SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

July 2, 2014

Ms. Heather Vick
Washington State Department of Ecology
Northwest Regional Office
3190 160th Avenue Southeast
Bellevue, Washington 98008

SUBJECT: CLEANUP ACTION PLAN ADDENDUM
Madison TT Property (VCP #NW1621)
1420 East Madison Street, Seattle, Washington
Project Number: 1002-003

Dear Ms. Vick:

SoundEarth Strategies, Inc. (SoundEarth) is pleased to present, on behalf of The Metropolitan Companies, Inc., this addendum to the Cleanup Action Plan for the property located at 1420 East Madison Street in Seattle, Washington (the Property), Voluntary Cleanup Program number NW1621. The Washington State Department of Ecology (Ecology) issued an opinion letter to Mr. Robby Tonkin on October 8, 2012, regarding the adequacy of a proposed cleanup action at the Property presented in a letter titled Revised Work Plan – Proposed Independent Cleanup Action, prepared by Environmental Associates, Inc. (EAI) and dated July 13, 2012. Ecology's opinion stated that upon completion of the proposed cleanup action, "no further remedial action may likely be necessary to clean up contamination at the Site." SoundEarth is requesting Ecology to issue a revised letter of no further action likely for the proposed modifications to the previously reviewed Cleanup Action Plan, discussed herein. These modifications are based on the review of existing site conditions and the results of the subsurface investigation (SI) conducted by SoundEarth at the Property in February and March 2014.

BACKGROUND

The Property description, past and future uses, surrounding property use, previous investigations, and the previously approved 2012 Cleanup Action Plan are summarized below.

Property Information

The Property includes two irregularly shaped tax parcels (King County parcel numbers 1728800075 and 1728800080) that cover approximately 12,266 square feet (0.28 acres) of land within the northeast Quarter of Section 32, Township 25 North, Range 4 East. The Property is listed as 1420 East Madison Street and is located approximately 1.2 miles northeast of downtown Seattle, Washington (Figure 1). The Property is currently vacant and owned by Madison TT LLC. Current property features are depicted on Figure 2. Earliest records indicate that the Property was developed before 1893 with three buildings that operated as stores. By 1950, the Property was redeveloped with as many as five storefronts, occupied by commercial businesses, including a laundry facility, a rug cleaner, a dye works, sheet-metal

shops, and several service/repair businesses. An automotive garage was present in the northwest portion of the Property. In 1965, all of the structures were demolished, and the Property operated as a Taco Time restaurant from 1965 through 2010. The restaurant was demolished in 2010.

Future Property Land Use

The planned development at the Property includes a six-story, mixed-use apartment building with two to three levels of belowground parking.

Current and Historical Surrounding Property Use

SoundEarth conducted a limited review of available historical documents for the parcels surrounding the Property. These documents included Sanborn Fire Insurance Maps, Kroll Maps, and archived tax records. The current and historical land use surrounding the Property is presented below and depicted on Figure 3.

North. The Property is bounded to the north by an alley, beyond which is a three-story apartment building. The First African Methodist Episcopal Church and its associated parking lot are located to the northwest of the Property. Residences formerly occupied the parcel that the three-story apartment building now occupies. The northwest corner of the church property was formerly occupied by residences and a retail gasoline service station and automotive repair shop between 1947 and 1979.

South. The Property is bounded to the south by the East Madison right-of-way (ROW). A public park and a six-story commercial office building are located to the south and southeast of the Property, across the East Madison Street ROW, respectively. Before the office building was constructed in 2012, the parcel was occupied by a restaurant and bar.

East. The Property is bounded to the east by the 15th Avenue ROW. A six-story, mixed-use building (first floor retail and five stories of apartments) with underground parking is located east of the 15th Avenue ROW. The parcels to the east of the Property were developed and used as residences, an "Oil and Gas" facility, and a restaurant prior to construction of the current building in 2009.

West. West of the Property is a parking lot, beyond which is a 1909-vintage retail building occupied by a dry cleaning business and medical supply office. The 1909-vintage building formerly operated as an upholstery shop. Several residences historically occupied the parcels west of the Property. The parcels west of the Property have maintained the same development and use since at least 1949.

Property Geology and Hydrogeology

The Washington State Department of Natural Resources online Subsurface Geology Information System indicated that the Property is underlain by Pleistocene Vashon Stade glacial till (geologic unit Qgt), which generally consists of very dense silty sand with variable gravel content. Fill material has been encountered beneath the Property during previous SIs. The fill material is comprised of silty fine to medium sand and gravel, with wood and metal debris from ground surface to a depth of approximately 6 feet below ground surface (bgs). Underlying the fill material is native, silty, fine to medium sand with gravel, locally interbedded with layers of silt and fine sand to the maximum depth explored of 40.5 feet bgs.

Two water-bearing zones are present beneath the Property: a shallow, discontinuous, perched water-bearing zone at a maximum approximate depth of 18 feet bgs (perched interval) and an intermediate, more continuous water-bearing zone at a maximum approximate depth of 31 bgs (intermediate interval). Groundwater elevations measured on February 28, 2014, ranged between 9.76 to 14.32 feet bgs in monitoring wells MW01, MW05, and MW08. The groundwater contours measured during this 2014 event indicate that groundwater, in general, flows to the west-southwest with average gradients between 0.059 and 0.10 feet per foot. The groundwater gradients and flow directions from the February and historical groundwater monitoring events are presented in the rose diagram on Figure 4.

A detailed description of the Property geology and hydrogeology is provided in the Subsurface Exploration Review, Geologic Hazard, and Preliminary Geotechnical Engineering Report, prepared by Associated Earth Sciences, Inc. (AESI), dated May 15, 2014, and provided as Attachment A.

PREVIOUS INVESTIGATIONS

Several investigations have been conducted by others at the Property between 2005 and 2012. The investigations have included the installation of a network of 15 monitoring wells, a soil gas investigation, a ground-penetrating radar (GPR) survey, and the advancement of 34 borings. The results of the investigations have identified diesel-range petroleum hydrocarbons (DRPH) in soil and groundwater and 1,2-dichloroethane (ethylene dichloride [EDC]) in groundwater at concentrations in excess of the applicable Washington State Model Toxics Control Act (MTCA) Method A cleanup levels (cleanup levels). A detailed summary of these investigations is provided in the Remedial Investigation Summary, Feasibility Study, and Cleanup Action Plan letter, prepared by TechSolve Environmental, Inc. and submitted to Ecology on August 4, 2011.

2014 SUBSURFACE INVESTIGATION

SoundEarth staff conducted a limited SI at the Property in February and March 2014. The purpose of the investigation was to evaluate if the EDC-contaminated groundwater extended beyond the Property boundary to the south, to determine whether GPR anomalies identified during previous investigations were underground storage tanks (USTs), and to further characterize the hydrogeology beneath the Property. The field activities and results are discussed in detail below.

Test pit Investigation

On February 5, 2014, three test pits were excavated on the Property under the observation of a SoundEarth geologist (TP01, TP02, and TP03). The test pits were completed in the north-central, southwestern, and southeastern portions of the Property (Figure 2). The test pits were excavated to depths between 18 and 20 feet bgs and observed for soil characteristics, indications of contamination, and the presence of shallow groundwater. Test pit TP02 was also excavated in order to evaluate whether a UST was present in the area where a GPR anomaly was identified during a previous investigation. A strong hydrocarbon odor was observed in soil from 18.5 feet bgs in the TP01. No other indications of contamination were observed, no USTs were encountered, and no samples were collected at that time.

Upon achieving total depth, each test pit was left as an open excavation for a minimum of 30 minutes to observe shallow groundwater seepage. A small volume of groundwater was observed flowing into test

pit TP01 at a depth of 18 to 19 feet bgs, but no measurable accumulation resulted. The two southern test pits contained no evidence of shallow water-bearing zones.

Monitoring Well Installation and Groundwater Sampling

SoundEarth staff completed a groundwater sampling event of existing on-Property wells on February 28, 2014. Upon arrival at the Property, SoundEarth staff opened all wells and allowed them to equilibrate with atmospheric pressure before collecting depth-to-water measurements in monitoring wells MW01 through MW15. Groundwater levels measured ranged from 8.49 (MW09) to 22.09 (MW11) feet below the top of well casing (Table 1). Groundwater samples were then collected from monitoring wells MW01, MW05, MW06, MW08, MW09, MW10, MW11, MW12, and MW14 according to the U. S. Environmental Protection Agency (EPA) *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (April 1996). Purging and sampling of each monitoring well were performed using a peristaltic pump and dedicated polyethylene tubing at a maximum flow rate of 110 milliliters per minute. The tubing intake was placed approximately 2 to 3 feet below the surface of the groundwater or mid-screen in each monitoring well. During purging, water quality was monitored using a QUANTA water quality meter equipped with a flow-through cell. The water quality parameters that were monitored and recorded included temperature, pH, specific conductance, dissolved oxygen, turbidity, and oxidation-reduction potential. Each monitoring well was purged until all six water quality parameters stabilized or a minimum of pH, specific conductivity, and turbidity or dissolved oxygen stabilized. Following purging, groundwater samples were collected from the pump outlet tubing located upstream of the flow-through cell and placed directly into clean, laboratory-prepared sample containers. Each container was labeled with a unique sample identification number, placed on ice in a cooler, and transported to Friedman & Bruya, Inc. (F&B) of Seattle, Washington, under standard chain-of-custody protocols for laboratory analysis. The groundwater samples were submitted for analysis of EDC by EPA Method 8260C.

On March 12, 2014, SoundEarth observed the installation of monitoring well MW16 in the sidewalk along the East Madison Street ROW directly south of the Property. The boring was also observed by a geotechnical engineer from AESI, who collected samples for geotechnical soil analysis. Boring SESB01 was advanced to 26 feet bgs by Boretec, Inc. of Valleyford, Washington, and soil samples were collected at 5-foot intervals, described in accordance with the Unified Soil Classification System by a SoundEarth geologist, observed for indications of contamination, and sampled for potential laboratory analysis. All soil descriptions and indications of contamination were recorded on a boring log (Attachment B). Soil samples were placed in containers labeled with a unique sample identification number, placed on ice in a cooler and transported to F&B under standard chain-of-custody protocols for laboratory analysis. The soil sample collected at 20 feet bgs was submitted for analysis of DRPH and oil-range petroleum hydrocarbons (ORPH) by Northwest Total Petroleum Hydrocarbon Method NWTPH-Dx. Upon achieving total depth, monitoring well MW16 was installed and developed by surging and purging of the well's screened interval. On March 13, 2014, SoundEarth returned to the Property to measure depth-to-water and collect groundwater samples from monitoring wells MW09 and MW16 using the same sampling methods described above. The two samples were also submitted for analysis of EDC by EPA Method 8260C.

Results

Analytical results for groundwater and soil samples collected during the 2014 SI are presented on Figure 5 and in Tables 1 and 2. Laboratory analytical reports are included as Appendix C. Results of the 2014 SI are summarized below.

Soil

Soil generally consisted of dense gravelly sand with varying amounts of silt. Fill was encountered from 0 to approximately 5 feet bgs. No indications of petroleum contamination were observed during drilling activities. The soil sample collected from SESB01 at a depth of 20 feet bgs did not contain detectable concentrations of DRPH and ORPH and, therefore, remained below the applicable cleanup levels.

Groundwater

The groundwater samples collected from monitoring wells MW05 and MW08 contained concentrations of EDC in excess of the cleanup level; EDC concentrations in monitoring wells MW01, MW06, MW09, MW10 through MW12, MW14, and MW16 were below the Method A cleanup level and/or the laboratory detection limit.

Hydrogeological Observations

The intermediate water-bearing zone was encountered in boring SESB01 at approximately 20 to 22 feet bgs. No shallow water-bearing conditions were encountered during drilling activities. AESI concluded that the soils encountered in the vicinity of the Property are suitable for the proposed redevelopment. AESI indicated that there may need to be temporary excavation dewatering and permanent dewatering if the anticipated foundation depth extends into the intermediate water-bearing zone. A detailed description of AESI's findings is provided in their geotechnical report (Attachment A).

SITE DEFINITION

As established in Chapter 173-340-200 of the Washington Administrative Code (WAC 173-340-200), the "Site" is defined by the full lateral and vertical extent of contamination that has resulted from previous activities on the Property. Based on previous investigations completed on the Property, the Site includes DRPH, ORPH, EDC in soil and/or groundwater within the Property boundaries.

Chemicals and Media of Concern

DRPH and ORPH have been detected at concentrations exceeding the applicable cleanup levels in several soil samples collected from the Property. These exceedances generally appear to be limited to two locations: the western (boring GL-8 at 14 feet bgs) and central portion (boring GB-3/MW08 at a depth of 10 feet bgs) of the Property at depths between 10 and 14 feet bgs. Several other areas of the Property have also contained elevated concentrations of DRPH and/or ORPH, but the concentrations were below the applicable cleanup levels, including in the northwest (borings B-3 and MW03), the southeast (boring SB-3), and central portions of the Property (borings GL-10 and MW10) at depths ranging from 4 to 15 feet bgs. Benzene was detected at a concentration exceeding the cleanup level in the boring GL-11, but has not been detected in any other soils samples collected and is not considered a

chemical of concern (COC). A cross-sectional depiction of the central portion of the Property is provided on Figure 5.

DRPH has been detected at a concentration slightly exceeding the cleanup level in one groundwater sample, collected from monitoring well MW10. DRPH exceeding the cleanup level has not been detected in any other monitoring wells located within the Site.

EDC is present in groundwater at concentrations exceeding the cleanup level. EDC and other chlorinated solvents have not been detected in any of the over 70 soil samples collected from beneath the Property and analyzed.

Vapor is not considered a medium of concern. G-Logics conducted a soil vapor investigation in December 2008. A total of 17 soil vapor points were advanced across the Property. Soil vapor samples were collected from each of the points and analyzed for volatile organic compounds (VOCs), including EDC. None of the soil vapor samples contained detectable concentrations of EDCs or any other VOCs.

Confirmed and Suspected Sources Areas

The results of the investigations conducted at the Site suggest that the petroleum impacts confirmed in soil and groundwater beneath the Site may be the result of a release from former automotive repair activities that may have operated in the former automotive garage, located in the northwest portion of the Property.

EDC impacts confirmed in groundwater within the south-central portion of the Property may be attributable to a release from the former sheet metal and/or dye works facilities. According to the Agency for Toxic Substances & Disease Registry's Toxicological Profile, EDC has been historically produced as a chemical intermediate for dyes and resins (1992). The EPA also lists EDC use in metal degreasing, paint, varnish, finish remover, soaps, and scouring compounds (*Locating and Estimating Air Emissions from Sources of Ethylene Dichloride*, 1984). Considering that both sheet metal and dye works facilities historically operated on the Property, the EDC is likely attributable to one or both facilities that operated on the Property from at least 1950 to 1965. Because no EDC source has been identified in soil, it is likely that the source of EDC may have been from a leaking underground sewer line.

2012 CLEANUP ACTION PLAN

EAI submitted to Ecology a Revised Work Plan – Proposed Independent Cleanup Plan (CAP) for the Property in July 2012. The cleanup action elements of the 2012 CAP are summarized below.

Soil Compliance

Contaminated soil will be excavated during Property redevelopment and directly loaded into trucks for off-site disposal to a regulated facility. Performance samples will be collected in order to properly profile soil and to document soil cleanup progress. Confirmation samples will be collected from the final limits of the excavation.

Groundwater Compliance

Temporary dewatering will be performed during Property redevelopment from a perimeter dewatering system and/or directly through a pump within the excavation area. Pumped groundwater will be discharged to the local sanitary sewer system. The groundwater may be pretreated prior to discharge to meet the discharge permit requirements. Permanent dewatering of the below-ground structure will be required. A permanent dewatering system will be installed surrounding the building foundation and discharged to the sanitary sewer. Periodic groundwater testing will be performed in order to confirm groundwater is in compliance with Ecology's desired threshold values by sampling either the discharge or perimeter monitoring wells (to be installed). Monitoring would be conducted until a minimum of four consecutive quarters of compliant groundwater results were achieved or until Ecology was satisfied with the results.

Vapor Compliance

Vapor intrusion is not anticipated to be a hazard upon completion of redevelopment due to the removal of contaminated soils, active dewatering, and anticipated ventilation system required for the underground parking structure.

In a letter dated October 8, 2012, Ecology presented an opinion of "…no further remedial action is likely to be necessary…" based on completion of the proposed CAP, as described above.

