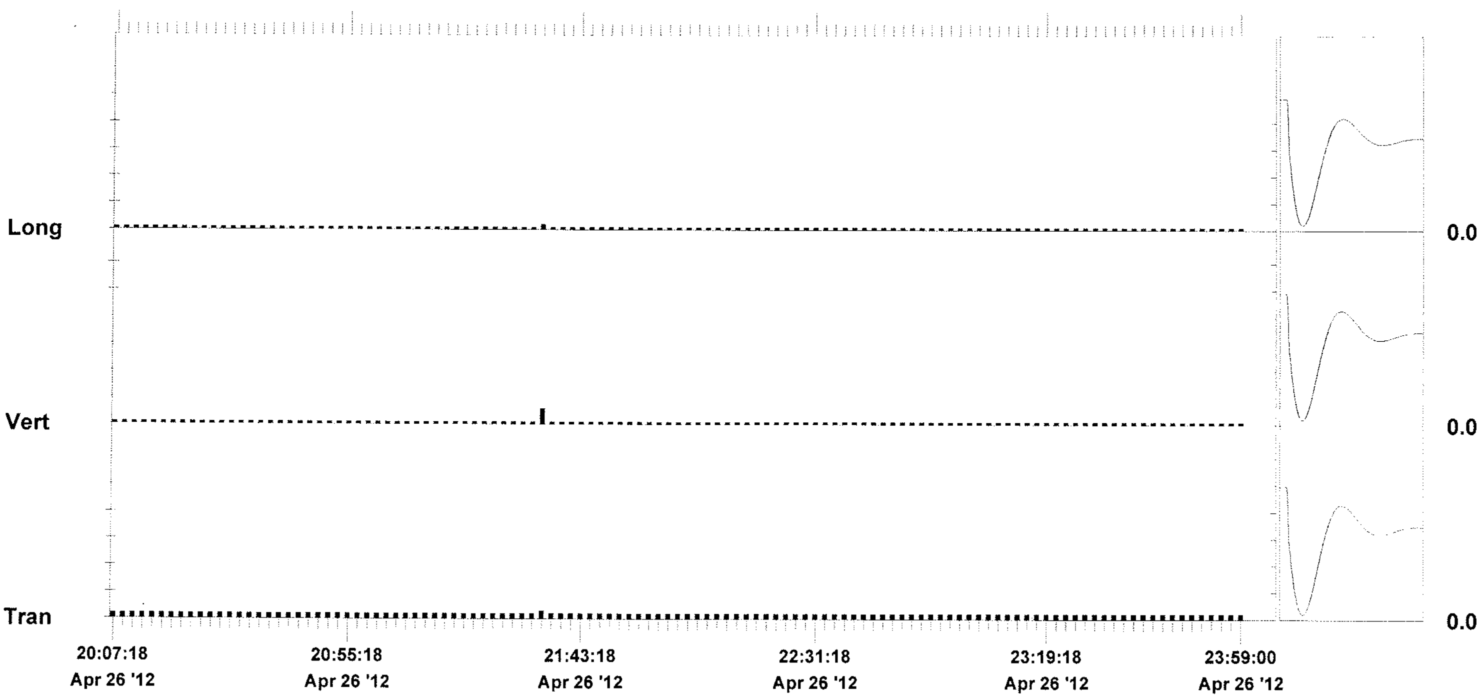
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.0300	0.01000	in/s
ZC Freq	47	85	64	Hz
Date	Apr 26 '12	Apr 26 '12	Apr 26 '12	
Time	21:34:18	21:34:18	21:34:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0316 in/s on April 26, 2012 at 21:34:18

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 27, 2012
Histogram Finish Time	05:30:00 April 27, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E99S.0A1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

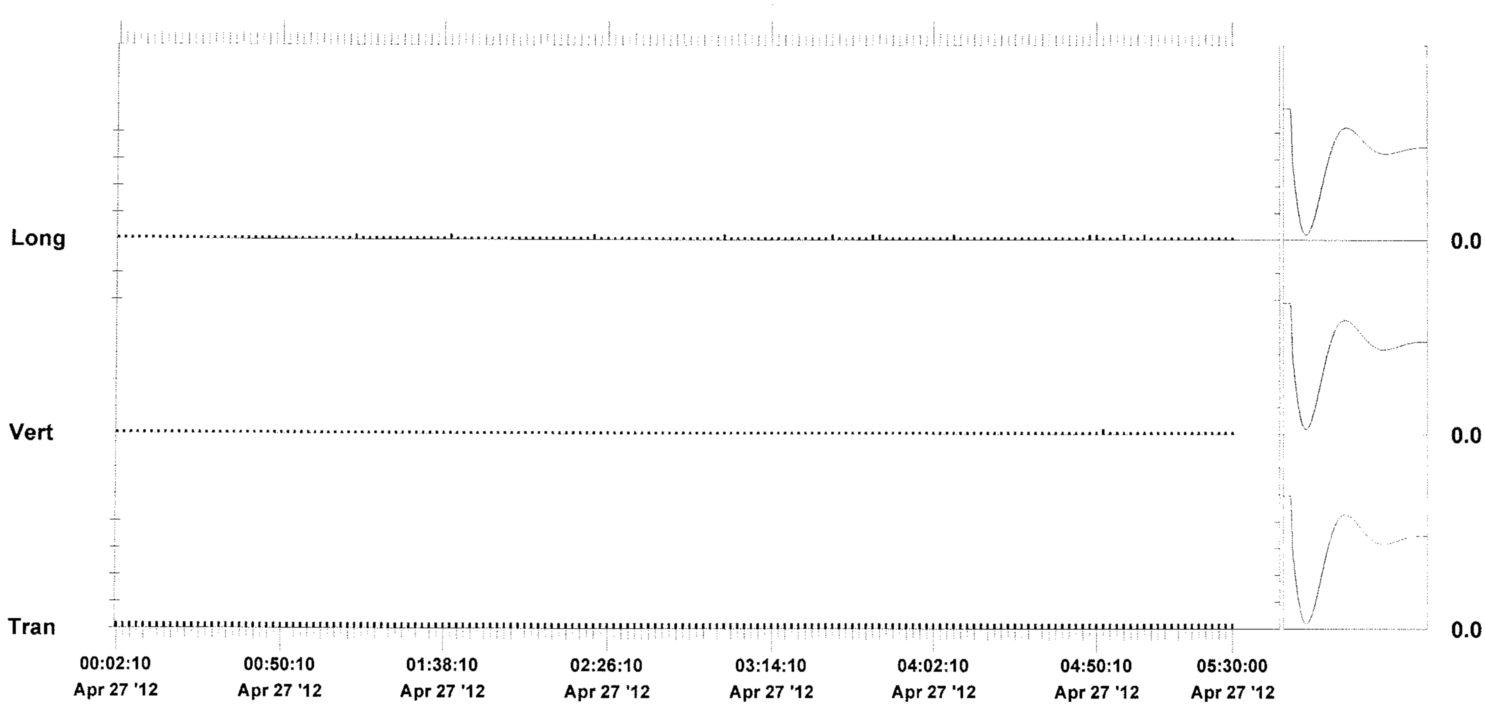
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	00:01:10	04:51:10	01:12:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 27, 2012 at 00:01:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:20 April 27, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	19:30:00 April 27, 2012	**Battery Level**	6.9 Volts
Number of Intervals	835 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9A7.IW1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

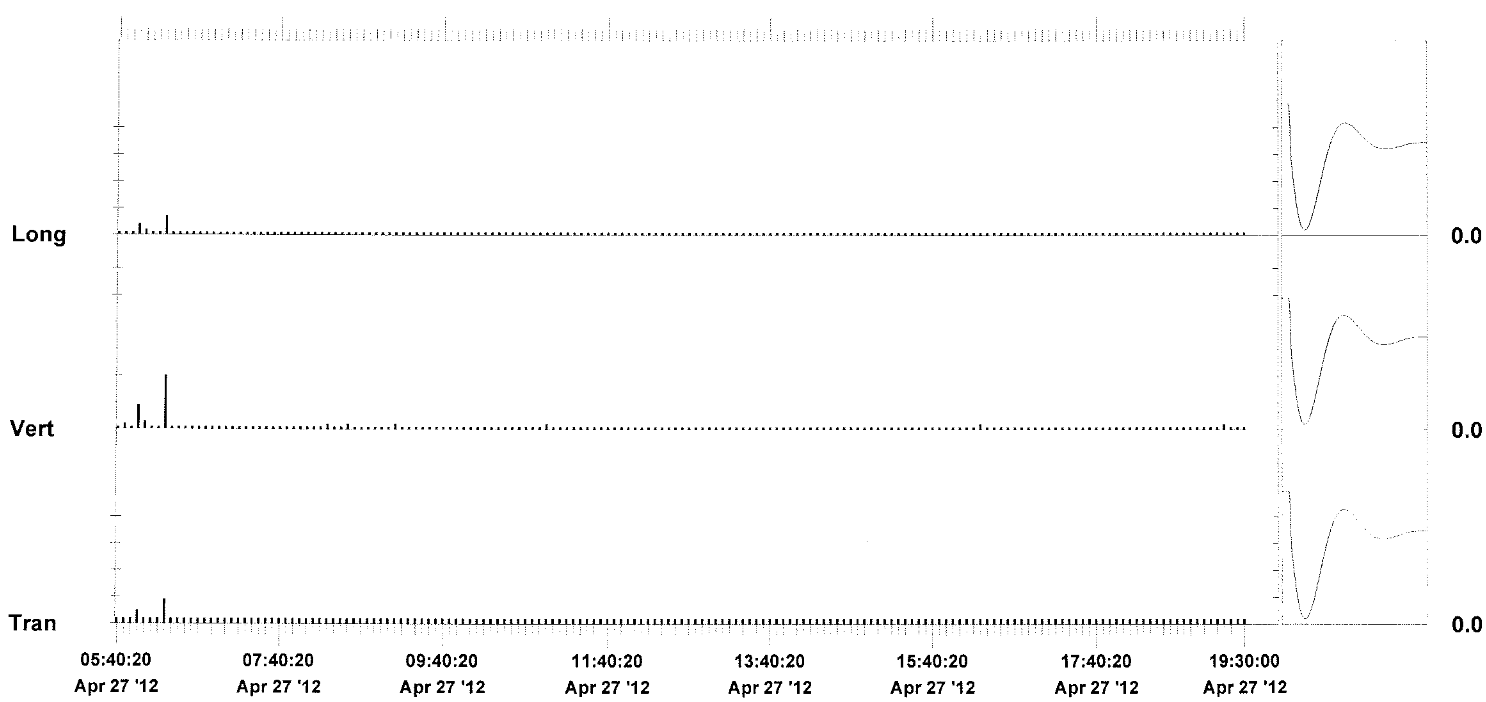
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0450	0.1000	0.0350	in/s
ZC Freq	85	>100	85	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	06:13:20	06:13:20	06:13:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.101 in/s on April 27, 2012 at 06:13:20

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div   Dynamic Geo Cal.