MODIFICATIONS TO CLEANUP ACTION PLAN

The results of SoundEarth's 2014 SI indicated that the proposed cleanup action elements of the 2012 CAP needed to be modified in order to effectively remediate the Site and to incorporate current site conditions. SoundEarth proposes to maintain the soil excavation cleanup action element of the 2012 CAP. SoundEarth proposes to additionally conduct an in situ remediation of groundwater by injection. These cleanup action element modifications are discussed in detail below.

Soil Compliance

SoundEarth is providing additional information regarding the soil compliance cleanup action component of EAI's CAP. The proposed redevelopment of the Property will require a mass excavation lot-line to lot-line to a maximum depth of 30 feet bgs, thus removing all previously identified petroleum-contaminated soil. Soil compliance monitoring will consist of collecting in situ performance and confirmational soil samples concurrent with Property construction excavation activities. Field screening on soil will be performed and will consist of the collection of soil samples during the excavation for the purpose of observing and recording physical characteristics of the soil that may provide evidence of the presence or absence of contamination. The soil will be observed for staining, odor, and sheen. In addition, volatile organic vapors will be measured in soil samples using a photoionization detector. Performance soil samples will be collected from areas where evidence of contamination is observed in order to properly profile soil and to document soil cleanup progress. Confirmational soil monitoring will consist of collecting soil samples from the final limits of the base and sidewalls of the excavation area to confirm that cleanup standards have been achieved. Soil samples will be collected from the bottom and the sidewalls of the excavation areas to a maximum depth of 30 feet bgs. The specific frequency and locations of soil sampling will be dependent on qualitative indications of potential contamination observed during the field screening activities.

Performance soil sample locations will be used as confirmational soil sampling locations in cases where the analytical results of the performance soil samples confirm that cleanup levels have been attained at the limits of the excavation area. The confirmational soil samples will be collected in the same manner as performance samples.

Contingency to Address Previously Unidentified Soil Contamination

The presence of aesthetic impacts and conditions encountered by on-site personnel during the construction excavation activities at the Property may be indicative of conditions associated with contaminated media. In the event that previously unidentified soil contamination is encountered, SoundEarth will oversee that the material is characterized and appropriately disposed of. Any of the following occurrences are considered common sense criteria that may require a mitigation or remediation response. These criteria include, but are not limited to:

- Obvious petroleum staining, sheen, or colored hues in soil or standing water.
- The presence of petroleum products or leachate of other chemicals.
- The presence of utility pipelines with sludge or trapped liquid, indicating petroleum or chemical discharge sludge.
- The presence of buried pipes, conduits, tanks, or unexplained metallic objects or debris.
- Materials with a granular texture that suggests industrial origin.
- Vapors causing eye irritation or nose tingling or burning.
- White, chalky compounds or fine particulate soil layers.
- Presence of petroleum-like vapor or odor.
- Burnt debris or the presence of slag-like material.

Any of these criteria identified by on-site personnel will be evaluated and, as appropriate, a sampling plan will be developed to properly characterize and manage the material in accordance with state and federal regulations.

In the event that a UST is encountered during the course of the excavation activities, a UST site assessment will be conducted under the oversight of a Washington State-certified UST site assessor, and the UST will be removed in accordance with Ecology's *Guidance for Site Checks and Site Assessment for Underground Storage Tanks* (2003), Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (2011), and *Underground Storage Tank Regulations* (WAC 173-360). The Property was formerly occupied by small commercial spaces where heating oil USTs may have been used. In the event that impacts to soil are observed, compliance soil samples will be collected in the same manner as described previously and will be analyzed to ensure that the contaminated soil is removed and properly characterized prior to disposal.

Groundwater Compliance

SoundEarth proposes to add a cleanup action element that remediates groundwater prior to the proposed excavation and Property redevelopment. The proposed cleanup action element includes conducting an in situ chemical oxidation (ISCO) event at the Property to reduce low-level EDC

concentrations in groundwater to below cleanup level. The ISCO event will consist of injecting hydrogen peroxide-activated sodium persulfate into monitoring wells MW01, MW05, and MW08 as an aqueous solution.

Once dissolved and activated, sodium persulfate decomposes into powerful radicals and readily oxidizes dissolved VOCs, such as EDC. SoundEarth calculated the mass of chemical oxidant needed to reduce EDC to below cleanup levels. Based on stoichiometry and assuming 50 percent of the sodium persulfate becomes radical and reacts with EDC, an estimated 28 pounds of sodium persulfate is required to oxidize one pound of EDC. However, since persulfate also reacts with natural organics present in the soil, a conservative soil oxidant demand (SOD) factor of 1 gram of persulfate per kilogram of soil (2 pounds of persulfate per ton of soil) was assumed in the injection volume calculations. Approximately 0.002 pounds of aqueous-phase EDC is estimated to be present beneath the Property based on the results of the 2014 groundwater sampling. Considering the SOD and estimated mass of EDC, a theoretical persulfate mass requirement of approximately 1,740 pounds was calculated. The required sodium persulfate will be delivered by injecting eleven 150-gallon batches of 12 percent sodium persulfate solution into monitoring wells MW01, MW05, and MW08.

Compliance groundwater monitoring will be conducted at the Site to monitor the effectiveness of the cleanup action on groundwater quality at the Property. A baseline performance groundwater monitoring event was conducted First Quarter 2014 to document groundwater conditions prior to the implementation of the cleanup action. Once the ISCO event has been conducted, SoundEarth will commence compliance groundwater monitoring the following quarter and will continue conducting compliance groundwater monitoring on a quarterly basis. The compliance groundwater monitoring events are considered performance monitoring until groundwater analytical results indicate concentrations of the COCs are below the cleanup levels, at which time the compliance groundwater monitoring will become confirmational monitoring. Additional injection events may be conducted depending upon the results of performance groundwater monitoring. Confirmational groundwater monitoring will be performed on a quarterly basis until four consecutive quarters of groundwater results with COC concentrations below the cleanup levels are achieved.

Compliance groundwater samples will be collected from representative intermediate- and shallow-seated monitoring wells MW01, MW05, MW08, MW09, and MW16 prior to the redevelopment of the Property. Monitoring wells MW01 through MW08 and MW10 through MW15 will be decommissioned during Property redevelopment and, therefore, will not be included in the compliance well network for the duration of the compliance monitoring. After Property redevelopment activities commence, compliance groundwater samples will be collected on a quarterly basis from the monitoring wells MW09 and MW16, which are considered downgradient points of compliance.

Shallow groundwater appears to be perched and discontinuous and will not likely infiltrate into the excavation at a measureable rate. An intermediate, more continuous water-bearing zone (intermediate interval) appears to be present at depths between 18 and 31 feet bgs. If the intermediate water-bearing zone is encountered during excavation and Property redevelopment, temporary and permanent dewatering may need to be performed at the Property, as recommended in AESI's geotechnical report. This temporary and permanent dewatering was recommended as cleanup action components in EAI's 2012 CAP. In the event that dewatering is required, the cleanup actions applicable to dewatering in EAI's CAP will be followed, with exception of treating groundwater prior to discharge. SoundEarth does not

anticipate pretreatment of the accumulated groundwater to be conducted, as King County's Industrial Wastewater Program's discharge screening levels for petroleum hydrocarbons and EDC are 100,000 and 170 micrograms per liter, respectively, and the maximum concentrations observed in groundwater beneath the Property for these contaminants is 540 and 56 micrograms per liter. In addition, groundwater will be remediated prior to excavation or Property redevelopment activities, which should further reduce concentrations of contaminants in groundwater beneath the Site. The accumulated groundwater will not be sampled to demonstrate compliance with cleanup levels, as EAI proposed in 2012 CAP because SoundEarth proposed to instead conduct quarterly compliance groundwater monitoring at monitoring wells.

Compliance groundwater samples will be submitted for laboratory analysis of EDC. In addition, post-injection groundwater monitoring will be sampled for sulfate in downgradient monitoring wells MW09 and MW11 to comply with the provisions of the Underground Injection Control registration.

PRELIMINARY CLEANUP ACTION SCHEDULE

Provided below is the preliminary cleanup action schedule for the Property.

Cleanup Action Component	Schedule
Underground Injection Control Registration	April 2014
Construction Permitting	April 2014–September 2015
Groundwater In Situ Chemical Oxidation Event	May 2014
Groundwater Compliance Monitoring	Quarterly following injection event: August 2014–May 2015
Remedial Excavation and Soil Compliance Sampling	June 2015
Submittal of Cleanup Action Report and request from Ecology for a no further action determination for the Site	July 2015

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report are derived, in part, from data gathered by others, and from conditions evaluated when services were performed, and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We do not warrant and are not responsible for the accuracy or validity of work performed by others, nor from the impacts of changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the use of segregated portions of this report.

CLOSING

SoundEarth requests that Ecology review the proposed modifications to the CAP contained herein and issue a revised No Further Action Likely opinion letter.

Respectfully,

SoundEarth Strategies, Inc.

Audrey Hackett
Project Scientist

John R. Funderburk, MSPH
Principal

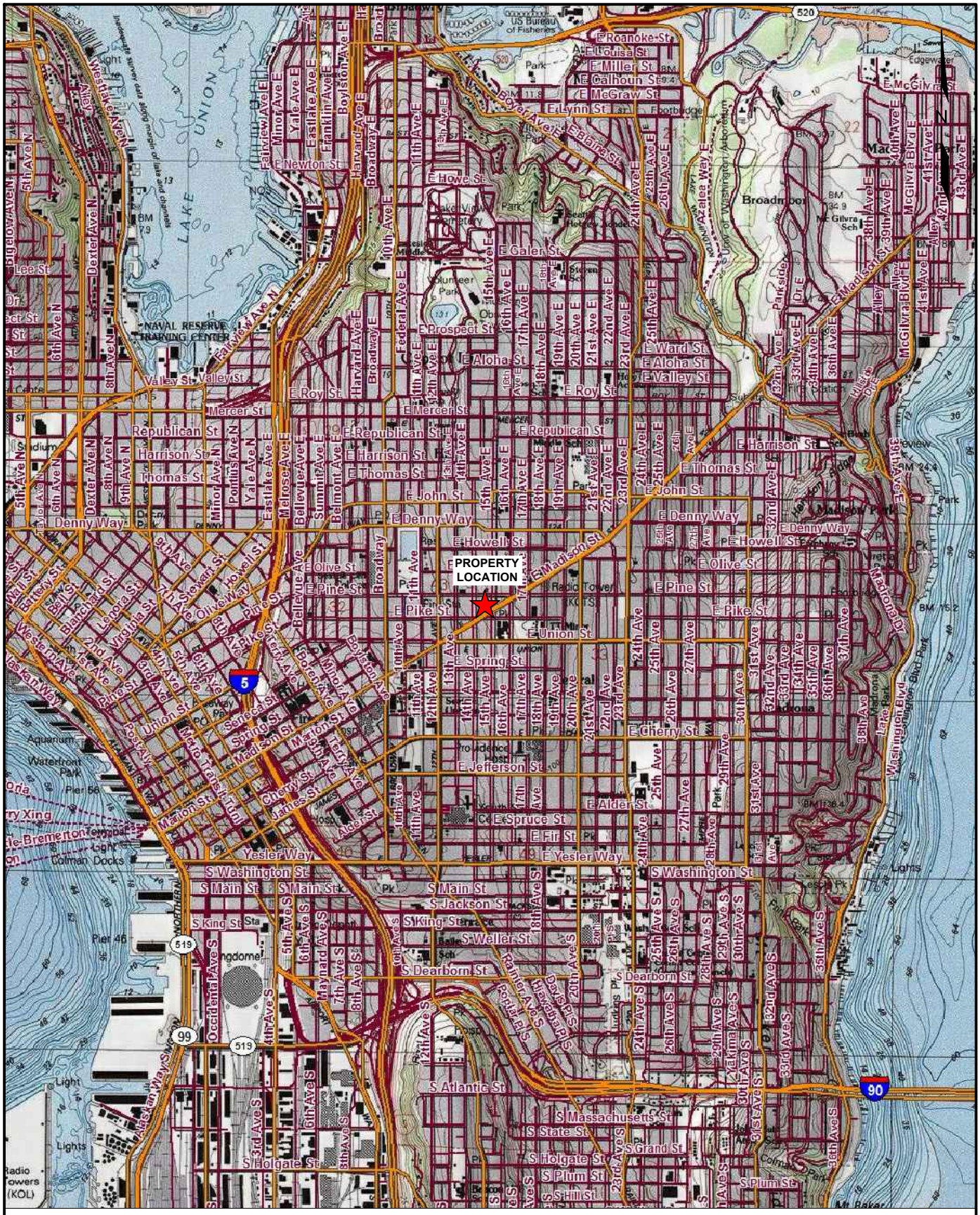
Attachments: Figure 1, Property Location Plan
Figure 2, Exploration Location Plan
Figure 3, Current and Historical Property Use
Figure 4, Rose Diagram
Figure 5, Geologic Cross Section A–A'
Table 1, 2014 Subsurface Investigation Summary of Groundwater Analytical Results
Table 2, 2014 Subsurface Investigation Summary of Soil Analytical Results
A, Geotechnical Report
B, Boring Log
C, Laboratory Analytical Reports
Friedman & Bruya, Inc., #402434
Friedman & Bruya, Inc., #403161
Friedman & Bruya, Inc., #403162

cc: Trent Mummery, The Metropolitan Companies, Inc.

APH/JRF:dnm/hsb

FIGURES

7/1/2014



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

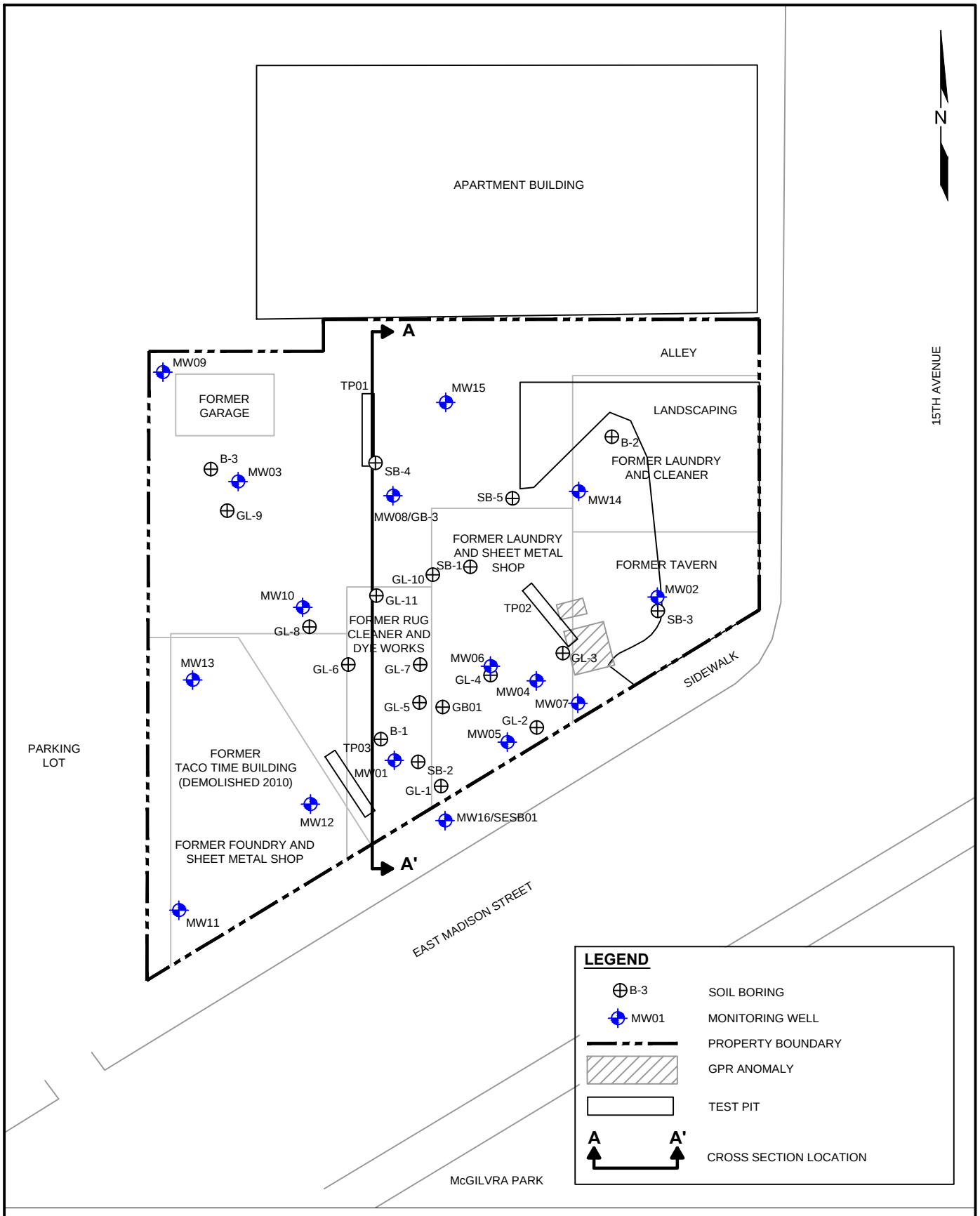
DATE: 01/21/2014
DRAWN BY: BLR
CHECKED BY: APH
CAD FILE: 1002-003_VIC