VIBRA -TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:18 April 27, 2012
Histogram Finish Time	20:00:00 April 27, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E9BA.EU1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

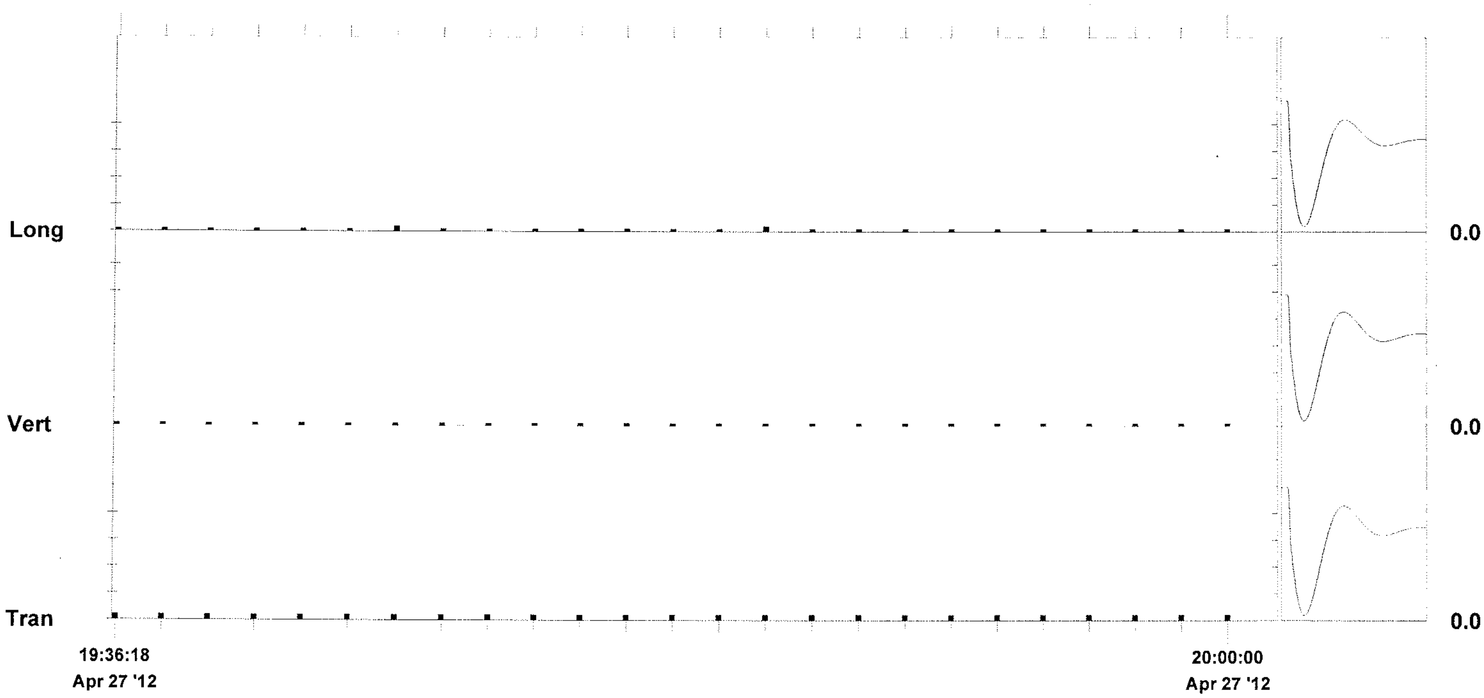
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	19:36:18	19:36:18	19:42:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 27, 2012 at 19:36:18

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 27, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 27, 2012	**Battery Level**	6.9 Volts
Number of Intervals	233 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9BB.SV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

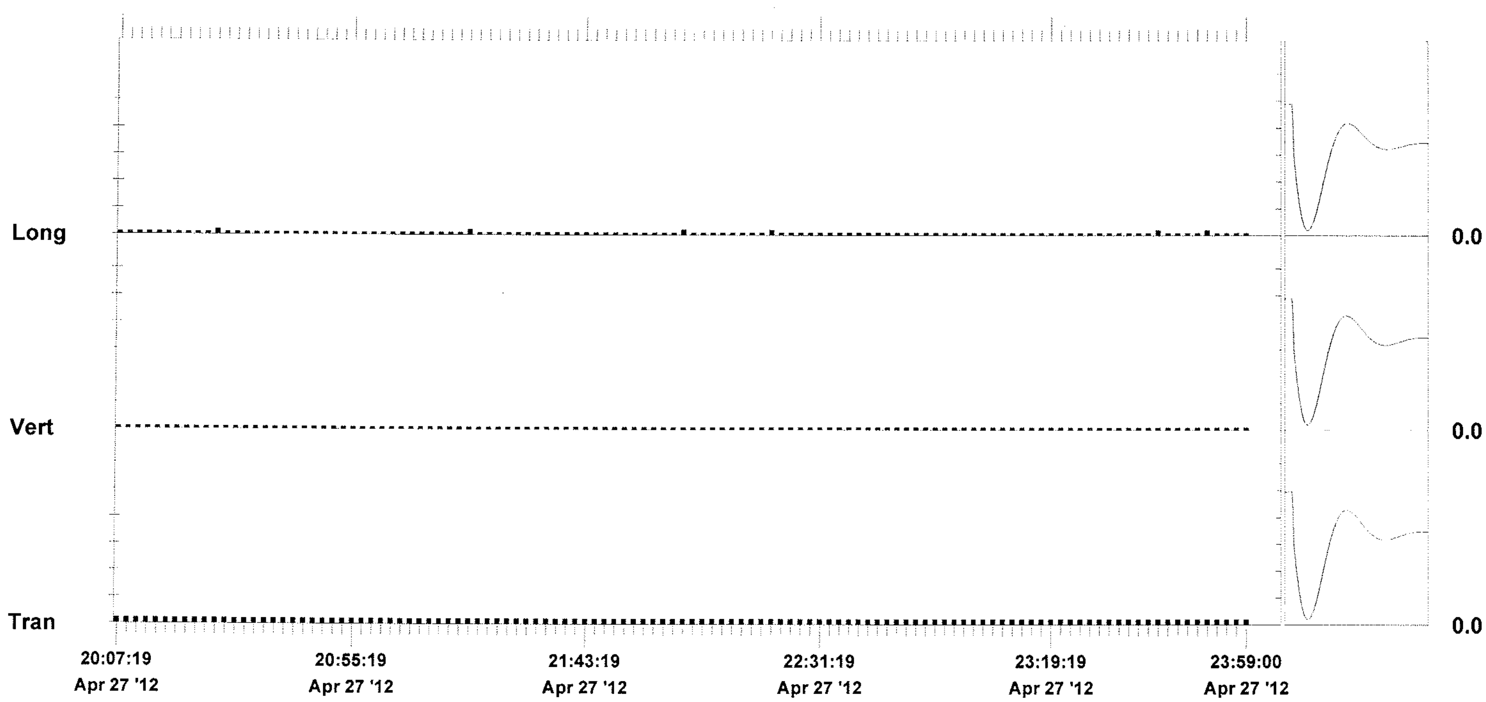
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 27 '12	Apr 27 '12	Apr 27 '12	
Time	20:06:19	20:06:19	20:26:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 27, 2012 at 20:06:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 28, 2012
Histogram Finish Time	05:30:00 April 28, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	7.0 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E9BM.OA1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

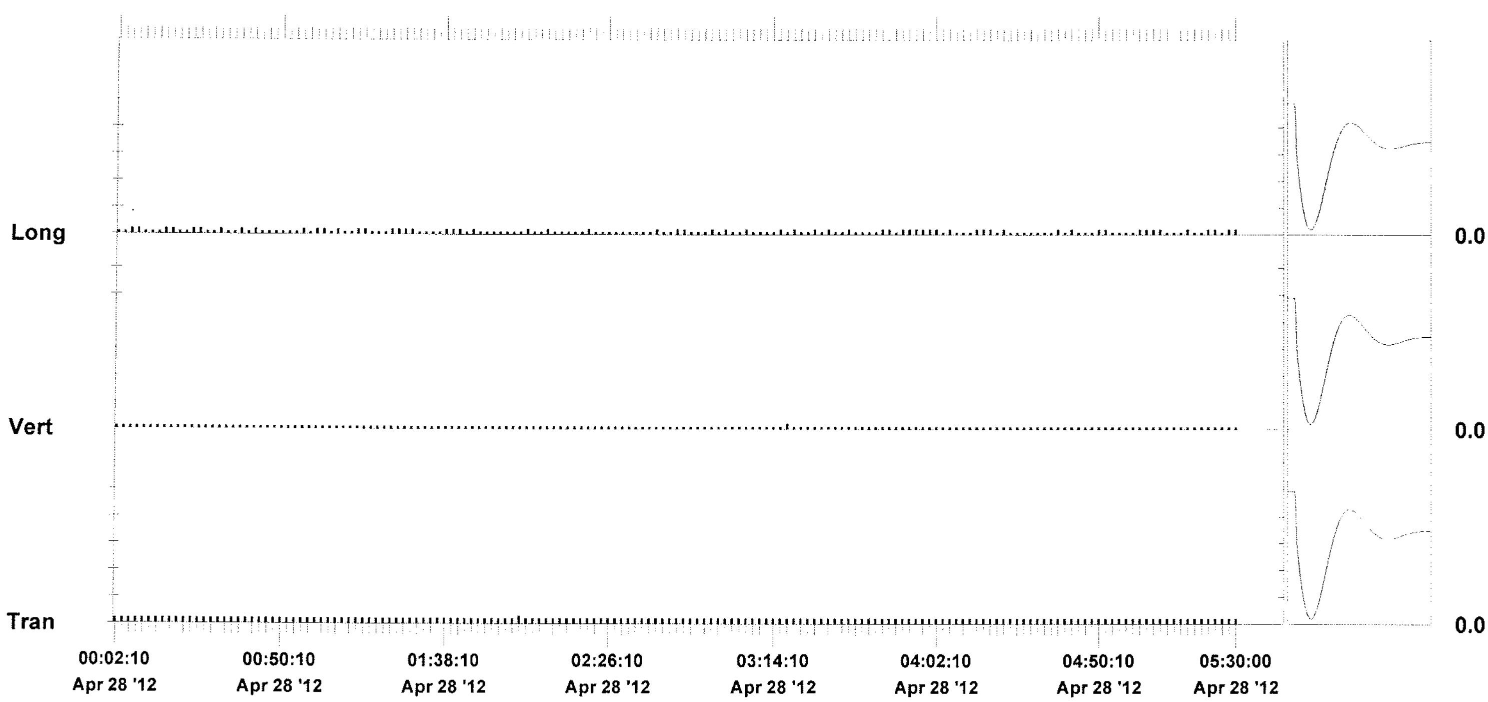
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	02:00:10	03:17:10	00:06:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0150 in/s on April 28, 2012 at 02:00:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:20 April 28, 2012
Histogram Finish Time	19:30:00 April 28, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E9C2.6W1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