PROJECT NAME: MADISON TACO TIME PROPERTY
PROJECT NUMBER: 1002-003
STREET ADDRESS: 1420 EAST MADISON STREET
CITY, STATE: SEATTLE, WASHINGTON

FIGURE 1
PROPERTY LOCATION PLAN

P:\1002 METROPOLITAN COMPANIES\1002-003 MADISON TACO TIME\TECHNICAL\CAD\FIGURE 1\1002-003_VIC.DWG

WWW.SOUNDEARTHINC.COM



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DATE: 06/11/14
DRAWN BY: BLR/JQC
CHECKED BY: APH
CAD FILE: 1002-003_2014CAP_EL

PROJECT NAME: MADISON TACO TIME PROPERTY
PROJECT NUMBER: 1002-003
STREET ADDRESS: 1420 EAST MADISON STREET
CITY, STATE: SEATTLE, WASHINGTON

FIGURE 2
EXPLORATION LOCATION MAP

7/1/2014
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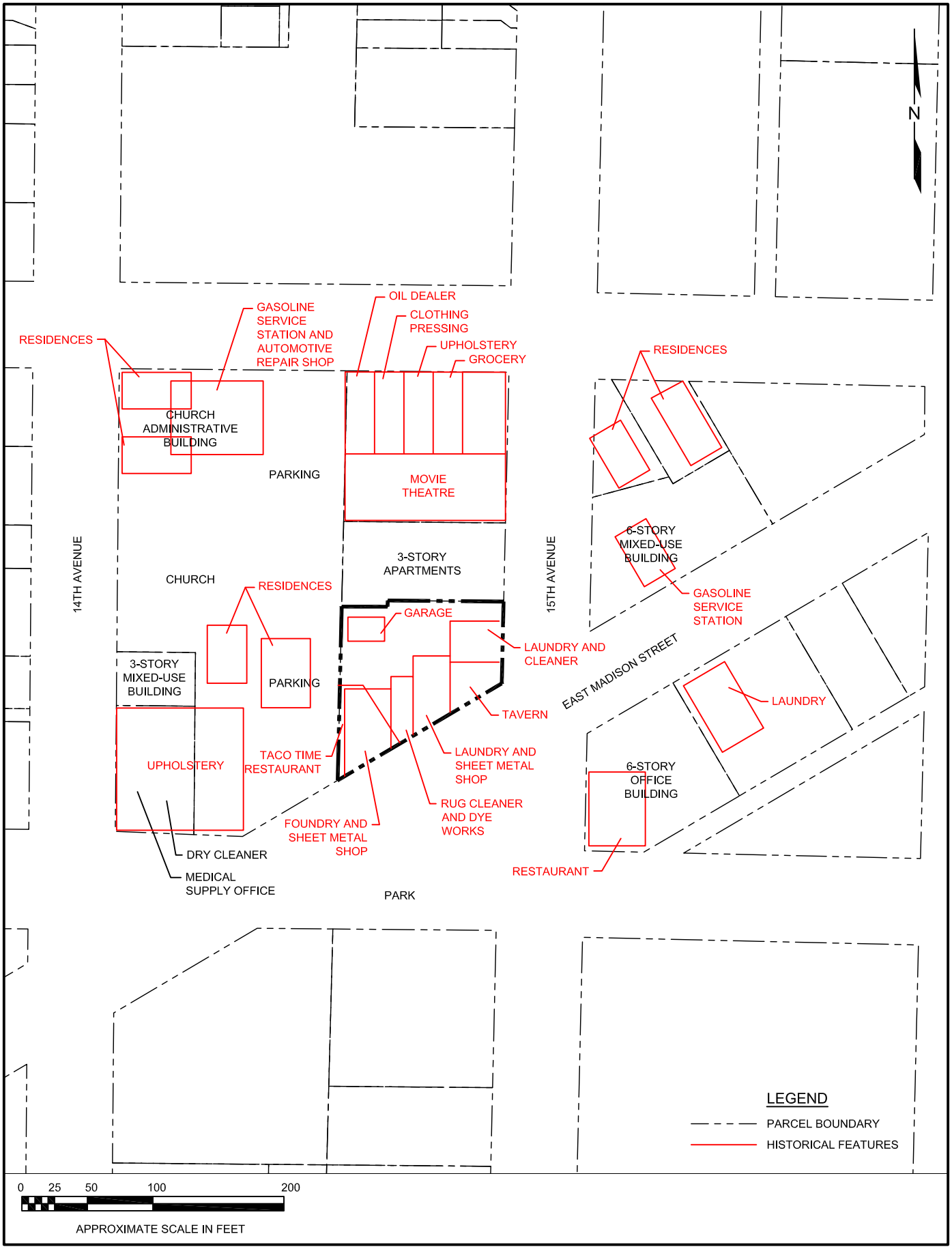
WWW.SOUNDEARTHINC.COM



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DATE: 06/11/14
DRAWN BY: BLR/JQC
CHECKED BY: APH
CAD FILE: 1002-003_2014CAP_HF

PROJECT NAME: MADISON TACO TIME PROPERTY
PROJECT NUMBER: 1002-003
STREET ADDRESS: 1420 EAST MADISON STREET
CITY, STATE: SEATTLE, WASHINGTON

FIGURE 3
CURRENT AND HISTORICAL PROPERTY USE

7/1/2014
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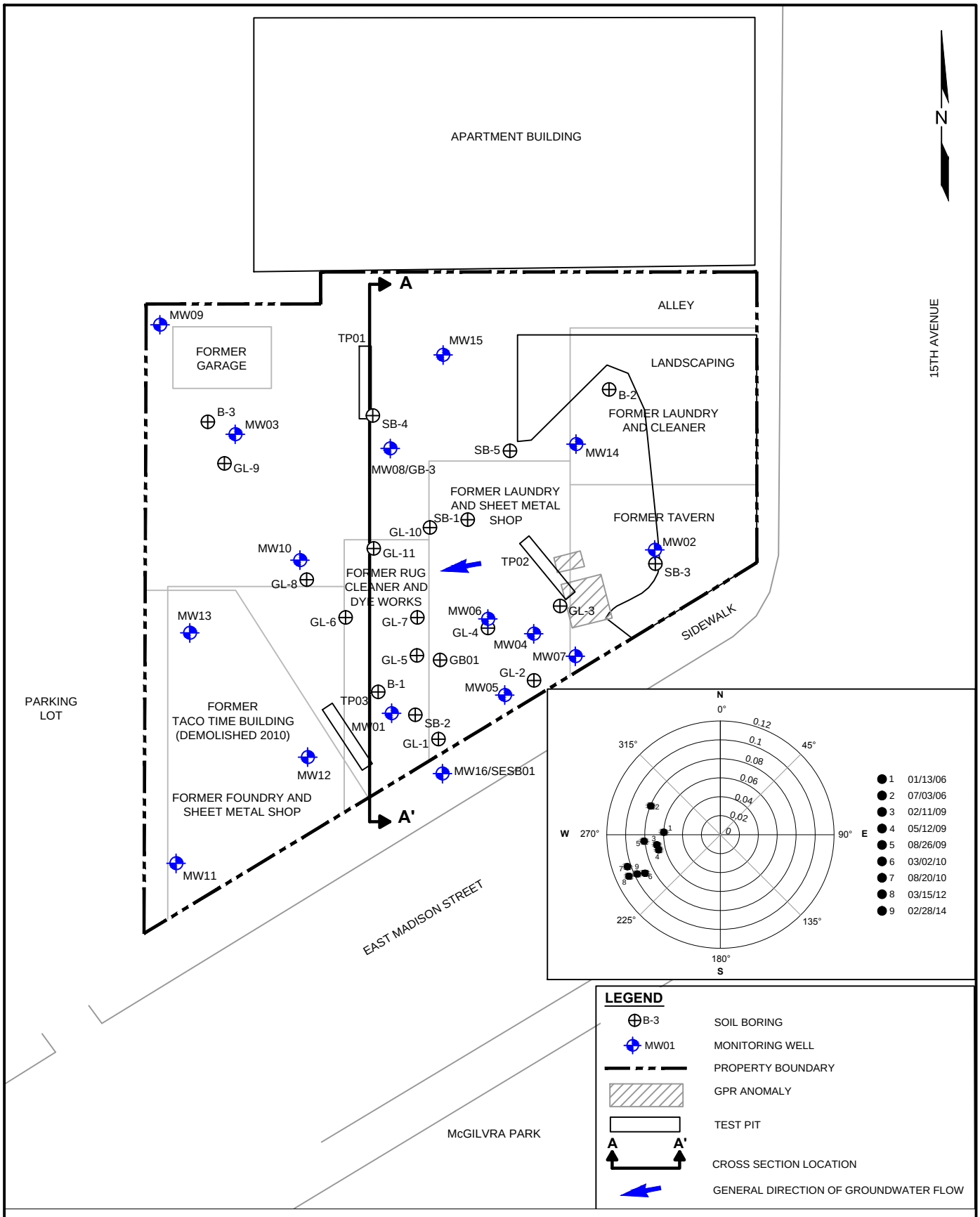
WWW.SOUNDEARTHINC.COM



SoundEarth Strategies
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DATE: 06/27/14
DRAWN BY: JQC
CHECKED BY: APH
CAD FILE: 1002-003_2014CAP_ROSE

PROJECT NAME: MADISON TACO TIME PROPERTY
PROJECT NUMBER: 1002-003
STREET ADDRESS: 1420 EAST MADISON STREET
CITY, STATE: SEATTLE, WASHINGTON

FIGURE 4
ROSE DIAGRAM

7/1/2014
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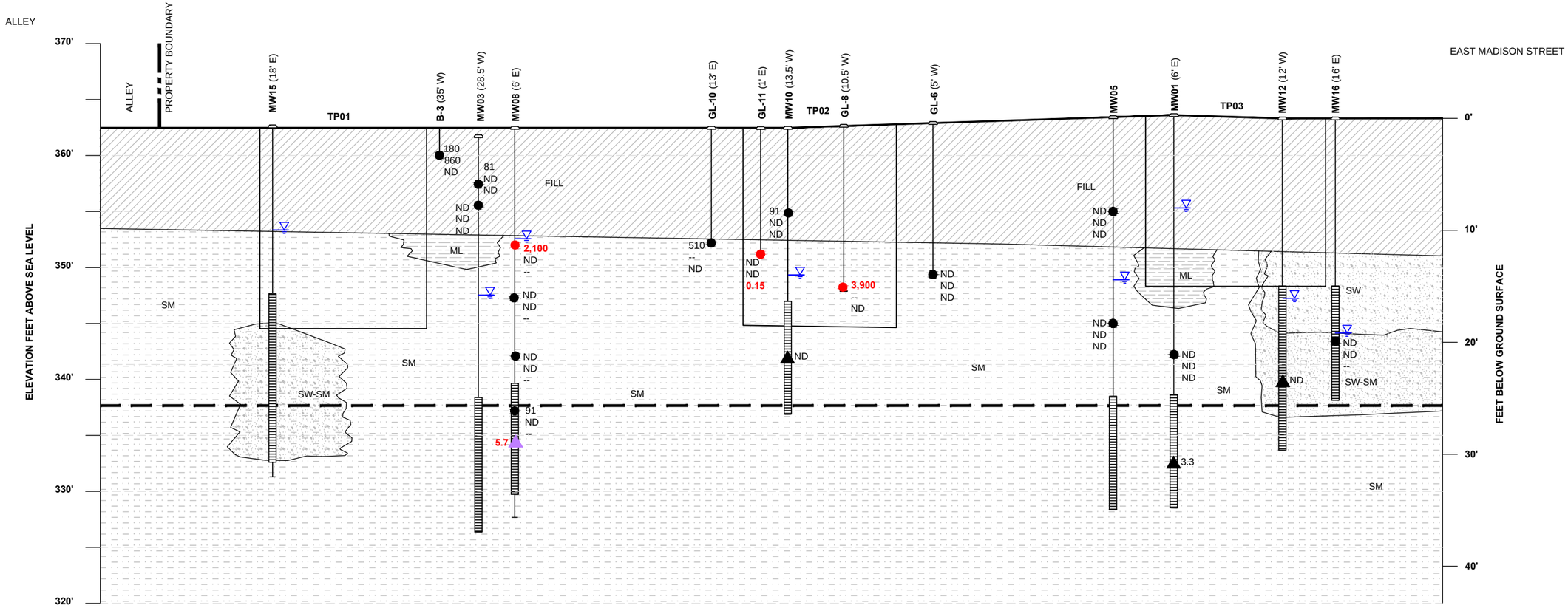
WWW.SOUNDEARTHINC.COM

A NORTH — A' SOUTH



LEGEND

ML
INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS

FILL
SILTY SANDS WITH GRAVEL

SM
SILTY SANDS, SAND - CLAY MIXTURES

SW
WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES

MW15 (18' E) OFFSET 18 FEET EAST

- BLANK CASING
- GROUNDWATER ELEVATION IN 2014
- WELL SCREEN INTERVAL
- WELL TERMINATION

PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (IN MILLIGRAMS PER KILOGRAM)

- 180 — DIESEL-RANGE PETROLEUM HYDROCARBONS
- 860 — OIL-RANGE PETROLEUM HYDROCARBONS
- 0.15 — BENZENE

▲ 3.3 — 1,2-DICHLOROETHANE CONCENTRATIONS IN GROUNDWATER SAMPLED IN 2014 (IN MICROGRAMS PER LITER)

PRELIMINARY CONSTRUCTION EXCAVATION DEPTH

- ▲ ● — CONCENTRATION(S) BELOW MTCA METHOD A CLEANUP LEVEL AND/OR LABORATORY REPORTING LIMIT
- ▲ ● — CONCENTRATION(S) EXCEED MTCA METHOD A CLEANUP LEVEL
- -- — NOT SAMPLED
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT
- ND — NOT DETECTED ABOVE LABORATORY REPORTING LIMIT

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 06/23/14
DRAWN BY: JQC/BLR
CHECKED BY: APH
CAD FILE: 1002-003_2014CAP_XAA

PROJECT NAME: MADISON TACO TIME PROPERTY
PROJECT NUMBER: 1002-003
STREET ADDRESS: 1420 EAST MADISON STREET
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 5 10 20
APPROXIMATE SCALE IN FEET

FIGURE 5
GEOLOGIC CROSS SECTION A-A'

P:\1002 METROPOLITAN COMPANIES\1002-003 MADISON TACO TIME\TECHNICAL\CAD\2014\CAP\1002-003_2014CAP_XAA_F.DWG
7/1/2014
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TABLES

Table 1
2014 Subsurface Investigation
Summary of Groundwater Analytical Results
1420 East Madison Property
1420 East Madison Street
Seattle, Washington

Well ID	Sample or Measurement Date	TOC[1] Elevation	Depth to Groundwater[2] (feet)	Groundwater Elevation[3] (feet)	Analytical Results[4] EDC
MW01	02/28/14	363.60	13.04	350.56	3.3
MW02	02/28/14	367.52	14.40	353.12	--
MW03	02/28/14	361.40	14.11	347.29	--
MW04	02/28/14	365.66	12.75	352.91	--
MW05	02/28/14	365.89	14.32	351.57	**11**
MW06	02/28/14	364.91	12.11	352.80	<1
MW07	02/28/14	367.16	14.17	352.99	--
MW08	02/28/14	362.25	9.76	352.49	**5.7**
MW09	03/13/14[5]	356.51	8.49	348.02	<1
MW10	02/28/14	362.40	13.19	349.21	<1
MW11	02/28/14	363.20	22.09	341.11	<1
MW12	02/28/14	363.33	16.76	346.57	<1
MW13	02/28/14	363.32	16.84	346.48	--
MW14	02/28/14	365.50	12.36	353.14	<1
MW15	02/28/14	362.05	9.15	352.90	--
MW16	03/13/14	--	21.72	--	<1
MTCA Method A Cleanup Level for Groundwater[6]					**5**

NOTES:

Red denotes concentration in excess of MTCA Method A Cleanup Level for Groundwater.