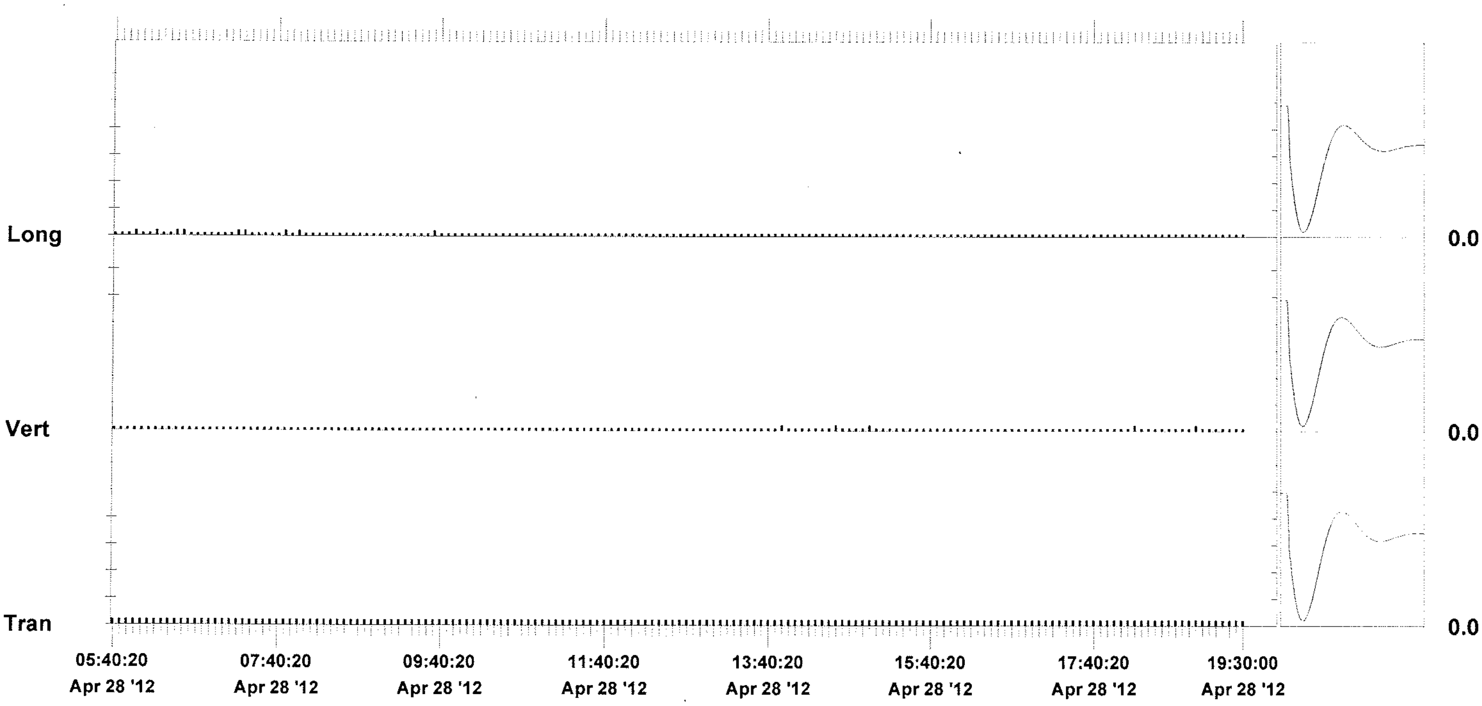
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	05:36:20	13:47:20	05:52:20	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 28, 2012 at 05:36:20

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:18 April 28, 2012
Histogram Finish Time	20:00:00 April 28, 2012
Number of Intervals	25 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E9D5.2U1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

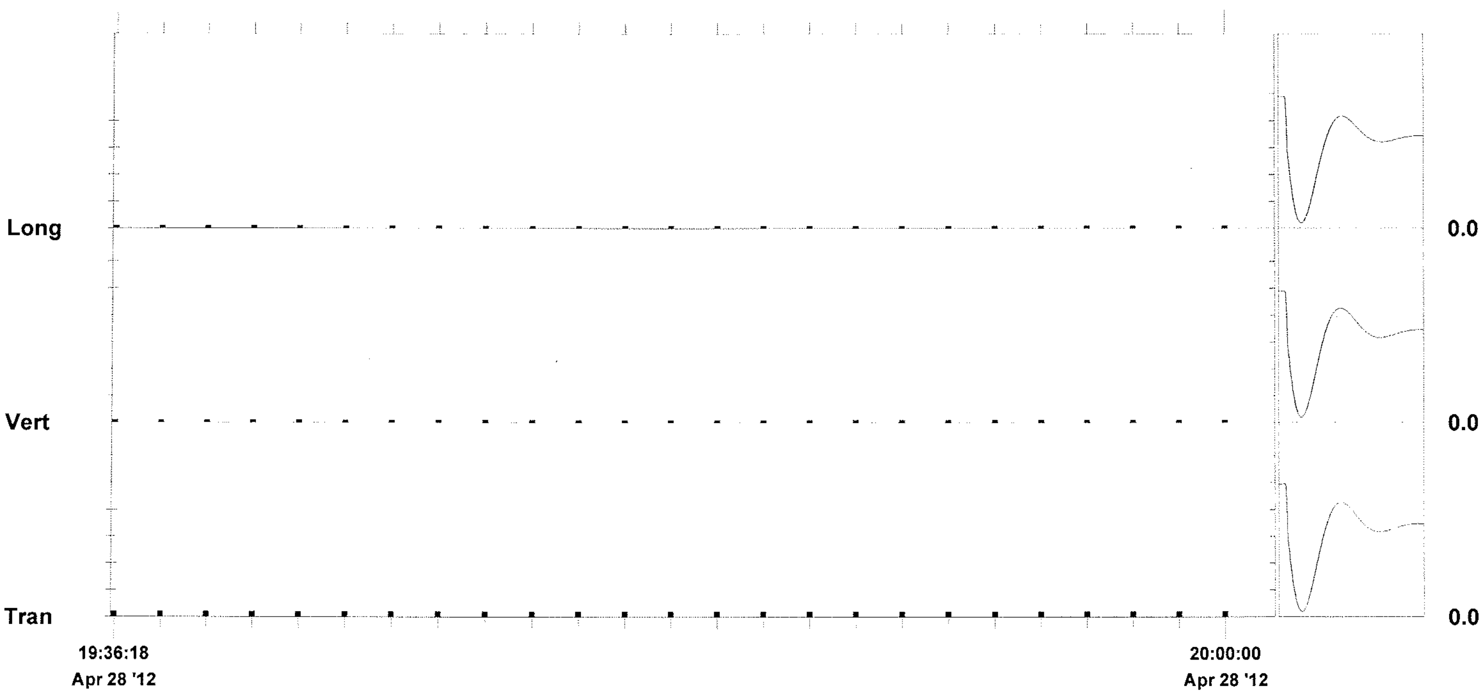
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.00500	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	19:36:18	19:36:18	19:36:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 28, 2012 at 19:37:18

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01) **Format Copyrighted 1996-2003 Instantel Inc.**

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 28, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 28, 2012	**Battery Level**	6.9 Volts
Number of Intervals	233 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9D6.GV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

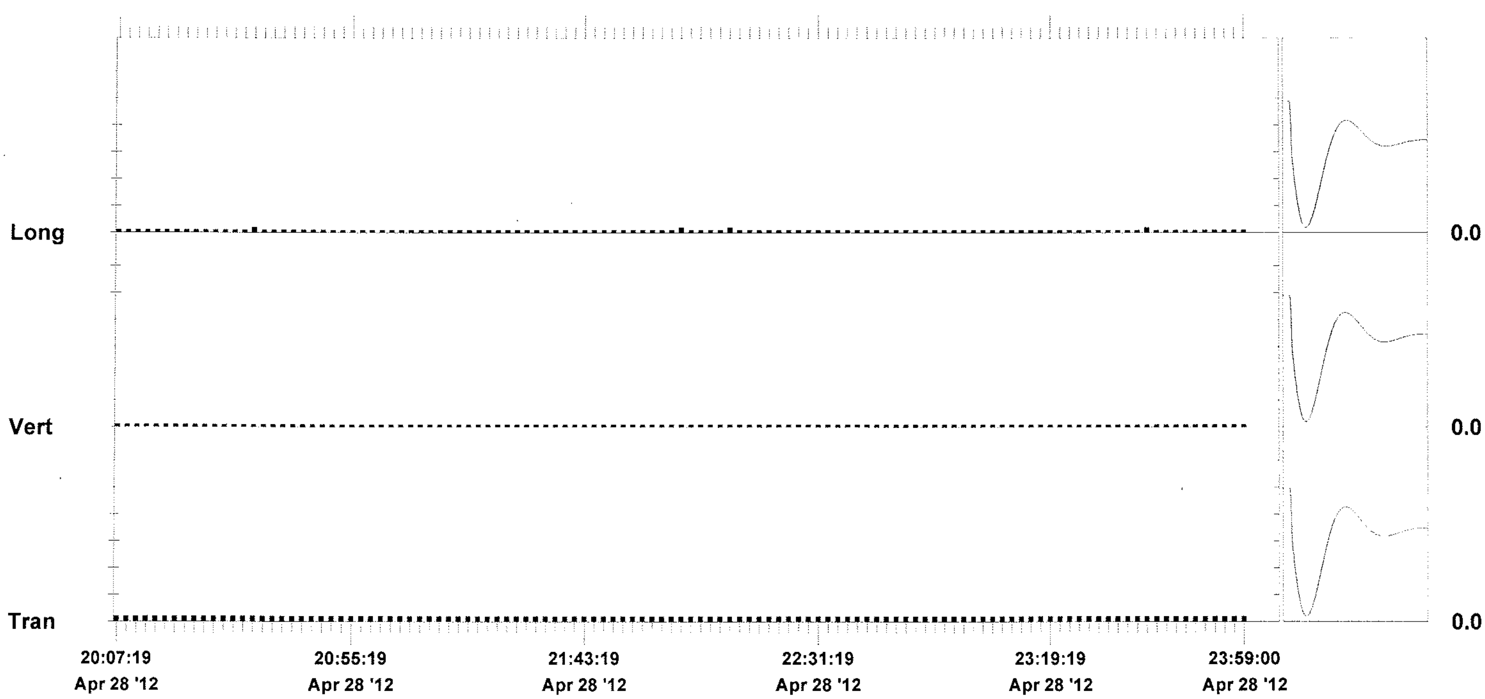
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 28 '12	Apr 28 '12	Apr 28 '12	
Time	20:06:19	20:06:19	20:34:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 28, 2012 at 20:07:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 29, 2012
Histogram Finish Time	05:30:00 April 29, 2012
Number of Intervals	330 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.9 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E9DH.CA1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