Samples analyzed by Friedman & Bruya, Inc. of Seattle, Washington.

Results presented in micrograms per liter.

[1]TOCs were surveyed relative to the rim of the catch basin located approximately 38 feet east of western property line and 17 feet south of northern property line, with benchmark of 359.40 feet, as reported in Well Installation and Groundwater Sampling letter report, prepared by G-Logics, dated September 22, 2010.

[2]As measured in feet below a fixed spot on the well casing rim.

[3]Calculated by subtracting the depth to groundwater from the TOC.

[4]Analyzed by U.S. Environmental Protection Agency Method 8260C.

[5]Depth to water measured on February 28, 2014.

[6]MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Adiminstrative Code, revised November 2007.

-- = not measured or not analyzed

< = not detected above the applicable laboratory reporting limit

EDC = 1,2-dichloroethane (ethylene dichloride)

MTCA = Washington State Model Toxics Control Act

TOC = top of casing elevation

Table 2
2014 Subsurface Investigation
Summary of Soil Analytical Results
1420 East Madison Property
1420 East Madison Street
Seattle, Washington

Well/Boring ID	Sample ID	Sample Date	Sample Depth (feet bgs)	Analytical Results[1]	
				DRPH	ORPH
MW16/SESB01	SESB01-20	03/12/14	20	<50	<250
MTCA Method A Cleanup Level for Soil[2]				**2,000**	**2,000**

NOTES:

Samples analyzed by Friedman & Bruya, Inc. of Seattle, Washington.

Results presented in micrograms per liter.

[1]Analyzed by Northwest Total Petroleum Hydrocarbon Method NWTPH-Dx.

[2]MTCA Cleanup Regulation, Method A Cleanup Levels, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Adiminstrative Code, revised November 2007.

< = not detected above the applicable laboratory reporting limit

bgs = below ground surface

MTCA = Washington State Model Toxics Control Act

ATTACHMENT A
GEOTECHNICAL REPORT

associated
earth sciences
incorporated

May 15, 2014
Project No. KE140057A

The Metropolitan Companies, Inc.
1510 14th Avenue, Suite B
Seattle, Washington 98122

Attention: Mr. Trent Mummery

Subject: Subsurface Exploration Review, Geologic Hazard, and Preliminary Geotechnical Engineering Report
Madison Mixed-Use Building
1420 East Madison Street
Seattle, Washington

Dear Mr. Mummery:

We are pleased to present the enclosed copies of the above-referenced final report. This report summarizes the results of our subsurface exploration review, geologic hazard, and preliminary geotechnical engineering study and offers geotechnical recommendations for the design and development of the proposed project.

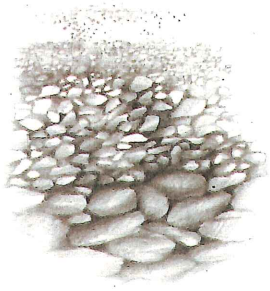
We have enjoyed working with you on this study and are confident that the recommendations presented in this report will aid in the successful completion of your project. If you should have any questions, or if we can be of additional help to you, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

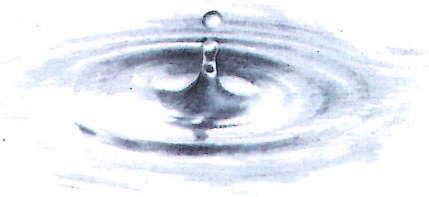
DRAFT

Kurt D. Merriman, P.E.
Senior Principal Engineer

KDM/pc
KE140057A3
Projects\20140057\KE\WP



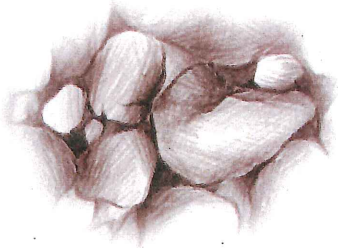
Geotechnical Engineering



Water Resources

Environmental Assessments and Remediation

Sustainable Development Services



Geologic Assessments

Associated Earth Sciences, Inc.

Serving the Pacific Northwest Since 1981

Subsurface Exploration Review, Geologic Hazard, and Preliminary Geotechnical Engineering Report

Madison Mixed-Use Building
1420 East Madison Street

Seattle, Washington

Prepared for

The Metropolitan Companies, Inc.

Project No. KE140057A
May 15, 2014

SUBSURFACE EXPLORATION REVIEW, GEOLOGIC HAZARD, AND PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

Madison Mixed-Use Building
1420 East Madison Street

Seattle, Washington

Prepared for:
The Metropolitan Companies, Inc.
1510 14th Avenue, Suite B
Seattle, Washington 98122

Prepared by:
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911 5th Avenue
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425-827-7701
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May 15, 2014
Project No. KE140057A

I. PROJECT AND SITE CONDITIONS

1.0 INTRODUCTION

This report presents the results of our subsurface exploration, geologic hazard, and preliminary geotechnical engineering study for the proposed Madison Mixed-Use Building located at 1420 East Madison Street in Seattle, Washington. The location of the subject site is shown on the "Vicinity Map," Figure 1. The existing site features and the approximate locations of the explorations evaluated for this study are presented on the "Site and Exploration Plan," Figure 2. The conclusions and recommendations contained in this report were prepared based on our current understanding of the project and are considered preliminary because design of the structure is not yet complete. Associated Earth Sciences, Inc. (AESI) should have the opportunity to review and modify our recommendations, as necessary, as the project plans are developed.

1.1 Purpose and Scope

The purpose of this study was to provide geotechnical design recommendations to be used in the design of the above-mentioned project. Our study included a review of available geologic literature, reviewing previous exploration boring logs prepared by others, observing a single new soil boring, and performing geologic studies to assess the type, thickness, distribution, and physical properties of the subsurface sediments and shallow ground water conditions. Geotechnical engineering studies were also conducted to provide foundation design recommendations including allowable foundation soil bearing pressures, anticipated settlements, excavation shoring recommendations, permanent basement/retaining wall lateral earth pressures, floor support recommendations, and drainage considerations. This report summarizes our current fieldwork and offers development recommendations based on our present understanding of the project.

1.2 Authorization

Authorization to proceed with this study was provided by Mr. Trent Mummery of the Metropolitan Companies, Inc. This report has been prepared for the exclusive use of the Metropolitan Companies, Inc. and their agents for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering and engineering geology practices in effect in this area at the time our report was prepared. No other warranty, expressed or implied, is made.

2.0 PROJECT AND SITE DESCRIPTION

This report was completed with our current understanding of the project based on discussions with Mr. Trent Mummery of the Metropolitan Companies, Inc. and review of preliminary project plans prepared by Roger Newell Architects. The plans are considered in progress, and reflect a mixed-use building with two or three floors of underground parking, at grade retail space, and up to five floors of conventional timber framing above. Zero lot line setbacks are anticipated for the project. The estimated maximum excavation depth for construction of the building foundation and basement levels is 20 to 30 feet below existing grade. Temporary excavation shoring will be required on all sides of the excavation to facilitate construction of the permanent basement walls.

The property is located at 1420 East Madison Street, Seattle, Washington (Figure 1). As depicted on the "Site and Exploration Plan," Figure 2, the site is trapezoidal in shape with approximately 150 feet of frontage on East Madison Street, which borders the site to the south, and 50 feet of frontage on 15th Avenue East, which borders the site to the east. The property is bounded to the north by an alley and to the west by a parking lot. According to King County tax assessor records, the site consists of two parcels with a combined area of 12,266 square feet. Topographic survey of the property indicated total relief of approximately 13 feet across the site, sloping downhill from northeast to southwest.

From 1965 through 2010, the site was a Taco Time restaurant. Prior to construction of the restaurant, the site's occupancy varied with several commercial business operations including cleaners, restaurants, dye works, sheet metal shops, service/repair businesses, and as well as a tavern and creamery. Presently, the two parcels that comprise the property are occupied by a parking lot (Geosyntec, 2013).

3.0 SUBSURFACE EXPLORATION

Our field study completed for this report included observing a single exploration boring at the site and reviewing several previous explorations completed during environmental evaluation by others. The location of this exploration, is identified as exploration boring EB-01 (SoundEarth Strategies [Sound Earth], MW-16), and depicted on Figure 2. The boring was drilled on March 12, 2014 and was advanced to a depth of 26.5 feet below ground surface.

The various types of sediments, as well as the depths where the characteristics of the sediments changed, are indicated on the exploration log presented in Appendix A. The depths indicated on the log where conditions changed may represent gradational variations between sediment types. If changes occurred between sample intervals in the exploration boring, they were interpreted. The observed exploration was approximately located in the field by measuring from existing features shown on Figure 2. We have also included the logs of several borings completed for previous environmental work on the site by others. These logs were used to

help characterize the site soil and ground water conditions. The subsurface conditions depicted on the previous boring logs were confirmed by observations during drilling and in situ testing completed during the drilling of EB-01.

The conclusions and recommendations presented in this report are based, in part, on the exploration boring completed for this study and review of existing exploration logs provided in Geosyntec Consultants' (Geosyntec) "Draft Phase 1 – Environmental Site Assessment". Because of the nature of exploratory work below ground, extrapolation of subsurface conditions between field explorations is necessary. It should be noted that subsurface conditions differing from those indicated on the exploration logs may be present due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of any variations between the field explorations may not become fully evident until construction. If variations are observed at that time, it may be necessary to re-evaluate specific recommendations in this report and make appropriate changes.

3.1 Exploration Boring

Exploration boring EB-01, located in the sidewalk along the south side of the site, was completed using 4¼-inch inside-diameter, hollow-stem auger with a truck-mounted drill rig. During the drilling process, samples were generally obtained at 5-foot-depth intervals. The environmental screening/sampling was conducted by SoundEarth, whose representatives were also on-site during the exploration.

Disturbed but representative samples were obtained (by SoundEarth) from the boring using the Standard Penetration Test (SPT) procedure in accordance with *American Society for Testing and Materials* (ASTM):D 1586. This test and sampling method consists of driving a standard, 2-inch outside-diameter, split-barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N") or blow count. If a total of 50 is recorded within one 6-inch interval, the blow count is recorded as the number of blows for the corresponding number of inches of penetration. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils; these values are plotted on the attached exploration boring log.

4.0 SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field exploration accomplished for this study, visual reconnaissance of the site, review of applicable geologic literature and existing reports. The subsurface data obtained from the boring drilled for this study was also supplemented by other borings presented in "Draft Phase 1 – Environmental Site Assessment" from Geosyntec. The location of boring EB-01, as well as the locations of previous borings

and monitoring wells, are shown on Figure 2. A copy of the EB-01 boring log is included in Appendix A. As shown on the boring logs, the exploration borings generally encountered fill soils overlying natural sediments of variable textural composition. The following section presents more detailed subsurface information organized from the shallowest (youngest) to the deepest (oldest) sediment types.

4.1 Stratigraphy

Fill

Fill soils (those not naturally placed), were encountered at the boring location directly beneath the surface pavement. The fill generally consisted of loose, gray to reddish brown sand with variable silt and gravel content. At the location of this boring drilled for this study, the fill ranged in thickness from approximately 0 to 5 feet. Greater fill thicknesses of 8 to 11 feet were present during previous observations of exploration pits, near the west perimeter of the site adjacent to the existing retaining wall structure. Fill thickness, composition, and density can vary randomly, particularly on a site that has been developed for numerous previous uses.

Recessional Outwash

At the location of boring EB-01, the recessional outwash sediments extended to a depth of approximately 5 to 10 feet. Recessional outwash was deposited by meltwater streams emanating from retreating glaciers during the last episode of glaciation. This unit is typically found directly overlying glacial till. It has not been overridden by glacial ice and is usually medium dense. In composition, it ranges from silty fine sand to clean coarse gravel with occasional cobbles and boulders. Due to the fluvial nature of deposition of recessional outwash, these materials are generally stratified. Recessional outwash is generally suitable for support of light to moderate foundation loads.

Vashon Lodgement Till/Subglacial Meltout Till

Lodgement till was deposited at the base of an active continental glacier and was compacted by the weight of the overlying glacial ice. Lodgement till is generally suitable for support of light to heavy foundation loads with proper preparation. Excavated lodgement till material is suitable for use in structural fill applications if suitable moisture conditions are achieved and if specifically allowed by project plans and specifications, which will require drying during favorable dry weather. At the time of exploration, we estimate that most of the lodgement till soils that we observed were at or above optimum moisture content for compaction purposes, and therefore, will require drying during favorable weather prior to compaction in structural fill applications.

Advance Outwash

The exploration boring, EB-01, encountered dense to very dense granular sediments, below the lodgement till cap, that were interpreted to represent advance outwash sediments. Advance outwash was deposited at the base of an advancing glacier, and was subsequently compacted by the weight of the overlying glacial ice. Advance outwash is suitable for support of light to heavy loaded foundations with proper preparation. Excavated advance outwash sediments are expected to be suitable for reuse in structural fill applications if specifically allowed by project plans and specifications, and are expected to be moisture-sensitive, though somewhat less moisture-sensitive than lodgement till sediments.

Detailed descriptions of the sediments encountered in our exploration is provided on the exploration log included in Appendix A.

4.2 Geologic Map Review

Review of the *Geologic Map of Seattle - A Progress Report* by Troost, Booth, Wisher, and Shimel (Open File Report 2005-1252) indicates that the area of the subject site is underlain by "deposits of pre-Fraser glaciation age." Our interpretation of the sediments encountered in our explorations is in general agreement with the regional geologic map.

4.3 Hydrology

It is currently anticipated that the maximum excavation depth for the proposed building will be 20 to 30 feet. Ground water was encountered during the drilling of EB-01 and was noted at a depth of approximately 22 feet, the following day. Based on the ground water elevations recorded in the existing monitoring wells, the water levels decline trending from the east to the southwest corner of the site. All previous deep explorations at the site reported the presence of ground water with depths ranging from approximately 14 feet to 31 feet below ground surface. Because the depth of the seepage will likely be above the base of the proposed building excavation, temporary dewatering during construction may be necessary and permanent exterior drainage for the basement building levels be required. From preliminary calculations and analysis, "slug-tests" and ground water modeling (MODFLOW) previously performed by Environmental Associates, Inc., a hydraulic conductivity 0.43 feet/day (ft/day) and predicted ground water pumping rates of 2 gallons per minute (gal/min) or less. During the drilling of EB-01, a relatively clean sand lense (approximately 4 inches thick) was noted and will have a higher hydraulic conductivity. Boring logs GB-01 through GB-05 also indicated heaving sand conditions throughout the saturated interval suggesting a significant flow capacity. AESI recommends that a site dewatering plan be developed prior to construction. The plan may include drilled wells, depending on the planned excavation depth. Well installation can be from the surface or the base of the excavation, depending on the excavation depth and inflow rates and volumes. Dewatering should lower and maintain a water level at least 2 feet below the planned excavation level.

II. SEISMIC HAZARDS AND MITIGATIONS

The following discussion of potential seismic hazards is based on the geologic and ground water conditions, as observed and discussed herein.

5.0 SEISMIC HAZARDS AND RECOMMENDED MITIGATION

Earthquakes occur in the Puget Lowland with great regularity. Fortunately, the vast majority of these events are small and are usually not felt by people. However, large earthquakes do occur as evidenced by the February 28, 2001, 6.8-magnitude event; the 1965, 6.5-magnitude event; and the 1949, 7.2-magnitude event. The 1949 earthquake appears to have been the largest in this area during recorded history and was centered in the Olympia area.

Generally, there are three types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture; 2) liquefaction; and 3) ground motion. The potential for each of these hazards to adversely impact the proposed project is discussed below.

5.1 Surficial Ground Rupture

The nearest known fault trace to the project is the Seattle Fault located approximately 1 to 2 miles to the south. Studies by the U.S. Geological Survey (USGS) (Johnson, et al., 1994 and Johnson, et al., 1999) have provided evidence of surficial ground rupture along a northern splay of the Seattle Fault. The recognition of this fault is relatively new and data pertaining to it are limited, with the studies still ongoing. According to the USGS studies, the latest movement of this fault was about 1,100 years ago when about 20 feet of surficial displacement took place. This displacement can presently be seen in the form of raised, wave-cut beach terraces along Alki Point in West Seattle and Restoration Point at the south end of Bainbridge Island. The recurrence interval of movement along these fault systems is still unknown, although it is hypothesized to be in excess of several thousand years. Due to the suspected long recurrence interval, the potential for surficial ground rupture is considered to be low during the expected life of the structure.