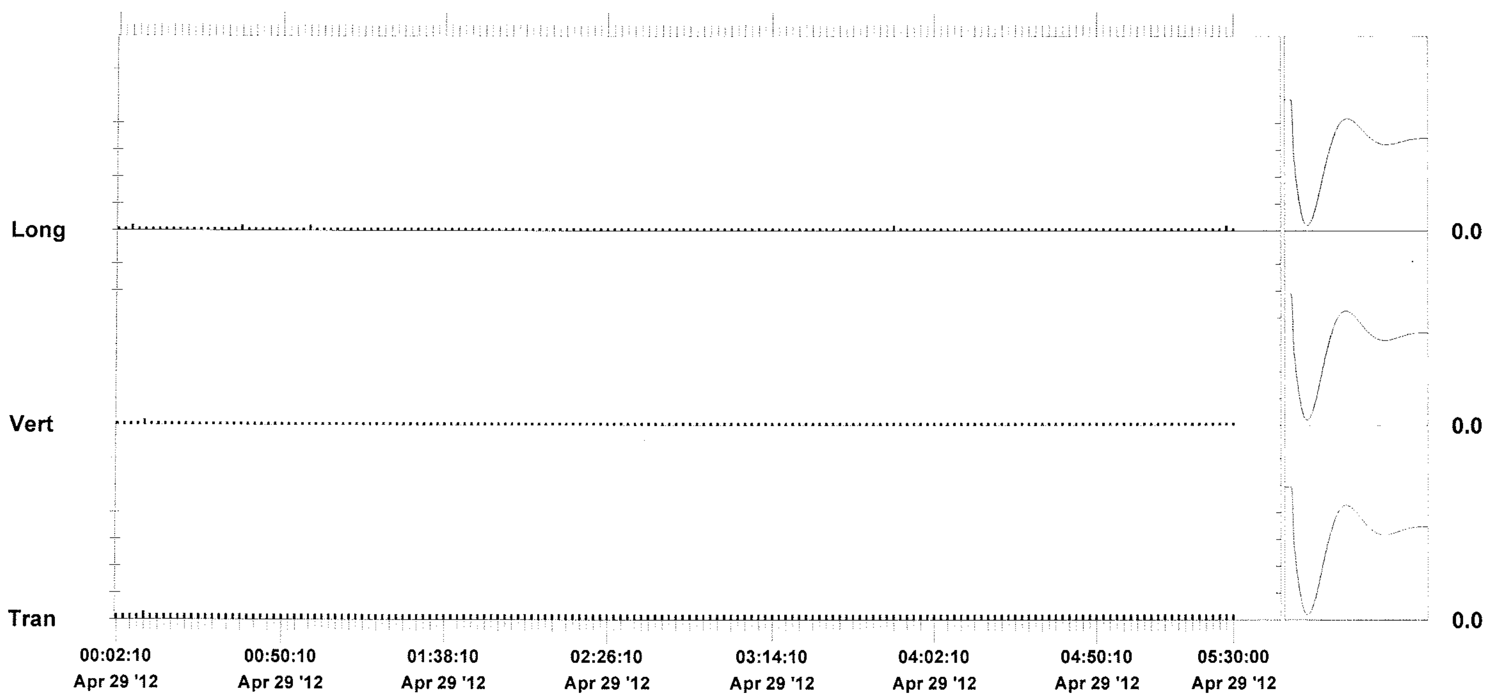
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.0150	0.01000	0.01000	in/s
ZC Freq	85	>100	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	00:10:10	00:10:10	00:05:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0180 in/s on April 29, 2012 at 00:10:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

Printed: May 1, 2012 (V 7.03 - 7.01)

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:19 April 29, 2012
Histogram Finish Time	19:30:00 April 29, 2012
Number of Intervals	835 at 1 minute
Range	Geo :10.00 in/s
Sample Rate	1024sps
Job Number:	1

Serial Number	BF10975 V 7.04-8.0 MultiSeis Plus
Battery Level	6.8 Volts
Calibration	July 12, 2011 by Vibra-Tech Inc.
File Name	L975E9DW.UV1

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

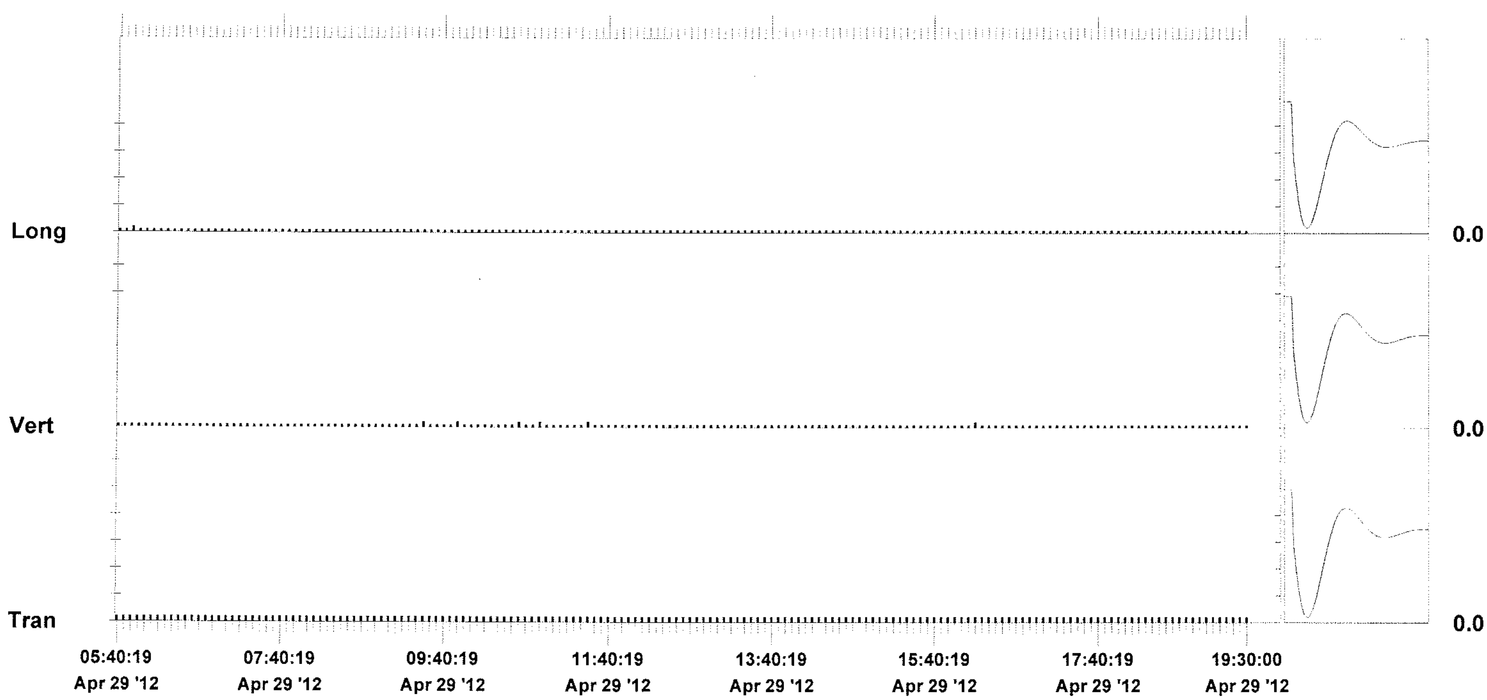
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.01000	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	05:36:19	09:25:19	05:49:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 29, 2012 at 05:36:19

N/A: Not Applicable



Time Scale: 5 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	19:35:18 April 29, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	20:00:00 April 29, 2012	**Battery Level**	6.8 Volts
Number of Intervals	25 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9EZ.QU1
Sample Rate	1024sps		
Job Number:	1		

Notes

Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

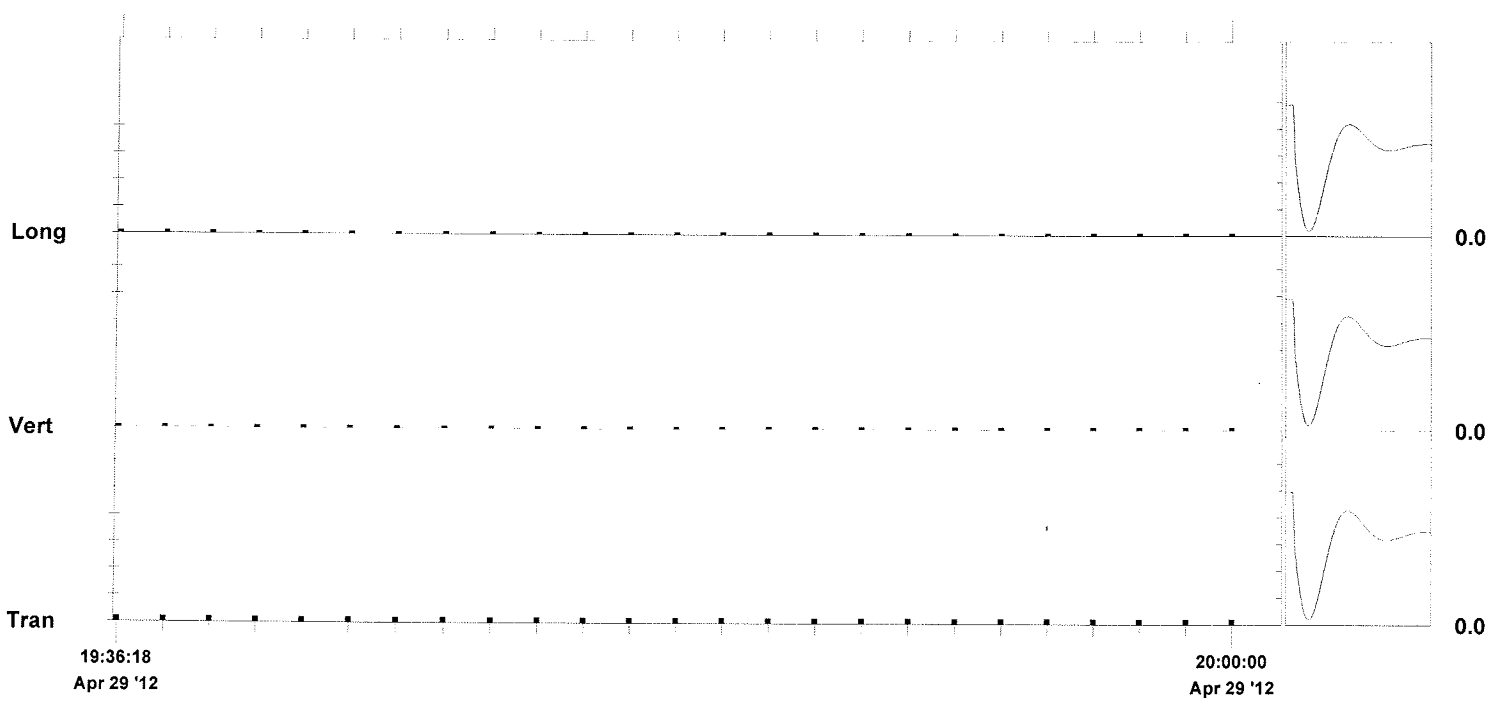
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.00500	in/s
ZC Freq	>100	N/A	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	19:36:18	19:36:18	19:36:18	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.4	7.5	7.3	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 29, 2012 at 19:37:18

N/A: Not Applicable



Time Scale: 1 minute /div **Amplitude Scale:** Geo: 0.0500 in/s/div

Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	20:05:19 April 29, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	23:59:00 April 29, 2012	**Battery Level**	6.9 Volts
Number of Intervals	233 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9F1.4V1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

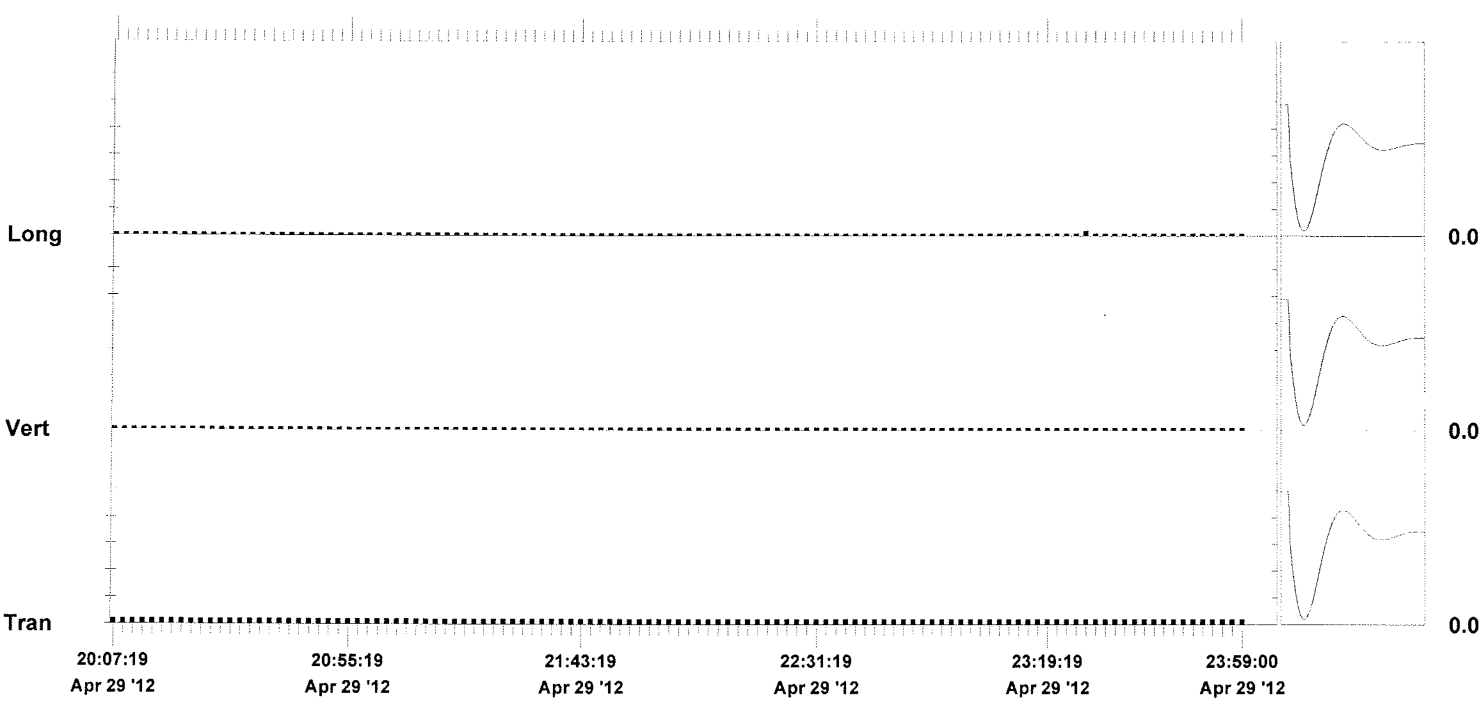
Post Event Notes

Microphone	Disabled
PSPL	N/A
ZC Freq	N/A
Channel Test	N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 29 '12	Apr 29 '12	Apr 29 '12	
Time	20:06:19	20:06:19	23:26:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.1	

Peak Vector Sum 0.0122 in/s on April 29, 2012 at 20:15:19

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	00:00:10 April 30, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	05:30:00 April 30, 2012	**Battery Level**	6.9 Volts
Number of Intervals	330 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9FC.0A1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

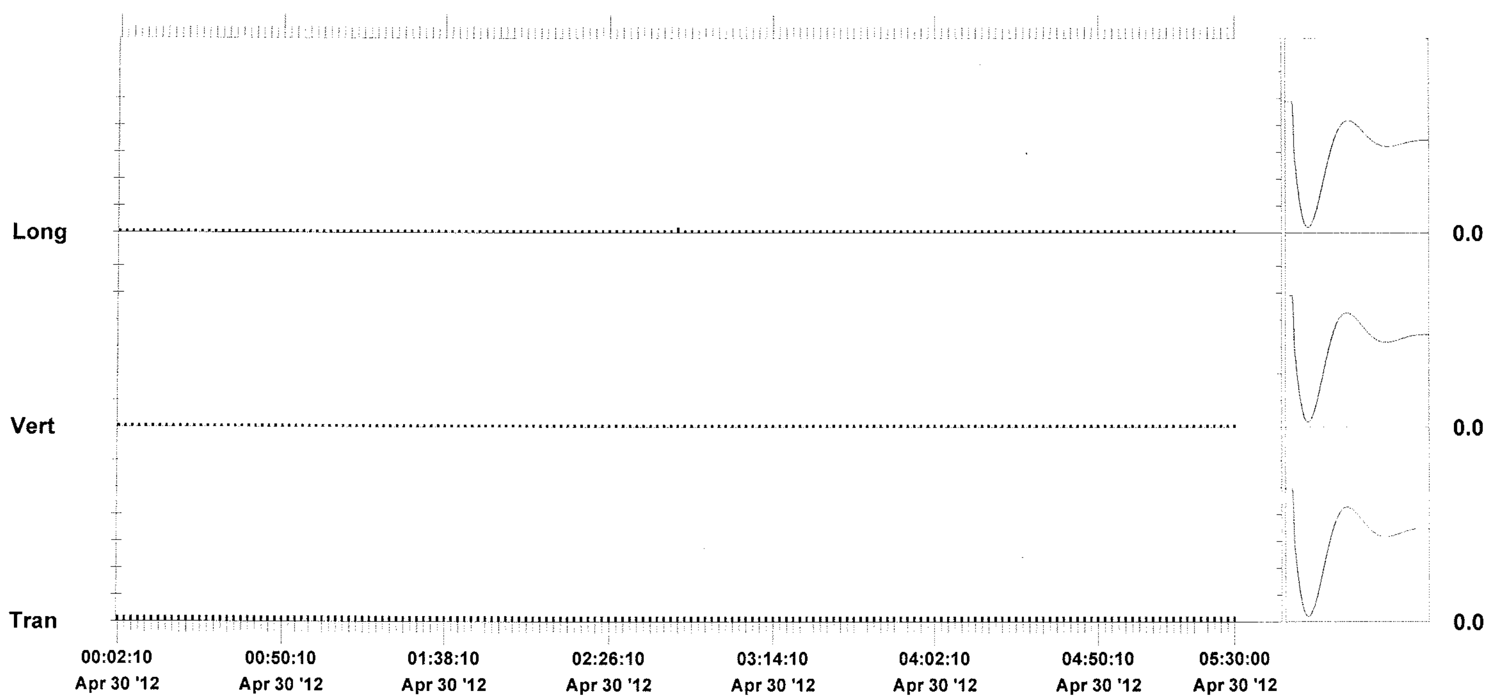
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.01000	0.00500	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	00:01:10	00:01:10	02:45:10	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.5	7.2	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0122 in/s on April 30, 2012 at 00:03:10

N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

VIBRA-TECH
The Vibration Monitoring Experts

Event Report

Histogram Start Time	05:35:19 April 30, 2012	**Serial Number**	BF10975 V 7.04-8.0 MultiSeis Plus
Histogram Finish Time	11:40:41 April 30, 2012	**Battery Level**	6.8 Volts
Number of Intervals	365 at 1 minute	**Calibration**	July 12, 2011 by Vibra-Tech Inc.
Range	Geo :10.00 in/s	**File Name**	L975E9FR.IV1
Sample Rate	1024sps		
Job Number:	1		

Notes
Location: Location #6
Client: URS - Williamsburg Works
User Name: Vibra-Tech Engineers, Inc.
General:

Extended Notes

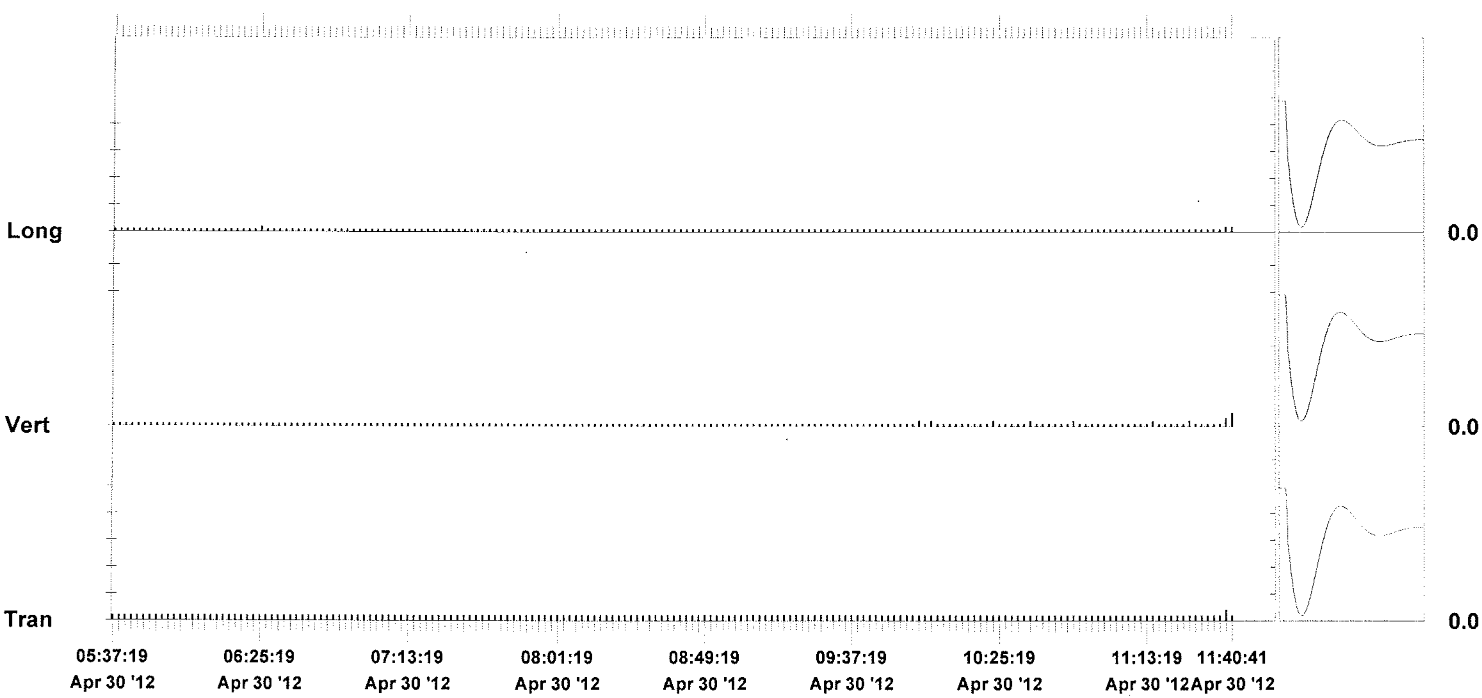
Post Event Notes

Microphone Disabled
PSPL N/A
ZC Freq N/A
Channel Test N/A

	Tran	Vert	Long	
PPV	0.0200	0.0250	0.01000	in/s
ZC Freq	>100	>100	>100	Hz
Date	Apr 30 '12	Apr 30 '12	Apr 30 '12	
Time	11:39:19	11:40:19	06:24:19	
Dynamic Geo Cal.	Passed	Passed	Passed	
Frequency	7.5	7.6	7.3	Hz
Overswing Ratio	3.7	3.7	4.2	