5.2 Liquefaction

Liquefaction is a process through which unconsolidated, saturated, granular soil loses strength as a result of vibrations such as those which occur during a seismic event. During normal conditions, the weight of the soil is supported by both grain-to-grain contacts and by the fluid pressure within the pore spaces of the soil below the water table. Extreme vibratory shaking can disrupt the grain-to-grain contact, increase the pore pressure, and result in a temporary decrease in soil shear strength. The soil is said to be liquefied when nearly all of the weight of the soil is supported by pore pressure alone. Liquefaction can result in deformation of the

sediment and settlement of overlying structures. Areas most susceptible to liquefaction include those areas underlain by non-cohesive silt and sand with low relative densities, accompanied by a shallow water table.

The subsurface conditions encountered at the site pose a small risk of liquefaction due to relatively high density and lack of substantial ground water. No detailed liquefaction analysis was completed as part of this study, and none is warranted, in our opinion.

5.3 Ground Motion

Based on the site stratigraphy and our visual reconnaissance of the site, it is our opinion that any earthquake damage to the proposed structure, when founded on a suitable bearing stratum, would be caused by the intensity and acceleration associated with the event and not any of the above-discussed impacts. Structural design of the building should follow 2012 *International Building Code* (IBC) standards using Site Class "C", as defined in Table 1613.5.2.

III. PRELMINARY DESIGN RECOMMENDATIONS

6.0 INTRODUCTION

Our exploration indicates that, from a geotechnical standpoint, the subject site is suitable for the proposed development provided the recommendations contained herein are properly followed. Sediments encountered in the vicinity of the anticipated foundation depth (20 to 30 feet) generally consist of dense to very dense lodgement till and advance outwash. These sediments are capable of providing suitable building support. Given the depth of the planned building excavation and its proximity to the site boundaries and adjacent structures, excavation for the lower building levels will require temporary shoring. Temporary shoring may be provided by either a soil nail shoring system, or using conventional tied-back, soldier pile shoring walls. Ground water was encountered within the planned excavation depth indicating the need for a dewatering plan prior to excavation and permanent foundation drainage for the basement levels of the building. Consequently, seepage and sloughing conditions should be anticipated if drilled shafts for temporary shoring are advanced below about 15 feet. Long-term conventional passive drainage installation should be designed to handle the anticipated seepage volumes. Collected seepage can be routed via gravity to the storm water system or collected in a pumped storage vessel if gravity discharge is impractical.

7.0 SITE PREPARATION

Following demolition of the existing structures, all remaining foundation elements should be removed. Following demolition, all existing pavement, fill, buried utilities, and any other deleterious materials should be removed or relocated if they are located below the planned building area. Erosion and surface water control should be established around the perimeter of the excavation to satisfy City of Seattle requirements.

8.0 TEMPORARY CUT SLOPES

In our opinion, stable construction slopes should be the responsibility of the contractor and should be determined during construction. It is not likely that temporary, unsupported cut slopes will be utilized on this project. Limited slopes from the top of the excavation shoring to the adjacent streets or alley may be required in places. For estimating purposes, we anticipate that temporary, unsupported cut slopes, completed in the unsaturated, loose to dense existing fill sediments or stiff, pre-Fraser non-glacial sediments can be planned at a maximum slope of 1.5H:1V (Horizontal:Vertical) up to a maximum height of 10 feet. Temporary cuts of similar height in the very stiff to dense, glacially consolidated sediments can be planned at a maximum slope of 1H:1V. Flatter temporary cut slopes should be planned in areas of ground water seepage. During excavation shoring construction, temporary vertical cuts up to 4 to 6 feet are

expected for placement of lagging or prior to placing a shotcrete soil nail facing. As is typical with earthwork operations, some sloughing and raveling may occur and cut slopes may have to be adjusted in the field. In addition, WISHA/OSHA regulations should be followed at all times.

9.0 STRUCTURAL FILL

Should structural fill be necessary to establish desired grades beneath lightly loaded portions of the project (floors, etc.), it should be placed and compacted according to the recommendations presented in this section. Due to the expected high foundation bearing loads, structural fill necessary to establish the subgrade elevation for footings shall consist of crushed rock heavily compacted in thin lifts. Structural fill may also be required for sidewalk and ramp subgrades and for backfill around foundation elements. All references to structural fill in this report refer to subgrade preparation, fill type, placement, and compaction of materials, as discussed in this section. If a percentage of compaction is specified under another section of this report, the value given in that section should be used.

Structural fill is defined as non-organic soil, acceptable to the geotechnical engineer, placed in maximum 8-inch loose lifts with each lift being compacted to at least 95 percent of the modified Proctor maximum dry density using ASTM: D 1557 as the standard. In the case of roadway and utility trench filling, the backfill should be placed and compacted in accordance with City of Seattle standards. For planning purposes, we recommend the use of Type 17 sand for road and utility trench backfill. The use of controlled density fill (CDF), approved by the City, can also be used for backfill.

The contractor should note that AESI should evaluate any proposed fill soils prior to their use in fills. This would require that we have a sample of the material at least 3 business days in advance of filling activities to perform a Proctor test and determine its field compaction standard. Soils in which the amount of fine-grained material (smaller than the No. 200 sieve) is greater than approximately 5 percent (measured on the minus No. 4 sieve size) should be considered moisture-sensitive. Use of moisture-sensitive soil in structural fills is not recommended. The on-site soils are not considered suitable for use as structural fill. In addition, construction equipment traversing the site when the soils are wet can cause considerable disturbance. For all fills, a select import material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction and at least 30 percent retained on the No. 4 sieve. Neither the native sediments nor local imported fill soils should be reactive with normal cements.

As required by the City of Seattle, Department of Planning and Development (DPD), as part of the project special inspection requirements, a representative from our firm should observe the subgrades and be present during placement of structural fill to observe the work and perform a

representative number of in-place density tests. In this way, the adequacy of the earthwork may be evaluated as filling progresses and any problem areas may be corrected at that time. It is important to understand that taking random compaction tests on a part-time basis will not assure uniformity or acceptable performance of a fill. As such, we are available to aid the owner in developing a suitable monitoring and testing frequency.

10.0 FOUNDATIONS

Conventional continuous footings and column pads, or a mat foundation may be used for building support when founded either directly on the undisturbed, dense to very dense natural sediments, or on a thin crushed rock mat placed over these materials as discussed subsequently in this section. We recommend that an allowable foundation soil bearing pressure of 8,000 pounds per square foot (psf) be utilized for design purposes, including both dead and live loads. Foundation areas should be deepened, if necessary, to expose sediments suitable for the support of the recommended bearing pressures. An increase of one-third may be used for short-term wind or seismic loading. All footings must penetrate to the prescribed bearing stratum and no footing should be founded in or above loose, organic, or fill soils. Given the high bearing pressures, footings should not be constructed on fill materials other than the thin rock working mat, as discussed subsequently.

It should be noted that the area bounded by lines extending downward at 1H:1V from any footing must not intersect another footing or filled area. In addition, a 1.5H:1V line extending down from any footing must not daylight because sloughing or raveling may eventually undermine the footing. Thus, footings should not be placed near the edge of steps or cuts in the bearing soils.

Anticipated settlement of footings founded on the dense to very dense natural sediments should be less than 1 inch with differential settlements one-half of the anticipated total settlement. Most of this movement should occur during initial dead load applications. However, disturbed soil not removed from footing or mat excavations prior to concrete placement could result in increased settlements. All footing areas should be observed by AESI prior to placing concrete to verify that the design bearing capacity of the soils has been attained and that construction conforms to the recommendations contained in this report. Such observation will be required by DPD as part of special inspection requirements. A perimeter foundation drain system should be provided as discussed under the "Drainage Considerations" section of this report.

The contractor must use care during site preparation and excavation operations so that the underlying soils are not softened. If disturbance occurs, the softened soils should be removed and foundations extended down to competent natural soil. Once the base of the excavation is reached, consideration should be given to "armoring" the exposed subgrade with a thin layer of rock to provide a working surface during foundation construction. We recommend a 6-inch layer of crushed rock for this purpose.

10.1 Lateral Resistance

Lateral loads on the foundation caused by seismic or transient loading conditions may be resisted by a combination of passive soil pressure against the side of the foundation and shear friction resistance along the base. An allowable base friction value of 0.40 and an allowable passive earth pressure of 350 pounds per cubic foot (pcf), expressed as an equivalent fluid unit weight, may be used for that portion of the foundation embedded below 2 feet. The above values only apply to a vertical foundation element cast "neat" against the undisturbed, very dense natural sediments. For fill placed around a mat or other foundation elements, a passive earth pressure value of 250 pcf is recommended. For this value to apply, the fill must be placed as structural fill and compacted to at least 95 percent of ASTM:D 1557. Passive resistance within 2 feet of the ground surface should be ignored. The passive values presented are used assuming an equivalent triangular fluid pressure distribution beginning at the surface. The triangular pressure distribution is truncated above 2 feet.

11.0 FLOOR SUPPORT

A slab-on-grade floor may be used directly over the dense to very dense natural sediments or over structural fill placed over the natural sediments. We anticipate that the lowest level of the building will support car traffic. Slab design can assume a soil subgrade modulus of 250 pounds per cubic inch (pci) for slabs cast over the dense to very dense natural sediments or a limited thickness of properly compacted structural fill placed over these materials.

If the elevation of the lowest floor slab is anticipated to be below the water table, a subslab drainage system might be considered and is described in Section 12.0. To protect against moisture migration through the slab, the floor should be cast atop a minimum of 6 inches of washed pea gravel or clean, uniform size, washed crushed rock to act as a capillary break. It should also be protected from dampness by an impervious, 15-mil (minimum thickness) plastic sheeting specifically designed for use as a moisture barrier. The capillary break and moisture barrier are considered damp proofing. If a more robust slab moisture protection system is desired, we recommend a waterproofing expert be consulted for design parameters that best fit the project.

12.0 DRAINAGE CONSIDERATIONS

The natural sediments underlying the site contain varying quantities of silt, and construction traffic across these materials when they are wet or damp will result in disturbance of the otherwise firm stratum. Therefore, prior to site work and construction, the contractor should be prepared to provide drainage and subgrade protection as the excavation progresses. This can be accomplished by the contractor through the use of a temporary drainage system to keep the base of the excavation "dry."

As previously discussed under the "Hydrology" section of this report, ground water seepage was encountered within the glacial sediments below the site. The depth of the seepage is likely above the base of the building excavation. Temporary dewatering during construction may be required depending on the planned depth of excavation and the rate and quantity of inflow. Dewatering wells, if required, can be drilled from the surface or the base of excavation. Permanent exterior drainage for the basement walls and foundations will be required. As discussed previously, due to the dense, fine-grained nature of the site soils, seepage rates should be slow and seepage volumes minimal. Initial dewatering of perched seepage zones may result in ground water accumulation that requires pumping. Conventional pumped sumps and long-term conventional passive drainage installation should handle the anticipated seepage volumes.

Depending on the depth of excavation and seepage volumes encountered, a subslab drainage system may be required. If required the system should consist of at least two rigid, perforated, 6-inch-diameter, polyvinyl chloride (PVC) pipes surrounded by washed pea gravel that span the full length of the underslab area, oriented parallel to the long axis of the building. The pipes should be located approximately midway between the central axis and the building perimeter. The pipes should be embedded at least below the slab base in trenches that are backfilled with washed gravel that is in communication with the capillary break. The subgrade below the slab should be graded at a minimum 1 percent slope toward the drainpipes. The collected flow should then drain to one or more sump tanks from where it can be pumped to a suitable point of discharge. We recommend that the system include an auxiliary pump and backup power supply if gravity drainage is not feasible.

When permanent exterior walls are constructed, a drainage system should be incorporated to collect water seeping through or behind the temporary shoring wall. Prior to constructing the permanent exterior walls, a proprietary drainage mat, such as Mira-Drain, should be placed in 4-foot-wide strips spaced no greater than 8 feet center-to-center from near the top of the shoring wall to its base. The bottom of the drainage mats should communicate with a permanent perimeter foundation drainage system. This system could consist of either an exterior or interior perimeter foundation drain. The perimeter drain can be discharged via gravity to the storm water system or to the subslab drainage system sump, if required.

13.0 TEMPORARY EXCAVATION SHORING SYSTEM

A deep excavation is currently being planned for this project, extending up to about 30 feet below existing site grades. Temporary excavation shoring will be required to support all four sides of the excavation and surrounding streets and utilities. Surcharge loading associated with the adjacent building to the southwest (across the alley) should also be included in the design. This section of the report presents design considerations and criteria for use in the design of the excavation shoring. *With this information and other pertinent data, it should be the*

responsibility of the shoring subcontractor(s) to determine the appropriate design details, construction methods, and procedures for installation of the shoring system.

13.1 Soil Nailing

Considering the generally dense nature of the on-site soils, soil nails may prove more economical and less restrictive than conventional soldier piles and tiebacks. This section of the report presents design considerations and criteria that should be considered in the design of soil nail-supported excavation shoring.

AESI does not provide soil nailing design drawings. We rely on experienced professional designers and contractors to provide the design drawings and details necessary to obtain permits. AESI can, however, provide the required inspection and monitoring of proof-testing to satisfy City of Seattle DPD requirements. The following report sections provide the basic information for the site soils to be used in a soil nail wall design. The final design should satisfy the criteria presented in this report, and installation and performance criteria required by the City of Seattle for temporary soil nail-supported wall construction.

Soil nailing consists of installing a grid pattern of grouted rebar tendons ("nails") into slightly inclined drilled holes spaced on a vertical soil cut face as excavation proceeds. The soil nail tendons are typically shorter in length than conventional tieback anchors. This produces a reinforced zone that is itself stable and supports the unreinforced ground behind it. The nails are passive, in that they are untensioned at the time of installation; over time, they become tensioned as they resist the deformation of the adjacent soil. The nail reinforcement improves stability in two ways. First, soil nails reduce the driving force along potential failure surfaces. Second, in frictional soils, nails increase the normal force and hence the soil shear resistance along potential slip surfaces.

Wire mesh reinforcement and rebar are attached to the nails and the face of the excavation is covered with a suitable thickness of air-placed concrete (shotcrete). The advantages of this technique over shoring that utilizes soldier pile walls is that the shotcrete wall can serve as the wall of the excavation without the need for deep piles and lagging, it can be constructed while above-grade work proceeds, and the wall can consist of either the temporary shoring wall alone or it can be incorporated into the permanent basement wall, providing the potential for cost savings. Soil nail shoring is typically performed as top-down construction, where structural components are installed simultaneously during the excavation.

Soil nailing reinforcement is conducted by excavating vertically from the top down in stages of approximately 4 to 6 feet. After each stage of excavation, the exposed soils along the limits of the excavation are reinforced prior to proceeding with the next stage of excavation. Construction of a soil nail wall typically involves the following major steps:

1. Drill and install perimeter face stabilization elements, if needed;
2. Excavate soil, typically a 6-foot lift, leaving a small berm in place at the excavation toe;
3. Drill for nail holes;
4. Install and grout nails;
5. Excavate out berm to form vertical cut face;
6. Place drainage mat against cut soil face and protect with plastic sheeting;
7. Place waterproofing (if specified);
8. Place reinforcements, bearing plates, and studs;
9. Apply shotcrete wall; and
10. Repeat process down to final excavation grade.

Consequently, this method requires that the soil withstand short-term, temporary vertical cuts of approximately 6 feet without caving. The glacially consolidated sediments that were encountered in our exploration borings are suitable for this type of construction, provided they remain unsaturated. As previously discussed, ground water seepage has been monitored, by others, within the areas identified as Vashon lodgement till and advance outwash at the site. We anticipate that the seepage zones present within the very dense till and outwash will generally remain standing over the required cut height, but some local sloughing or piping should be anticipated. If sloughing or caving ground conditions are persistent, the use of dewatering wells to temporarily lower ground water levels may be required to complete the excavation, shoring, and permanent well installations.

Open cuts should not be allowed to stand unshored for more than 3 days. This time could be less if zones of fractured or slickensided soil or ground water seepage are encountered. Open face cuts should not be left open over weekends or holidays. After applying the first lift of shotcrete, the next lift can be built after 4 days or once the shotcrete has attained 50 percent of its design strength. The project structural engineer should verify this recommended interval between lifts and provide additional or alternative recommendations, if necessary.