Peak Vector Sum 0.0274 in/s on April 30, 2012 at 11:40:19

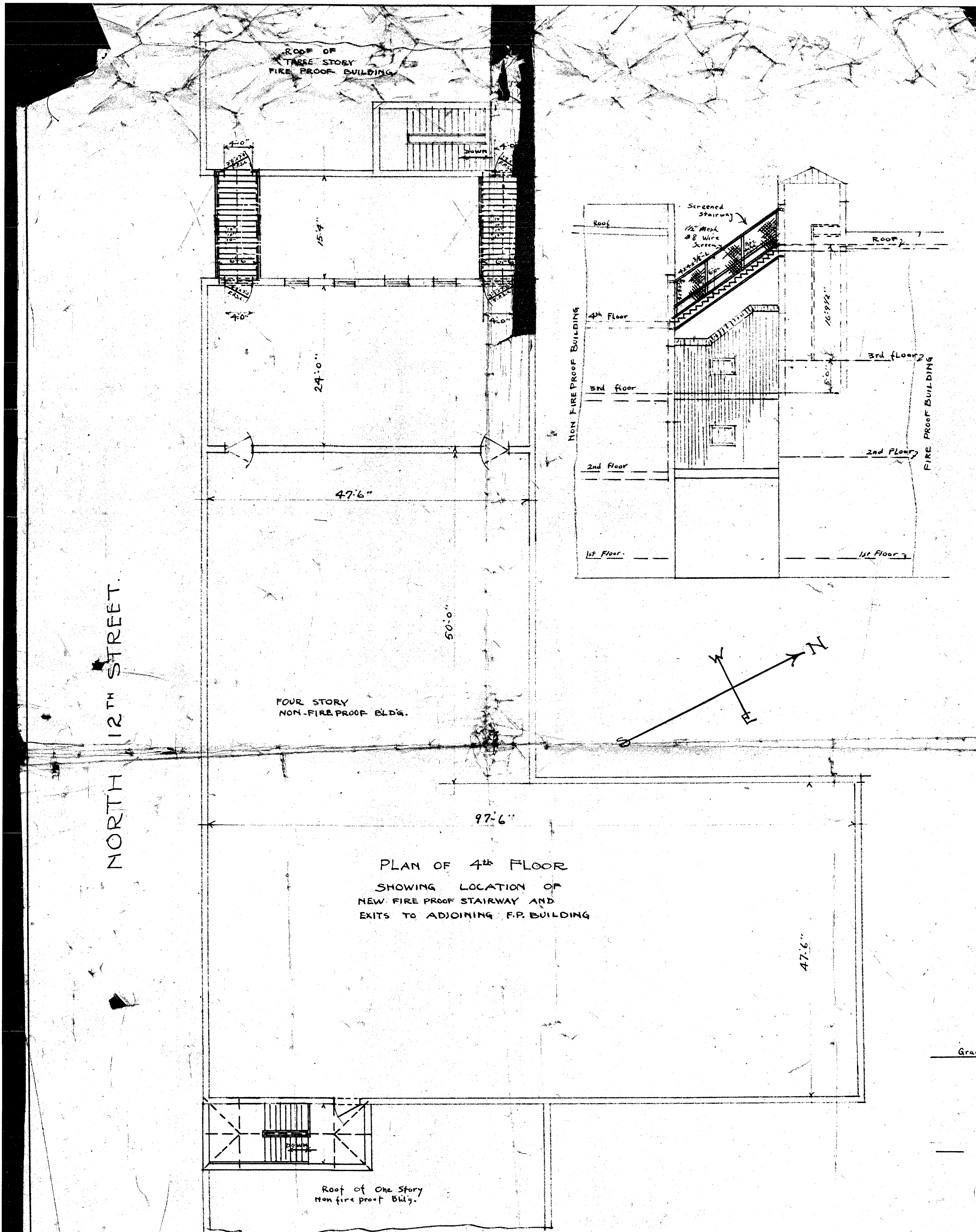
N/A: Not Applicable



Time Scale: 2 minutes /div **Amplitude Scale:** Geo: 0.0500 in/s/div Dynamic Geo Cal.

APPENDIX M

BUILDING FOUNDATION PLANS

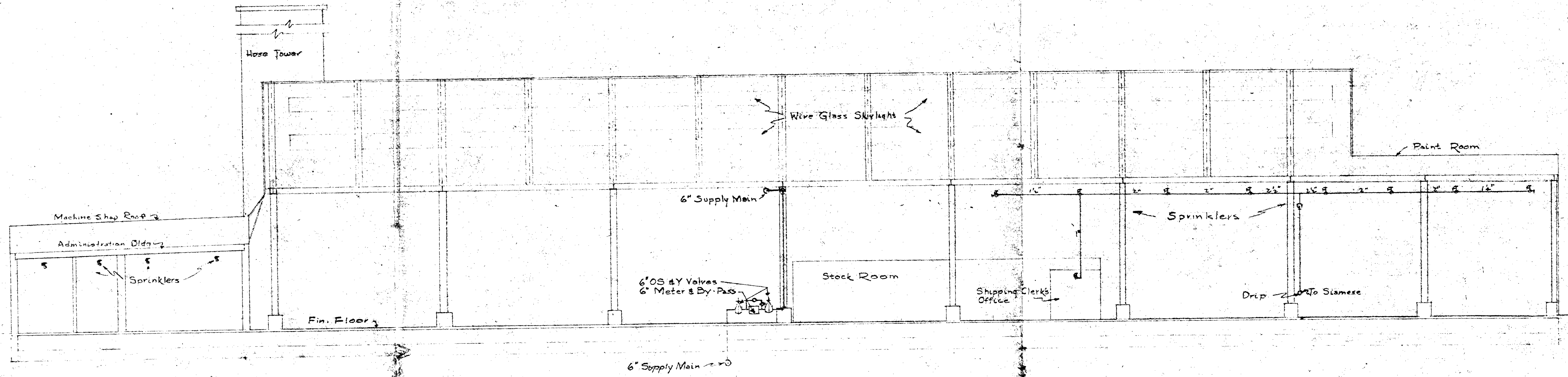


SCALE 1/8 IN.=1 FT.

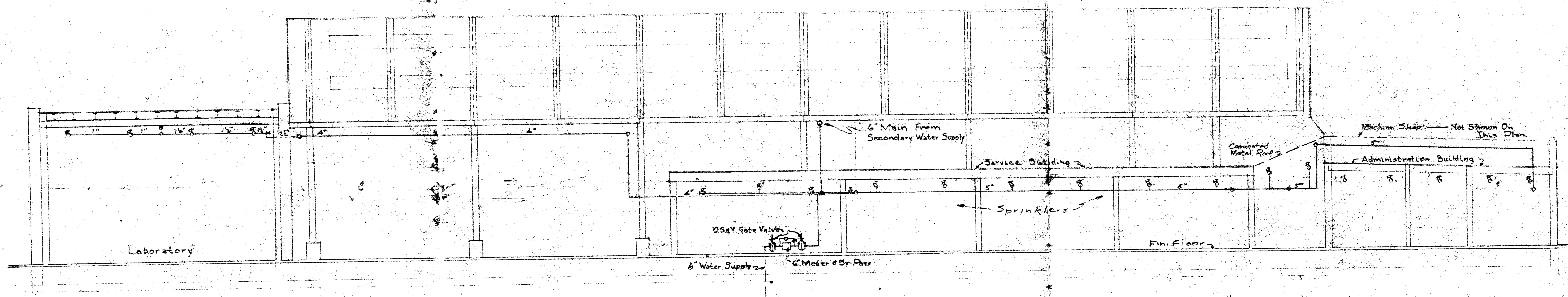
B'LD'G ON THE N. SIDE OF 12TH ST. 300 FT.
W. OF KENT AVE., B'KLYN., N.Y.

BLOCK 2277
LOT 1

DWG NO. 2



WEST ELEVATION N. 11TH ST.
SCALE 1/8"=1'-0"



EAST ELEVATION N. 12TH ST.
SCALE 1/8"=1'-0"