A series of load tests must be performed to verify the design and ultimate skin friction or adhesion of the soil nails. Two types of testing should be accomplished for soil nailing. An initial verification test program is performed prior to wall construction to verify that the design adhesion values are correct. Common verification testing programs consist of at least two 200 percent tests of the design or allowable load in the soil for each excavation wall. Verification testing is usually accomplished by loading each nail in 25 percent increments held for 5 minutes up to the final load of 200 percent design load. Creep measurements are recorded during the verification test, where the load is generally held for an hour and any nail movement is measured. The creep measurements are commonly performed at either the 150 percent or the 200 percent point. Verification nails should be constructed exactly as the production nails will be constructed, including the same drilling equipment, driller, inclination, grout, etc. Verification test nails are commonly sacrificial nails that do not become

incorporated in the shoring wall. As construction of the wall proceeds, proof-tests are conducted on approximately one of every 20 nails to verify that the soil conditions and installation methods have not changed. Proof test procedures are similar to the verification procedures except that the final load is less (130 percent) and the creep measurements usually last only 10 minutes. Proof test nails remain in the wall following testing and are an integral part of the shoring. We recommend that AESI monitor installation and testing of both the verification and proof nails.

For design purposes, we recommend the following soil parameters be utilized:

Moist Unit Weight:	130 pcf
Friction Angle:	
Fill / Recessional Outwash	32 degrees
Till / Advance Outwash	38 degrees
Cohesion:	0 psf

For design of soil nail anchors used in the shoring system, the anchor loads are transmitted to the surrounding soil by side friction or adhesion with the soil. For anchors installed with an air-rotary drill or hollow-stem auger in the glacial sediments, an allowable shaft friction of 1,200 psf can be assumed. For 6-inch-diameter pressure-grouted anchors, installed fully within glacially consolidated sediments, a shaft friction of 2,000 psf can be assumed.

Figure 4 of this report presents lateral earth pressure values that can be used for design of the permanent basement wall. It should be noted that in calculating lateral earth pressures the base of the wall should be considered to be at the foundation subgrade elevation. We do not anticipate that significant excavations below foundation subgrade elevation will be planned.

The competence of the glacially overridden soil encountered at the site indicates that it is likely the soil nail anchor holes can generally be drilled and the anchors installed without the use of casing. However, caving should be expected in the upper loose fill, medium dense recessional outwash sediments, and in areas of ground water seepage. The contractor should be prepared to use casing, where necessary, to maintain open borings. The anchor holes should be drilled without the use of drilling fluids or water so that the optimum allowable adhesion between the grouted anchor and the soil can be developed. The holes should be grouted immediately after drilling or redrilled prior to grouting, if left open for a period of more than 2 hours. Anchors should be installed such that they avoid conflict with all underground utilities, and a minimum separation of 10 feet should be maintained between all anchors and any nearby utilities.

Surface water should be controlled by means of curbs, gutters, or swales, so that water does not flow over exposed soil cuts or newly constructed walls. Drainage behind the shotcrete wall should be provided by installing Mira-Drain or equivalent drainage mats per the manufacturer's recommendations. The drainage mats should be installed behind the shotcrete

wall for the full wall height, with the 4-foot-wide fabric strips placed at a spacing of 8-feet on-center for the full length of all walls. The Mira-Drain mats should freely communicate with the perimeter drain system through a series of weep holes or drain sleeves.

Care must be exercised when installing soil nails to avoid existing utilities and foundations. Demonstration of utility and foundation protection will be required to obtain a temporary soil nail easement from the City of Seattle.

Monitoring Program

A program should be established to monitor the horizontal and vertical movement of the excavation sidewalls and the installed shoring wall. This monitoring program will be required by the City of Seattle DPD. The monitoring should be performed by a licensed surveyor with monitoring points established on settlement-sensitive structures (buildings, manholes, poles, etc.) around the excavation and at regular intervals along the shoring wall. Monitoring should be performed at least twice a week, and the specifics of the monitoring program should be provided to AESI for review prior to implementation. We recommend the monitoring program be prepared as part of the final shoring wall design.

13.2 Soldier Pile Wall

For excavations greater than approximately 15 feet in depth, the soldier beams are laterally restrained with drilled tieback anchors. Soldier piles, which are wide flange beams, are placed in predrilled holes that extend beyond the bottom of the excavation. The portion of each soldier pile extending below the bottom of the excavation is grouted in place with sufficient strength concrete to transmit the vertical loads of the soldier beams to the soil below the excavation level. The upper portion of the soldier pile is then backfilled with a relatively weak grout so that it may be removed, as necessary, for placement of lagging. The contractor should be prepared to utilize casing or drilling fluids as necessary to complete soldier pile/tieback installation in the event that the shaft excavation does not remain open.

We recommend that timber lagging be backfilled with a flowable lean mix sand during installation to reduce the potential for movement of the cut soil and provide drainage behind the wall. The lagging should span a maximum of 8 feet. A 60 percent reduction of the lateral pressures presented subsequently can be used for timber lagging design to account for soil arching.

Due to its depth, the proposed excavation will require multiple rows of tieback anchors on all sides. For multiple rows of tiebacks, a design pressure in the form of an "apparent" earth pressure distribution is recommended. We recommend an apparent active earth pressure of 25(H+2) psf presented as a trapezoidal distribution where H is the retained excavation depth. Refer to Figure 3 for additional design details and a graphic representation of the recommended apparent earth pressures. The apparent pressure distribution should be assumed

to act over the tributary area of the piles above the excavation. The recommended earth pressure reflects surcharging from "normal" construction equipment and activities, as well as the variability of the site soils. A traffic surcharge equivalent to 2 feet of soil has been incorporated into the design-apparent earth pressures and is reflected in the H+2 portion of the apparent earth pressure. Any additional surcharge loads must be added and can be calculated using formulas shown on Figure 5. The use of apparent earth pressure for the shoring system assumes some minor deformation of the soil will occur. Typically, deformation on the order of 0.001 to 0.002 times the height of the excavation is possible. This could result in deflections on the order of about 0.3 to 0.6 inches for a 30-foot-tall wall. Theoretically, an equal amount of settlement occurs behind the wall. The settlement is typically greatest immediately adjacent to the wall and decreases with distance away from the wall. The limits of settlement are typically within a distance of one-half to one wall height behind the top of wall. Therefore, a comprehensive survey of the surrounding streets, structures, and other critical reference points should be performed prior to construction activities. These points should then be accurately monitored, as necessary, both horizontally and vertically, until the permanent walls and floors have been completed in the excavation.

The grouted soldier piles must be designed for sufficient vertical capacity, and should include the vertical component of the inclined tieback loads. It should be noted that settlement of the soldier piles under load could also cause a reduction in anchor pre-stress, allowing lateral tilting about the base. For design purposes, the vertical load capacity should be determined based on an allowable adhesion or side friction of 2 kips per square foot (ksf), an allowable end bearing of 15 ksf for the temporary loading condition (lean mix backfill), and 30 ksf for the permanent loading condition (concrete backfill). These allowable end bearing conditions assume a minimum embedment of at least 10 feet below the base of the excavation. For computing bending moments in piles, 80 percent of the above earth pressures should be used.

The soldier piles also need to be located a sufficient depth below the base of the excavation to provide adequate lateral or "kick-out" resistance to horizontal loads below the lowest brace or tieback level. In this regard, the lateral resistance may be computed on the basis of passive pressure in the form of an allowable "passive" earth pressure equivalent to 350(D) psf where D is the depth of embedment below the base of the excavation in feet. The upper 2 feet of passive resistance should be ignored due to ground disturbance. This pressure may be considered to be acting against twice the diameter of the grouted soldier pile section.

13.3 Tieback Anchors

For tiebacks used in the shoring system, the grouted anchors must be located far enough behind the soldier pile wall to develop anchorage within a stable soil mass to prevent system failure or excessive deformation. We recommend that this anchorage be obtained behind an assumed failure plane defined by a horizontal line extending a distance equal to H/4 behind the retained excavation at the base of the excavation, which then rotates 60 degrees from the horizontal and extends upward to the ground surface. The area between this assumed failure

plane and the retained excavation is referred to as the "no load zone." These recommendations are presented on Figure 3.

The anchor loads are transmitted to the surrounding soil by side friction or adhesion with the soil. Temporary tieback anchors completed using hollow-stem auger techniques within the dense natural sediments may be designed for a presumptive allowable shaft friction of 1,200 psf. Alternatively, for 6-inch-diameter, pressure-grouted anchors installed fully within glacially consolidated sediments, a shaft friction of 2,000 psf can be used. Presumptive anchor design loads must be confirmed by proof-testing, as outlined subsequently. All anchors should be a minimum of 10 feet in length past the no load zone. Tieback anchors should be installed at an angle of at least 15 degrees below the horizontal.

Care must be exercised when installing tiebacks to avoid existing utilities and foundations. As previously noted, several of the buildings in the project area contain basement levels. Demonstration of utility and foundation protection will be required to obtain a temporary tieback easement from the City of Seattle. All tiebacks will need to be de-stressed subsequent to wall and floor construction.

We recommend for this site that each anchor be sized for a design or allowable load of not more than 50 percent of the ultimate load available through the anchor (as indicated by 200 percent verification tests). The test anchors should be capable of holding the ultimate load without excessive yield or creep so that a factor of safety of at least 2.0 is available for production anchors should further stressing occur. The rods or cables should transmit the anchor load to the soldier pile in such a manner to avoid eccentric loading.

A series of anchor tests should be performed to verify the design and ultimate skin friction or adhesion of the tieback anchors. Because of the variation in the soil types and their densities, we recommend that AESI monitor the anchor test program. A common anchor testing program would consist of at least two 200-percent verification tests per side of the excavation plus proof-loading every production anchor to 130 percent of the design load. Verification test anchors are usually loaded in 25 percent increments that are held for 5 minutes up to the final load of 200 percent design load. The 200 percent load is commonly held for an hour and creep measured. The other component of the anchor test program for the project would be proof-loading each of the production anchors to 130 percent of the design load. Each anchor should withstand this load for at least 5 minutes. The anchor should then be locked off at the design load.

Subsequent to locking off the tiebacks at the design load, all of the tieback holes should be backfilled to prevent possible collapse of the holes and any related consequences. Typically, sand is used as backfill material; however, most non-cohesive mixtures are suitable (subject to approval by the geotechnical engineer) provided there is no bonding to the tierods.

13.4 Monitoring Program

A program should be established to monitor the horizontal and vertical movement of the excavation sidewalls and the installed shoring wall. This monitoring program will be required by the City of Seattle DPD. The monitoring should be performed by a licensed surveyor with monitoring points established on settlement-sensitive structures (buildings, manholes, poles, etc.) around the excavation and at regular intervals along the shoring wall. Monitoring should be performed at least twice a week and the specifics of the monitoring program should be provided to AESI for review prior to implementation. We recommend the monitoring program be prepared as part of the final shoring wall design.

14.0 BASEMENT WALL DESIGN PARAMETERS

Permanent basement wall design can be performed based on apparent earth pressures presented for the temporary shoring design with the addition of a seismic surcharge loading. Additional lateral loads associated with seismic activity should be incorporated into permanent wall design. We recommend that incremental dynamic lateral loads of 5H and 10H psf be used for wall design for the "active" and "at-rest" loading cases, respectively.

15.0 PROJECT DESIGN AND CONSTRUCTION MONITORING

The conclusions and recommendations contained in this report are considered preliminary and were prepared based on our current understanding of the project. As the project design matures we should have the opportunity to review and modify our recommendations, as necessary.

We are available to provide additional geotechnical consultation as the project design develops and possibly changes from that upon which this report is based. We recommend that AESI perform a geotechnical plan review of all earthwork, foundation, or shoring-related specifications prior to completion of the final design. In this way, our earthwork and foundation recommendations may be properly interpreted and implemented in the design.

We are also available to provide geotechnical engineering and monitoring services during construction. The integrity of the foundation depends on proper site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this current scope of work.

We have enjoyed working with you on this study and are confident that these recommendations will aid in the successful completion of your project. If you should have any questions, or require further assistance, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

DRAFT

Frank Crossley
Senior Staff Engineer

DRAFT

Kurt D. Merriman, P.E.
Senior Principal Engineer

Attachments:

	Figure 1:	Vicinity Map
	Figure 2:	Site and Exploration Plan
	Figure 3:	Soil Nail Wall Design Criteria
	Figure 4:	Soldier Pile Retaining Wall Design Criteria
	Figure 5:	Surcharge Pressures on Adjacent Walls
	Appendix A:	Exploration Logs

REFERENCES

Geosyntec Consultants, Draft phase 1 – environmental site assessment, August 2013.

Johnson, et al., 1994, Origin and evolution of the Seattle Fault and Seattle Basin, Washington, Geology, v. 22, p.71-74.

Johnson, et al., 1999, Active tectonics of the Seattle Fault and Central Puget Sound Washington - implications for earthquake hazards, Geological Society of America Bulletin, July 1999, v. 111, n. 7, p. 1042-1053.

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APPENDIX A

Exploration Logs

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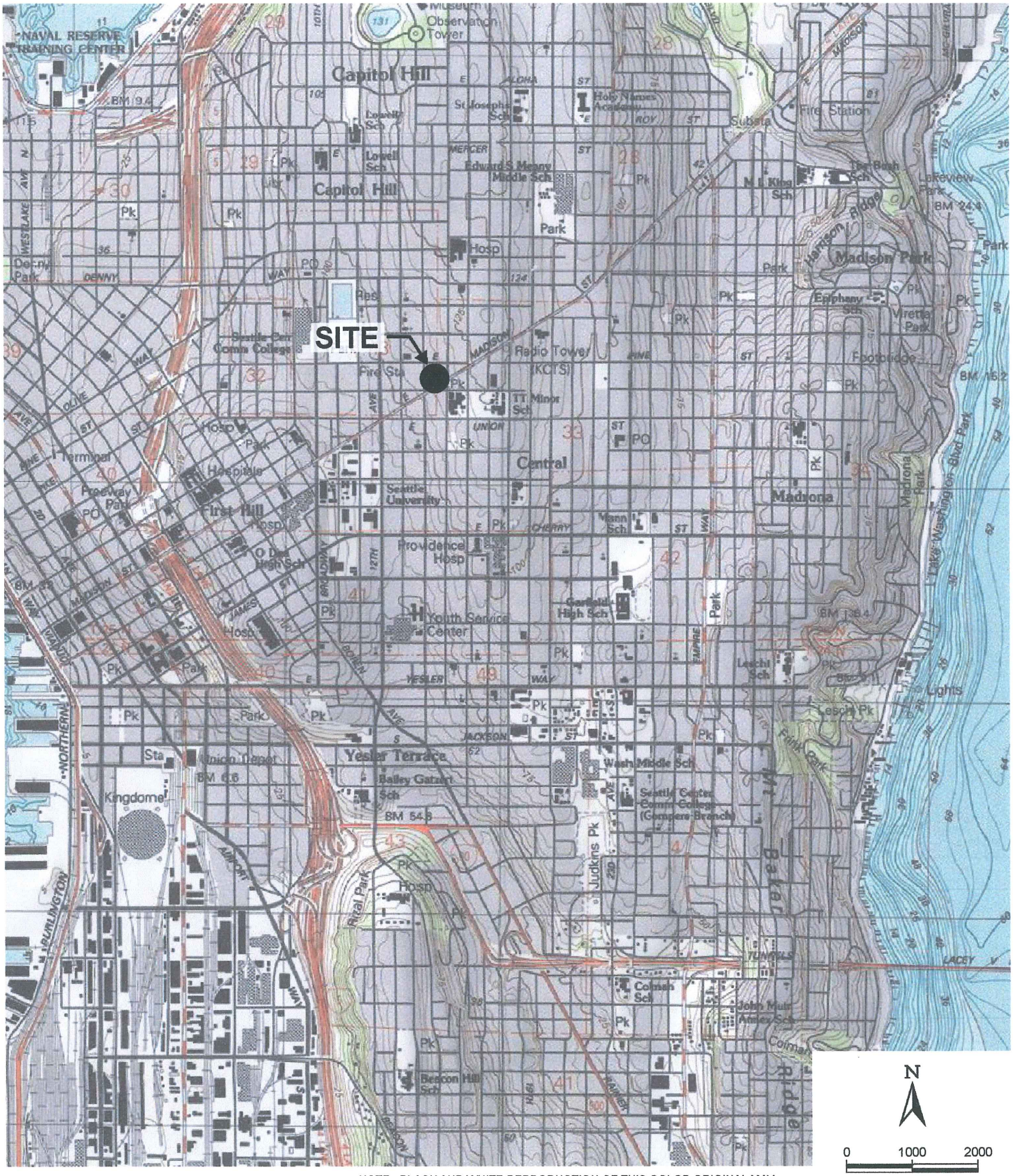

REFERENCE: USGS TOPO!

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

Associated Earth Sciences, Inc.

VICINITY MAP

MADISON MIXED USE BUILDING
SEATTLE, WASHINGTON

FIGURE 1

DATE 5/14

PROJ. NO. KE140057A

140057 East Madison \ 140057 Vicinity.cdr

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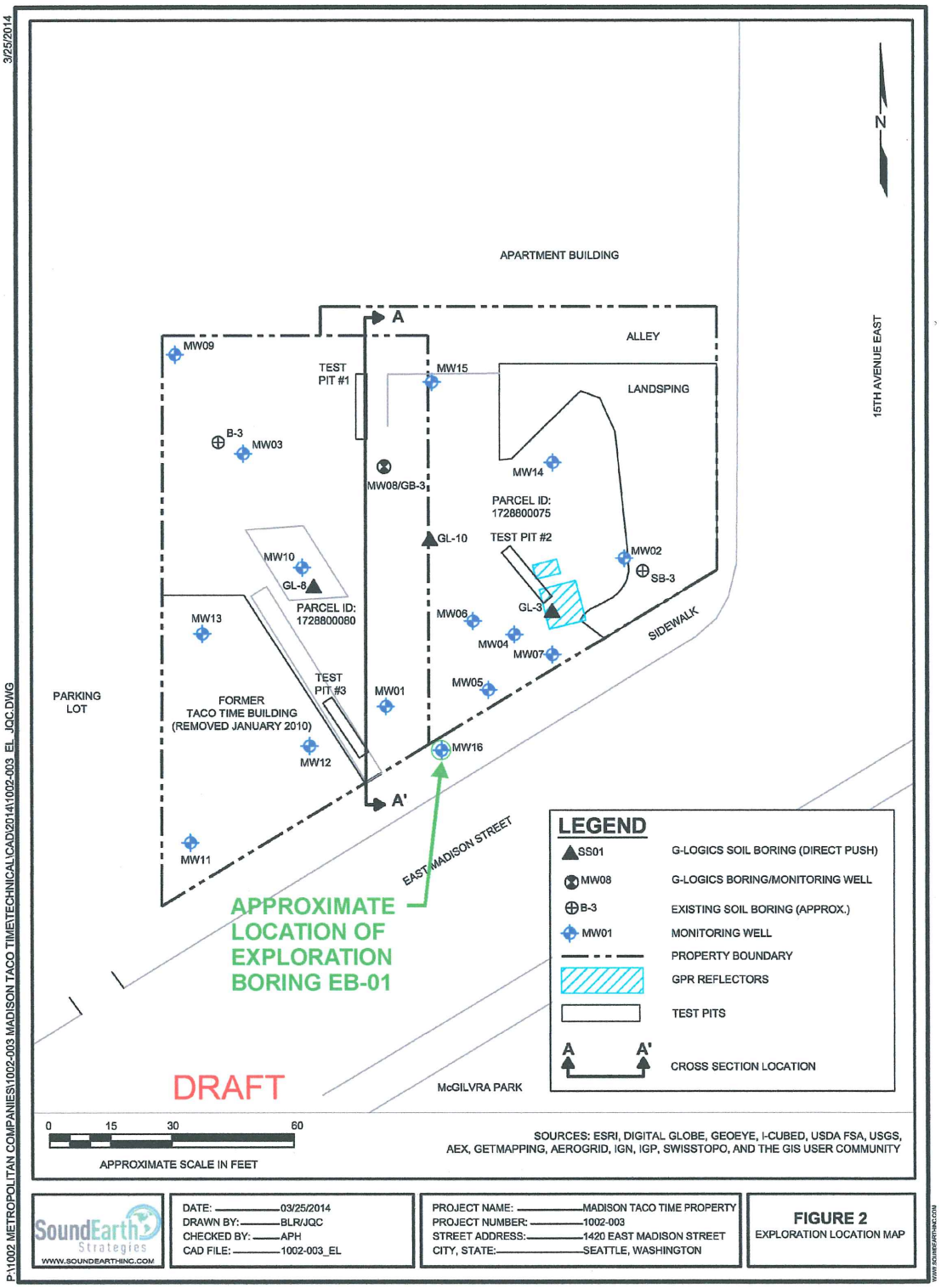

REFERENCE: SOUND EARTH STRATEGIES

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

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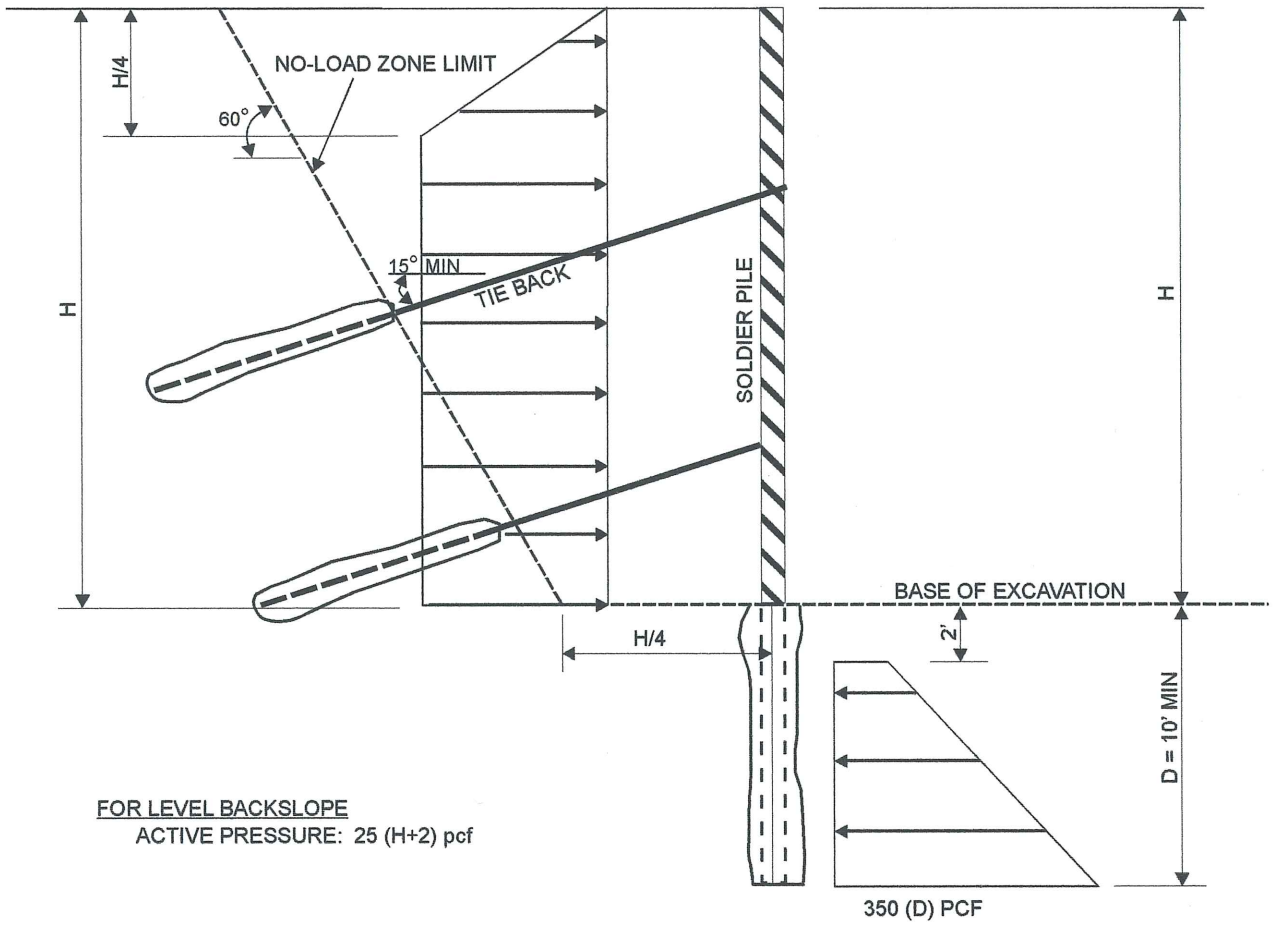
SITE AND EXPLORATION PLAN
MADISON MIXED USE BUILDING
SEATTLE, WASHINGTON

FIGURE 2
DATE 5/14
PROJ. NO. KE140057A

140057 East Madison \ 140057 Site and Explr 4-14.cdr



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NOTES:

1. SOLDIER PILE EMBEDMENT DEPTH "D" SHOULD CONSIDER NECESSARY VERTICAL CAPACITY, KICKOUT, AND OVERTURNING RESISTANCE.

2. ALL TIEBACKS SHOULD BE PRESTRESSED TO 130 PERCENT OF DESIGN LOAD AND LOCKED OFF AT 100 PERCENT OF DESIGN LOAD. AT LEAST 2 ANCHORS SHALL BE PRESTRESSED TO 200 PERCENT OF DESIGN LOAD AND MONITORED FOR CREEP. TIEBACK ANCHOR ZONE IS TO BE LOCATED BEHIND THE NO-LOAD ZONE.

3. PRESUMPTIVE ALLOWABLE TIEBACK - SOIL ADHESION = 2 KIPS PER SQUARE FOOT (KSF) FOR PRESSURE GROUTED ANCHORS.

4. PASSIVE PRESSURES INCLUDE A FACTOR OF SAFETY OF 1.5.

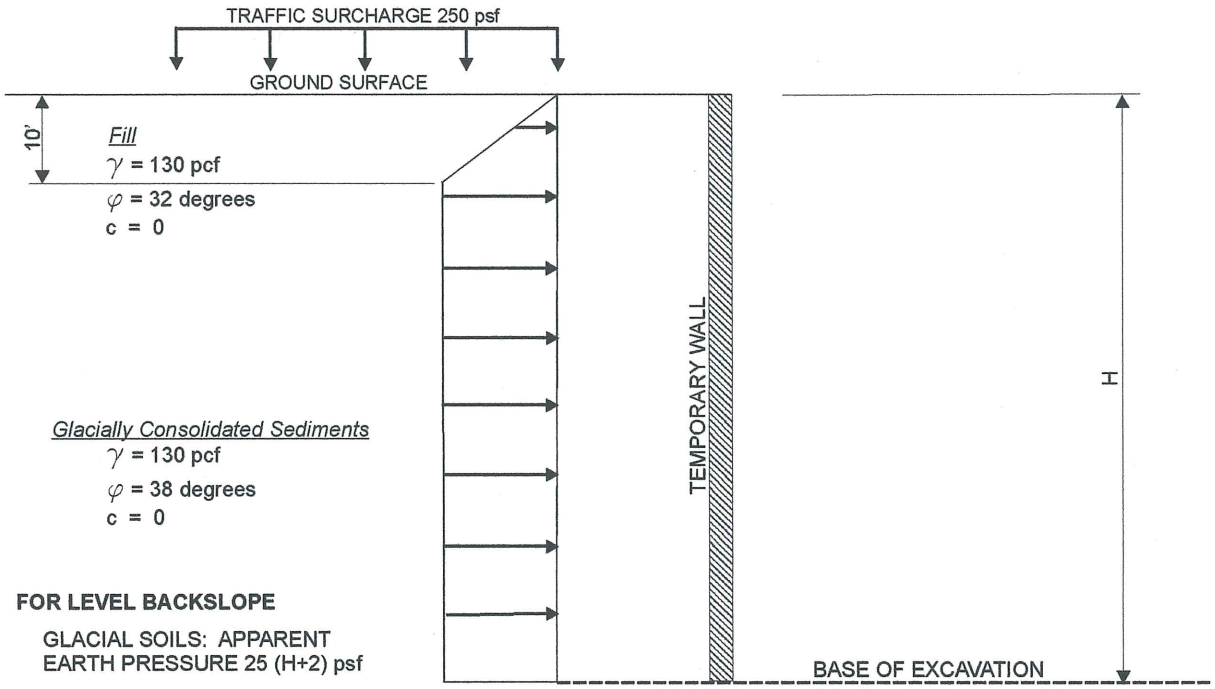
5. ALLOWABLE SKIN FRICTION OF SOLDIER PILE - 2000 PSF OVER DEPTH "D". ALLOWABLE END BEARING = 30 KSF FOR CONCRETE BACKFILL.

6. DIAGRAMS DO NOT INCLUDE HYDROSTATIC PRESSURE SURCHARGE AND ASSUME WALLS ARE SUITABLY DRAINED TO PREVENT BUILDUP OF HYDROSTATIC PRESSURE.

7. DIAGRAM IS ILLUSTRATIVE AND NOT REFERENCED TO A PARTICULAR LOCATION.

8. DIAGRAM DOES NOT INCLUDE PRESSURES DUE TO SURFACE SURCHARGES FROM ANY ADJACENT STRUCTURES. THESE PRESSURES MUST BE PROVIDED BY THE STRUCTURAL ENGINEER. SEE FIGURE 5.

9. BASE OF EXCAVATION SHALL BE DEFINED AS THE FOUNDATION SUBGRADE ELEVATION.



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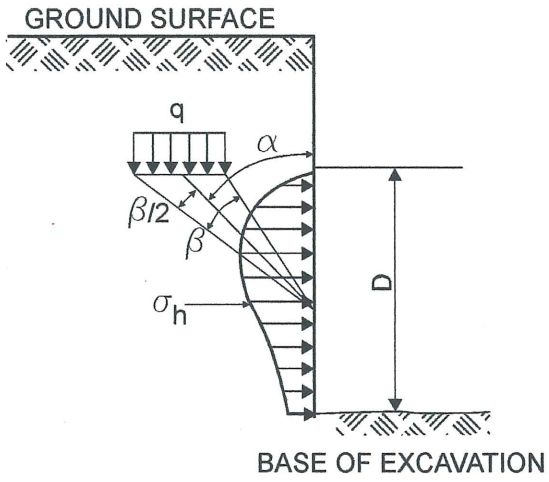
NOTES:

1. DIAGRAM DOES NOT INCLUDE HYDROSTATIC PRESSURES OR SLOPE SURCHARGES.

2. DIAGRAM IS ILLUSTRATIVE AND NOT REFERENCED TO A PARTICULAR LOCATION.

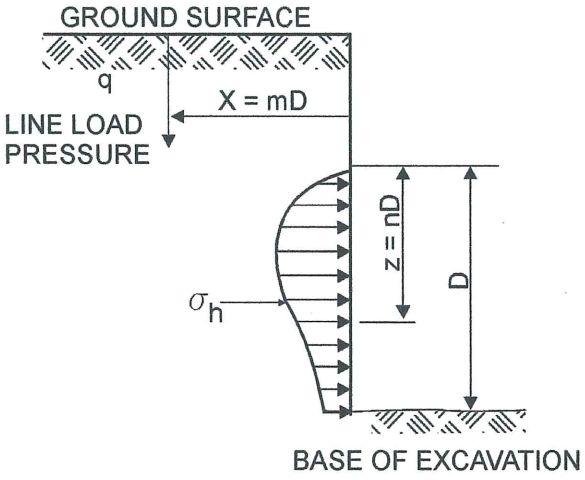
3. DIAGRAM DOES NOT INCLUDE SURCHARGE DUE TO SURFACE SURCHARGES FROM ANY ADJACENT STRUCTURES. THESE SURCHARGES MUST BE PROVIDED BY THE STRUCTURAL ENGINEER. SEE FIGURE 5.