BLOCK 2287
LOT 1

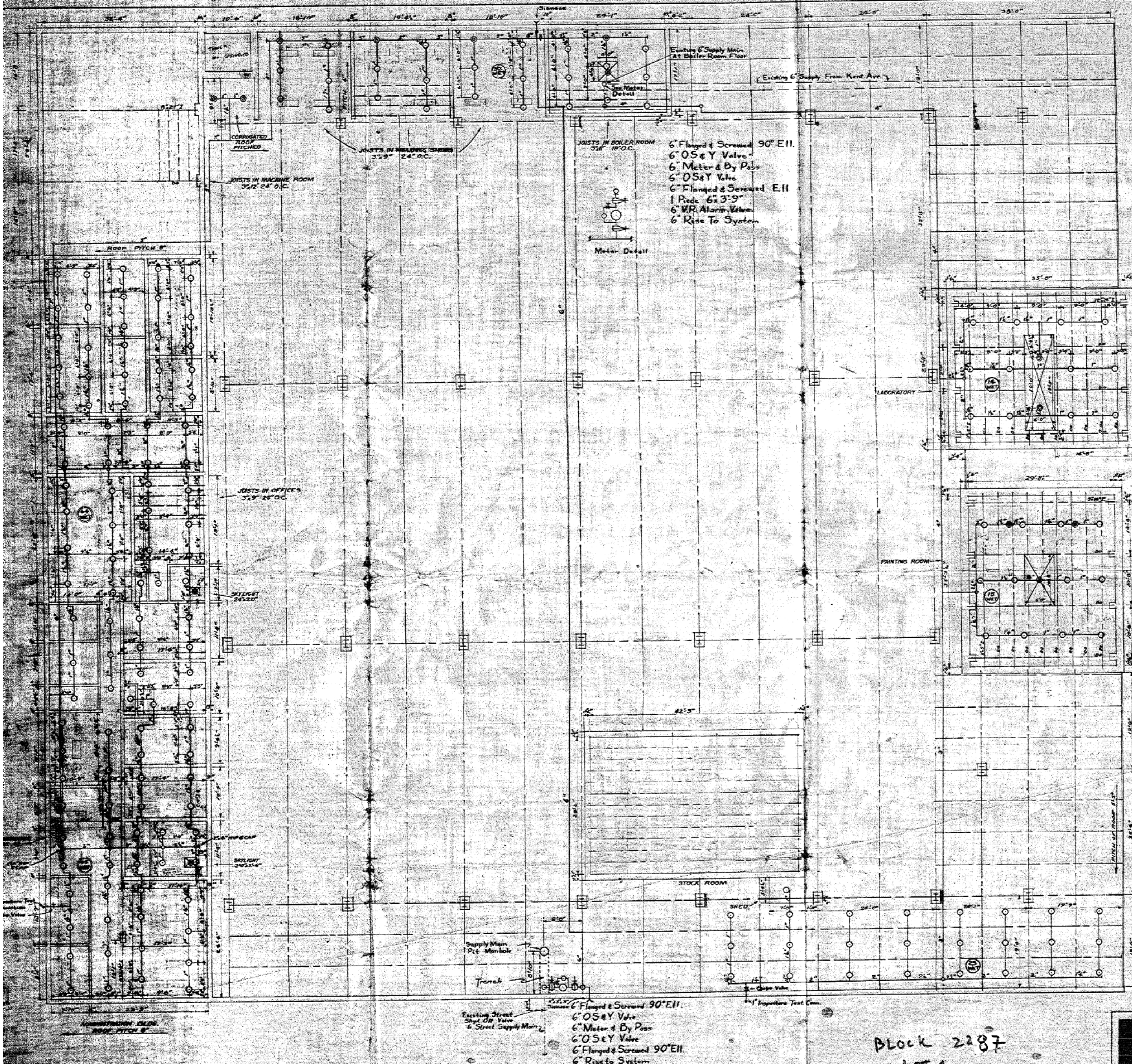
Total No. Sprinkler Heads = 193

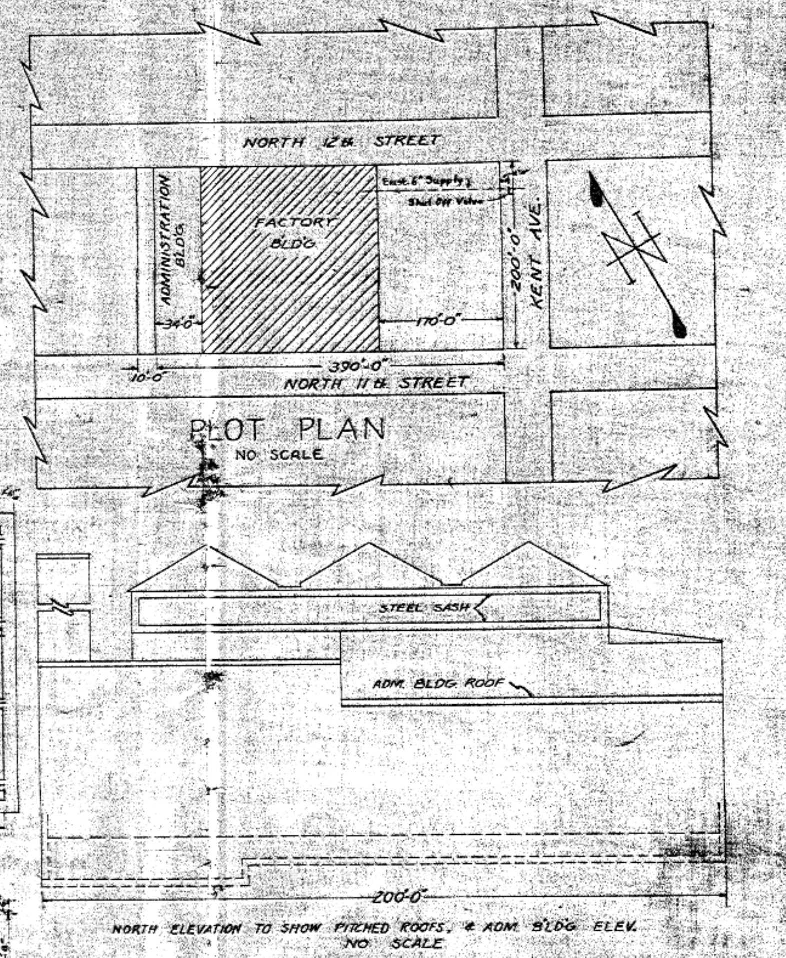
[redacted]

NORMAN HEATING CO. INC.
820 TENTH AVE. N.Y.C.

FERRO-CO CORPORATION
21 N. 11TH STREET BKLYN. N.Y.

DRAWN: 8-18-49
DRAWN BY: I.G.
CHECKED BY: N.S.
DRAWING NO. SP-2
SCALE- AS NOTED





General Notes

Reliable Issue "C" Sprinklers To Be Installed With Deflectors 4" To 10" Below Bottom of Joist.
Reliable Model "D" Alarm Valve To Be Installed.
Dimensions Noted Under Pipe Are End To End.
Minimum Flowing Pressure of 15 P.S.I. on Highest Line With 500 GPM Flowing.
Entire Installation To Be In Accordance With Article #15 of The Building Code & Rules of The Board of Standards & Appeals.
Pipe & Fittings As Per Article #15.26.
Drainage in Accordance With #15.28 (Not Directly Into Public Sewer).
Pipe & Fittings To Be Covered As Per #15.27.
No Piping To Be Covered or Painted Until After Inspection As Per Article #15.35.
All Devices Used in Conjunction With Sprinkler System To Be An Approved Type As Per #15.6.
All Equipment Will Be Installed As Shown On Approved Plans, And All Details Not Required To Be Shown On The Plan Will Be Installed In Accordance With Requirements of Article #15.20 And The Rules of The Board.
All Sprinklers To Be Installed in Accordance With Article #15.19
Location of Meter & Valves To Meet The Approval of The Water Department.
No Other Sprinkler Heads To Be Connected To This System.

Construction Notes

Offices - Built up Roofing on Wood Joists
Welding Sheds - Ditto
Laboratory - Metal Plate on Steel I Beams
Painting Room - Ditto
Packing Area - Corrugated Metal on Steel I Beams.

Hanger Notes

On Mains - Clevis Hangers, C Clamps, Machine Threaded Rod.
On Lines - Clip Ring " " " " "

Total Number Sprinkler Heads This Sheet = 193

BLOCK 2287
LOT 1

[redacted]

NORMAN HEATING COMPANY INC.
820 TENTH AVE., NEW YORK, N.Y.

SPRINKLER SYSTEM
FOR
FERRO-CO CORPORATION
21 NORTH 11th ST., BROOKLYN, N.Y.

DRAWN:
DRAWN BY: J.S.
DRAWING NO. SP-1

SECTION
CONCRETE FLOOR ON THE GROUND
1 PORTLAND CEMENT
2 SAND
4 BROKEN STONE
END SECTION
16'0"
28'0"
12'0"
END VIEW
ROOF 4"
FLOOR 6"
REINFORCED CONCRETE APPROVED METHOD
1 - PORTLAND CEMENT
2 - SAND
4 - BROKEN STONE
DETAIL OF ROOF AND FLOOR
3'8"
VENTILATOR SKYLIGHT
W.C.
PROPOSED
SECOND STORY
PRESENT 2 STORY WAREHOUSE
PRESENT BUILDING 1 STORY
PROPOSED 2 STORY
BUILDING LINE
NO 10TH ST
NO 11 TH ST
GROUND FLOOR
87'0"
52'0"
7'0"
13'0"
PROPOSED
SECOND STORY
ON
ENGINE ROOM.
STANDARD OIL CO. OF N.Y. PRATT WORKS.
BROOKLYN
SCALE 1/8"=1FT MAY 2 1912
F.L.R.SWEET.
BLOCK 2294
LOT 1
DWG NO. 3

BRICK BOILER HOUSE

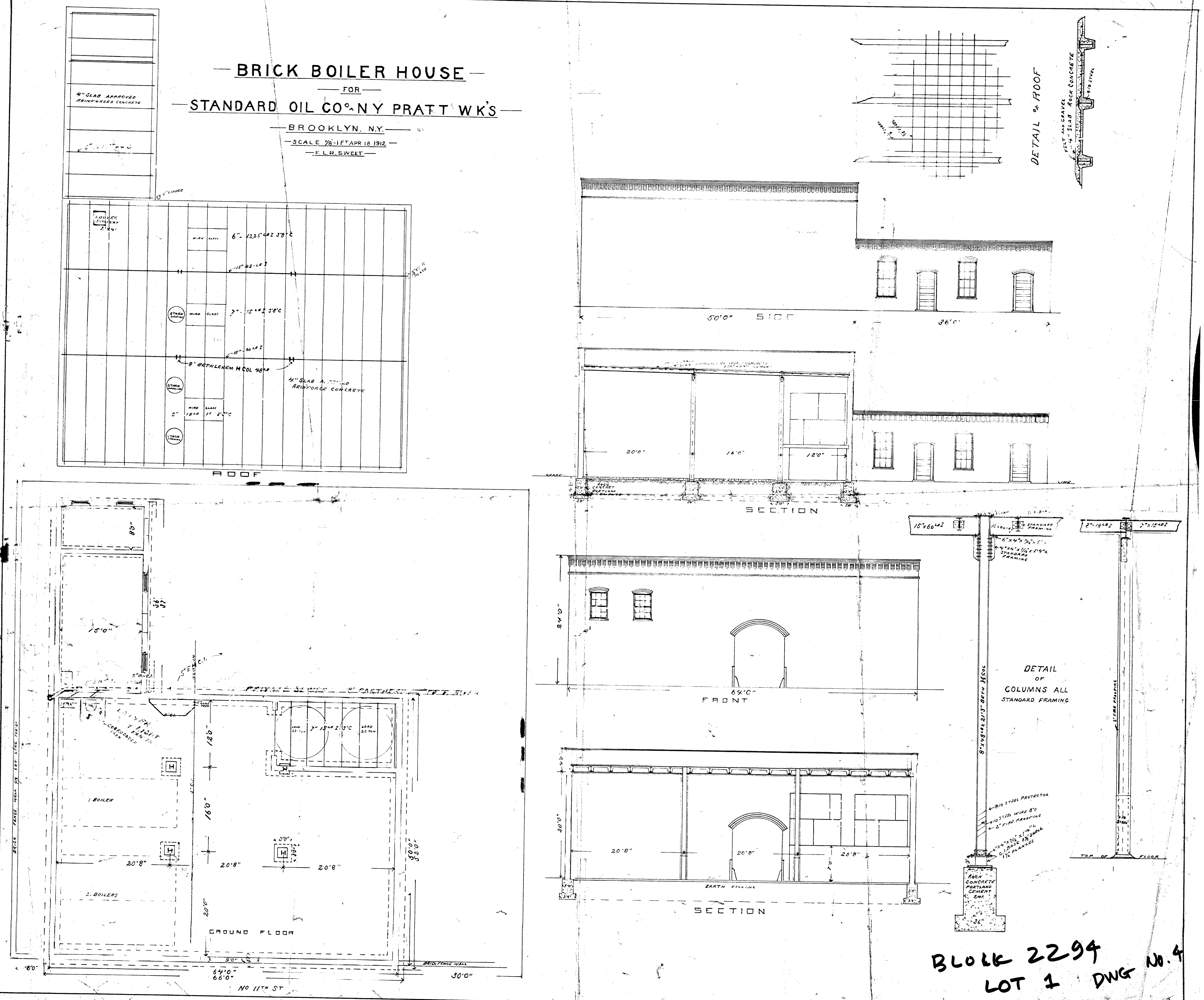
FOR

STANDARD OIL Co. NY PRATT WK'S

BROOKLYN, N.Y.

SCALE 1/8 - 1 FT APR 18 1912

F. L. R. SWEET



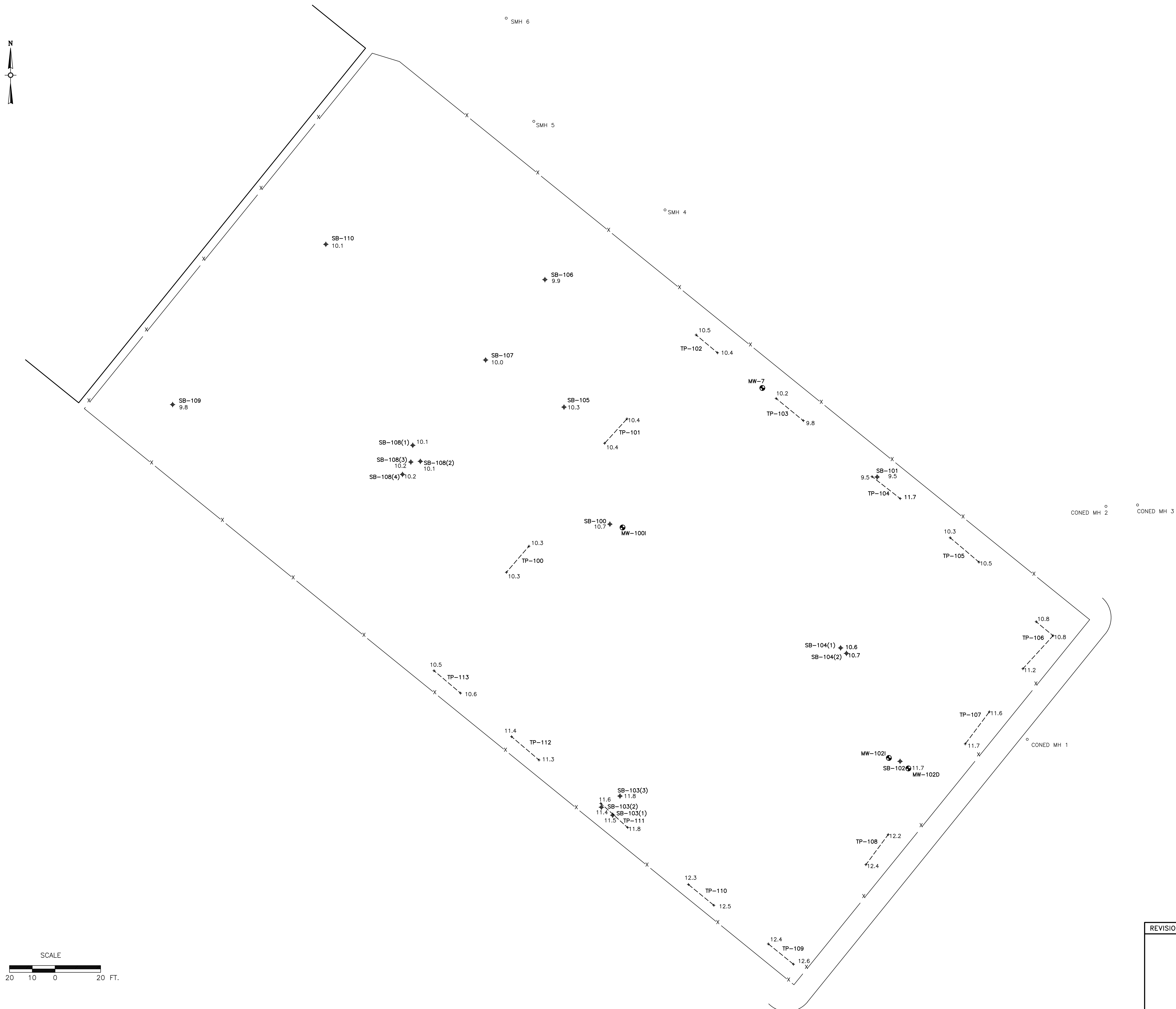
BLOCK 2294
LOT 1 DWG NO. 4

APPENDIX N

SURVEY DATA

1	688766.0554	642067.1555	10.9200	MAG NAIL
2	688936.1858	641870.5584	10.1000	SPIKE
3	688840.1218	642096.0417	9.8300	SPIKE
4	688981.9274	641920.1694	8.2000	SPIKE
101	688775.3462	642098.7789	10.3100	COR CLF
102	688767.2404	642100.2693	10.2100	LAMPPOST
103	688615.1573	641969.0241	12.5700	COR CLF
104	688606.7647	641957.8977	12.0900	FC PC
105	688603.4163	641966.3230	12.1100	FC POC
106	688607.6451	641974.9722	11.9700	FC PT
107	688769.0282	642105.5205	9.7800	FC PC
108	688776.8692	642108.0912	9.8600	FC POC
109	688784.8017	642104.3146	9.6400	FC PT
110	688714.6543	642010.6524	11.6400	MW-102I
111	688710.0550	642019.1811	11.7300	MW-102D
112	688667.8448	642000.5962	12.3700	TP-108
113	688681.0556	642010.3755	12.2100	TP-108
114	688713.1900	642015.5750	11.7300	SB-102
115	688720.8499	642044.2000	11.6900	TP-107
116	688734.9307	642054.7657	11.5700	TP-107
117	688762.9750	641989.4966	10.5500	SB-104(1)
118	688760.5699	641992.0355	10.6700	SB-104(2)
119	688753.8328	642069.4711	11.2100	TP-106
120	688768.3198	642082.7318	10.8100	TP-106
121	688774.4508	642075.3046	10.7900	TP-106
122	688800.6410	642050.1961	10.5100	TP-105
123	688811.3116	642037.5860	10.2700	TP-105
124	688828.4956	642015.6531	11.6900	TP-104
125	688838.1407	642003.3010	9.4500	TP-104
126	688837.9514	642005.5190	9.4700	SB-101
127	688862.6831	641973.1368	9.8300	TP-103
128	688872.4403	641961.2108	10.1500	TP-103
129	688876.9953	641955.1050	10.4100	MW-7
130	688892.4496	641935.4815	10.4300	TP-102
131	688900.2817	641926.1187	10.5300	TP-102
132	688924.5794	641859.7369	9.9100	SB-106
133	688889.2963	641833.7093	10.0300	SB-107
134	688868.6194	641868.1283	10.2500	SB-105
135	688852.7620	641885.9519	10.4100	TP-101
136	688863.4706	641895.7427	10.3500	TP-101
137	688752.9464	641811.0908	10.4500	TP-113
138	688743.1291	641822.7283	10.5500	TP-113
139	688724.0098	641845.1214	11.4000	TP-112
140	688713.8062	641857.1373	11.3400	TP-112
141	688694.7294	641884.2722	11.6300	TP-111
142	688684.1457	641896.0506	11.7900	TP-111
143	688689.5425	641889.4906	11.5300	SB-103(1)
144	688693.0481	641884.5276	11.3900	SB-103(2)
145	688697.9628	641892.6929	11.7500	SB-103(3)
146	688659.1641	641922.7036	12.3300	TP-110
147	688650.0065	641933.8790	12.4700	TP-110
148	688633.0690	641957.7911	12.4300	TP-109
149	688624.1522	641968.8292	12.5700	TP-109

150	688722.8388	642071.3534	10.2600	CONED MH 1
151	688825.0556	642105.8920	9.9200	CONED MH 2
152	688825.6730	642119.7482	10.2100	CONED MH 3
153	688955.1231	641912.4136	8.3700	SMH 4
154	688993.9868	641854.8403	7.5900	SMH 5
155	689039.2844	641842.7615	7.6000	SMH 6
156	689026.1511	641781.0322	0.0000	BUILDING CORNER
157	689023.9345	641783.9951	0.0000	COR CLF
158	689020.2815	641795.9215	0.0000	<PT CLF
159	688570.2271	641931.6627	13.4900	BUILDING CORNER
160	688870.5317	641655.1725	0.0000	BUILDING CORNER
161	688867.9507	641657.6453	0.0000	COR CLF
162	688815.7878	641893.7957	11.0400	MW-100I
163	688817.2756	641888.2556	10.6900	SB-100
164	688807.5946	641852.7392	10.2500	TP-100
165	688851.8733	641801.7602	10.0700	SB-108(1)
166	688844.8186	641805.0925	10.1300	SB-108(2)
167	688844.5199	641800.9166	10.1700	SB-108(3)
168	688839.0799	641797.2341	10.1900	SB-108(4
169	688869.7424	641696.3812	9.8100	SB-109
170	688940.0666	641763.6288	10.0900	SB-110
171	688614.9654	641966.0348	0.0000	
172	688776.2821	642096.6390	0.0000	
173	689045.0164	641757.7063	0.0000	
174	688889.3970	641631.8465	0.0000	



WELL ELEVATIONS

MW-7
CASING – 10.41
PVC – 9.90

MW-100I
CASING – 11.04
PVC – 10.51

MW-102D
CASING – 11.73
PVC – 10.98

MW-102I
CASING – 11.64
PVC –11.07

NOTES

1. SURVEY CONDUCTED ON APRIL 24, 2012.

2. HORIZONTAL AND VERTICAL DATUM FROM MAP PROVIDED BY URS CORP.

REVISIONS

YEC, INC.
VALLEY COTTAGE NEW YORK

WILLIAMSBURG WORKS
FORMER MGP SITE
BOROUGH OF BROOKLYN, NEW YORK

DATE:	SCALE:	DRAWN BY:	CHECKED BY:	JOB NO.
MAY 2012	1" = 20'	MBW	DRS	A0442