4. BASE OF EXCAVATION SHALL BE DEFINED AS THE FOUNDATION SUBGRADE ELEVATION.



ISOLATED FOOTING

$\sigma_h = 0.64q\ (\beta - \text{SIN}\,\beta\,\text{COS}2\alpha)$



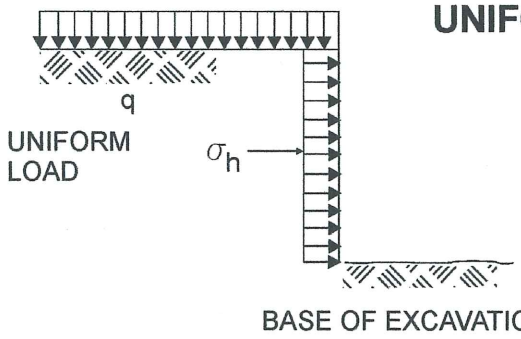
CONTINUOUS FOOTING PARALLEL TO EXCAVATION

(FOR m>0.4)

$$\sigma_h = \frac{1.28q}{D}\ \frac{m^2 n}{(m^2 + n^2)^2}$$

(FOR m≤0.4)

$$\sigma_h = \frac{q}{D}\ \frac{0.2\,n}{(0.16 + n^2)^2}$$



UNIFORM LOAD DISTRIBUTION

$\sigma_h = 0.4q$

q = vertical pressure in psf

DEFINITIONS AND UNITS

D	Excavation depth below footing in feet
σ_h	Lateral soil pressure in psf
q	Unit loading pressure in psf
β	Radians

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APPENDIX A

Exploration Logs

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
KE140057A	EB-1	1 of 1

Project Name	Madison Mixed Use Building	Ground Surface Elevation (ft)	~362
Location	Seattle, WA	Datum	N/A
Driller/Equipment	Boretec	Date Start/Finish	3/12/14,3/12/14
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	6 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Concrete Sidewalk					
				Fill Moist, brownish gray, medium to coarse silty SAND, few GRAVEL (SM). Moist, reddish brown, fine to coarse silty SAND, few gravel (SM).					
5		S-1		**Vashon Recessional Outwash** Moist, reddish brown, fine to coarse silty SAND, trace gravel (SM).			2 1 2	▲3	
10		S-2		**Vashon Lodgement Till / Subglacial Meltout Till** Moist, grayish brown, fine to coarse SAND, trace to few silt, trace to few gravel (SM).			22 40 46	▲86	
15		S-3		Moist, gray, fine to coarse SAND, trace to few silt (SM).			50/6"	▲50/6"	
20		S-4		**Vashon Advance Outwash** 4 inch layer of wet, gray, fine to coarse SAND, trace silt (SW) at 20 feet.			50/4"	▲50/4"	
25		S-5		Wet, gray, fine to coarse SAND, trace to few silt, trace to few gravel (SM).			45 50/4"	▲95/10"	
				Bottom of exploration boring at 26.5 feet No ground water encountered.					
30									
35									

DRAFT

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: FC

Approved by:

AESIBOR 140057.GPJ April 29, 2014

DRAFT

LOG OF EXPLORATORY BORING

PROJECT NAME	Taco Time - Madison	BORING NO.	MW-1
LOCATION	1420 E. Madison Street, Seattle, WA	PAGE	1 of 2
DRILLED BY	Cascade Drilling, Inc.	APPROX. TOC ELEV.	96.06'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	35.1'
LOGGED BY	Mike Noll	DATE COMPLETED	1/12/06

SAMPLE NUMBER	SAMPLE TYPE	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 0.2 foot: ASPHALT
								0.2 to 4.0 feet: SANDY SILT with gravel (ML), reddish-brown to about 3 feet, tan to olive gray below 3 feet, 50 to 60 percent nonplastic fines, 40 to 45 percent fine to medium and some coarse sand, 5 percent fine subangular to subrounded gravel, stiff, dry to moist, no odor, some red brick fragments.
				5				**4.0 to 10.0 feet: SILTY SAND with gravel (SM),** olive brown to olive gray, some yellowish-orange mottling, 50 percent fine to medium and some coarse sand, 40 to 50 percent nonplastic fines, 5 percent fine subangular to subrounded gravel, dense, dry to moist, no odor.
				10				**10.0 to 16.0 feet: SANDY SILT with gravel (ML),** gray to olive gray, 60 percent nonplastic fines, 30 percent fine to medium and some coarse sand, 10 percent fine to medium subangular to subrounded gravel, stiff to very stiff, dry, no odor.
			▽ 1/13/06	15				
MW1-20	SB	0		20				**16.0 to 35.1 feet: SILTY SAND with gravel (SM),** gray to olive gray, 35 to 50 percent fine to medium and some coarse sand, 25 to 35 percent low plasticity fines, 25 to 30 percent fine to medium subrounded gravel, dense, moist, becoming wet at 29 feet, no odor.
MW1-25	SB	0		25				

REMARKS

1) SB = Split Barrel sampler, driven using 300-lb. jars dropped 30 inches. 2) PID = Photoionization Detector, calibrated to 100 parts per million (ppm) isobutylene. 3) ATD = At Time of Drilling. 4) TOC = Top of Well Casing.

NOLL ENVIRONMENTAL, INC.

TACO2.gds:3.01/26/06.TACO...26-32-003.2

DRAFT

LOG OF EXPLORATORY BORING

PROJECT NAME	Taco Time - Madison	BORING NO.	MW-1
LOCATION	1420 E. Madison Street, Seattle, WA	PAGE	2 of 2
DRILLED BY	Cascade Drilling, Inc.	APPROX. TOC ELEV.	96.06'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	35.1'
LOGGED BY	Mike Noll	DATE COMPLETED	1/12/06

SAMPLE NUMBER	SAMPLE TYPE	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
MW1-30	SB	0	ATD	30				16.0 to 35.1 feet: SILTY SAND with gravel (SM), continued.
MW1-35	SB	0		35				Bottom of boring = 35.1 feet.
				40				**WELL COMPLETION DETAILS** 0.2 to 24.8 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC blank riser pipe. 24.8 to 34.8 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC well screen with 0.010-inch machined slots. 34.8 to 35.1 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC rounded end cap. 0 to 1.0 foot: Concrete. 1.0 to 23.0 feet: Bentonite chips hydrated with potable water. 23.0 to 35.1 feet: #2 Monterey silica sand.
				45				
				50				

REMARKS

1) SB = Split Barrel sampler, driven using 300-lb. jars dropped 30 inches. 2) PID = Photolonization Detector, calibrated to 100 parts per million (ppm) isobutylene. 3) ATD = At Time of Drilling. 4) TOC = Top of Well Casing.

NOLL ENVIRONMENTAL, INC.

TACO2.gds:3.01/26/06.TACO...26-32-003.2

DRAFT

LOG OF EXPLORATORY BORING

PROJECT NAME	Taco Time - Madison	BORING NO.	MW-2
LOCATION	1420 E. Madison Street, Seattle, WA	PAGE	1 of 2
DRILLED BY	Cascade Drilling, Inc.	APPROX. TOC ELEV.	100.01'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	35.0'
LOGGED BY	Mike Noll	DATE COMPLETED	1/12/06

SAMPLE NUMBER	SAMPLE TYPE	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 0.2 foot: ASPHALT
								0.2 to 1.0 feet: SILTY SAND with gravel (SM), olive gray, 75 percent fine and some medium sand, 20 percent nonplastic fines, 5 percent fine subrounded gravel, medium dense, dry, no odor.
								1.0 to 5.0 feet: SANDY SILT with gravel (ML), brown to olive brown, 50 percent nonplastic fines, 40 percent fine to medium sand, 10 percent fine subrounded gravel, stiff, dry, no odor, common rootlets at 1 to 4 feet, some red brick fragments at 4 to 5 feet.
				5				5.0 to 8.0 feet: SILTY SAND with gravel (SM), gray to olive gray, 70 percent fine and some medium sand, 25 percent nonplastic fines, 5 to 10 percent fine to medium subangular to subrounded gravel, dense, dry, no odor, common red brick fragments.
								8.0 to 20.0 feet: SANDY SILT with gravel (ML), olive and gray to olive gray, 50 to 60 percent nonplastic to low plasticity fines, 30 to 50 percent fine to medium and some coarse sand, 5 to 20 percent fine to medium subangular to subrounded gravel, stiff to very stiff, dry, no odor, some brick fragments to about 12 feet.
				10				
			▽ 1/13/06	15				
MW2-20	SB	0		20				20.0 to 35.0 feet: SILTY SAND with gravel (SM), olive and gray to olive gray, 40 to 65 percent fine to medium and some coarse sand, 10 to 30 percent low plasticity fines, 25 to 30 percent fine to medium subangular to subrounded gravel, dense, moist, becoming wet at 23 feet, no odor or sheen.
			▽ ATD					
MW2-25	SB	0		25				

REMARKS

1) SB = Split Barrel sampler, driven using 300-lb. jars dropped 30 inches. 2) PID = Photoionization Detector, calibrated to 100 parts per million (ppm) isobutylene. 3) ATD = At Time of Drilling. 4) TOC = Top of Well Casing.

NOLL ENVIRONMENTAL, INC.

TACO2.gds:3.01/25/06.TACO...26-32-003.2

DRAFT

LOG OF EXPLORATORY BORING

PROJECT NAME	Taco Time - Madison	BORING NO.	MW-2
LOCATION	1420 E. Madison Street, Seattle, WA	PAGE	2 of 2
DRILLED BY	Cascade Drilling, Inc.	APPROX. TOC ELEV.	100.01'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	35.0'
LOGGED BY	Mike Noll	DATE COMPLETED	1/12/06

SAMPLE NUMBER	SAMPLE TYPE	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
MW2-30	SB	0		30				20.0 to 35.0 feet: SILTY SAND with gravel (SM), continued.
MW2-35	SB	0		35				Bottom of boring = 35.0 feet.
				40				
				45				
				50				

WELL COMPLETION DETAILS

0.2 to 24.7 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC blank riser pipe.
24.7 to 34.7 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC well screen with 0.010-inch machined slots.
34.7 to 35.0 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC rounded end cap.

0 to 1.0 foot: Concrete.
1.0 to 23.0 feet: Bentonite chips hydrated with potable water.
23.0 to 35.0 feet: #2 Monterey silica sand.

REMARKS

1) SB = Split Barrel sampler, driven using 300-lb. jars dropped 30 inches. 2) PID = Photoionization Detector, calibrated to 100 parts per million (ppm) isobutylene. 3) ATD = At Time of Drilling. 4) TOC = Top of Well Casing.

NOLL ENVIRONMENTAL, INC.

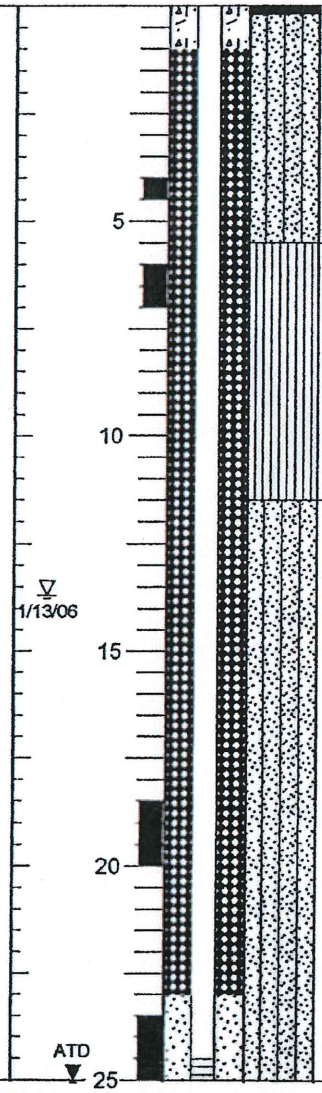
TACO2.gds:3.01/26/06.TACO...26-32-003.2

DRAFT

LOG OF EXPLORATORY BORING

PROJECT NAME	Taco Time - Madison	BORING NO.	MW-3
LOCATION	1420 E. Madison Street, Seattle, WA	PAGE	1 of 2
DRILLED BY	Cascade Drilling, Inc.	APPROX. TOC ELEV.	93.89'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	34.8'
LOGGED BY	Mike Noll	DATE COMPLETED	1/12/06

SAMPLE NUMBER	SAMPLE TYPE	PID (in ppm)
MW3-4	G	0
MW3-6	SB	0
MW3-20	SB	0
MW3-25	SB	0



LITHOLOGIC DESCRIPTION

0 to 0.2 foot: ASPHALT

0.2 to 5.5 feet: SILTY SAND with gravel (SM), dark gray to dark brown, some yellowish-orange mottling, 40 to 45 percent fine to medium and some coarse sand, 30 percent low plasticity fines, 20 percent fine to medium subangular to subrounded gravel, medium dense, moist, no odor, red brick fragments at 1 to 2 feet.

5.5 to 11.5 feet: SANDY SILT with gravel (ML), gray to olive gray, some minor yellowish-orange mottling, 60 percent nonplastic fines, 30 percent fine to medium and some coarse sand, 10 percent fine to medium subangular to subrounded gravel, stiff to very stiff, dry to moist, no odor.

11.5 to 30.0 feet: SILTY SAND with gravel (SM), gray to olive gray, 40 to 50 percent fine to medium and some coarse sand, 20 to 40 percent low plasticity fines, 10 to 30 percent fine to medium subangular to subrounded gravel, dense, moist, no odor.

REMARKS

1) SB = Split Barrel sampler, driven using 300-lb. jars dropped 30 inches. 2) G = Grab sample collected from soil cuttings. 3) PID = Photoionization Detector, calibrated to 100 parts per million (ppm) isobutylene. 4) ATD = At Time of Drilling. 5) TOC = Top of Well Casing.

NOLL ENVIRONMENTAL, INC.

TACO2.gds:3.01/26/06.TACO...25-32-003.2

DRAFT

LOG OF EXPLORATORY BORING

PROJECT NAME	Taco Time - Madison	BORING NO.	MW-3
LOCATION	1420 E. Madison Street, Seattle, WA	PAGE	2 of 2
DRILLED BY	Cascade Drilling, Inc.	APPROX. TOC ELEV.	93.89'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	34.8'
LOGGED BY	Mike Noll	DATE COMPLETED	1/12/06

SAMPLE NUMBER	SAMPLE TYPE	PID (in ppm)	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								11.5 to 30.0 feet: SILTY SAND with gravel (SM), continued.
MW3-30	SB	0		30				
								30.0 to 35.0 feet: SILTY SAND with gravel (SM), gray to olive gray, 60 percent fine to coarse sand, 10 to 15 percent low plasticity fines, 20 to 30 percent fine to medium subrounded gravel, dense, wet, no odor or sheen.
MW3-35	SB	0		35				
								Bottom of boring = 35.0 feet.
				40				**WELL COMPLETION DETAILS** 0.2 to 24.5 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC blank riser pipe. 24.5 to 34.5 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC well screen with 0.010-inch machined slots. 34.5 to 34.8 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC rounded end cap. 0 to 1.0 foot: Concrete. 1.0 to 23.0 feet: Bentonite chips hydrated with potable water. 23.0 to 35.0 feet: #2 Monterey silica sand.
				45				
				50				

REMARKS

1) SB = Split Barrel sampler, driven using 300-lb. jars dropped 30 inches. 2) G = Grab sample collected from soil cuttings. 3) PID = Photoionization Detector, calibrated to 100 parts per million (ppm) isobutylene. 4) ATD = At Time of Drilling. 5) TOC = Top of Well Casing.

NOLL ENVIRONMENTAL, INC.

TACO2.gds:3.01/26/06.TACO...26-32-003.2

DRAFT

BORING NO. B - 101

Logged By: KJ | Date Drilled: 5/17/2012 | Surface Elev. 367' approx.
Drilled By: Boretec

Depth ft.	Elevation	USCS Code	Description	Sample Loc.	Sample No.	SPT Blow Counts	Water Content %	Other Tests/ Comments
			Old, uneven asphalt pavement.					
		SM	Brown SILTY SAND, moist, loose, sand is fine and medium grained, contains some small pieces of burnt debris.			2,2,2 (N=4)	14.9	
5		SM-GM	As above, rock fragment in sampler tip, poor recovery.			50/5" (N=50+)	10.9	
		SM-GM	No sample recovery other than rock chips.			50/3" (N=50+)		
10		SM	Gray SILTY SAND, damp, very dense, sand is mostly fine and medium grained with lesser rounded coarse sand and fine gravel, suspected gravel/cobbles based on drill rig chatter, poor sample recovery.			50/2" (N=50+)		
		SM	Gray SILTY SAND with GRAVEL, damp, very dense, occasional cobbles, sand is mostly fine and medium grained.			50/4" (N=50+)	6.3	
15		SM-GM	Gray and greenish gray SILTY SAND with GRAVEL, damp, very dense, contains rock fragments (cobbles?)			50/5" (N=50+)	6.1	
			Very difficult rocky drilling from 17 to 19 feet.					
20	▽	SM	Gray SILTY SAND, wet, dense, stratified, sand is fine and medium grained, trace rounded gravel.			9,19,25 (N=44)	19.9	
25								

LEGEND: 2" O.D. SPT Sampler; 3" O.D. California Sampler; ▽ Water Level noted during drilling; ▼ Water Level measured at later time, as noted

GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

BORING LOG

PROPOSED SIX-STORY MIXED-USE BUILDING
1420 E. MADISON ST.
SEATTLE, WASHINGTON

JOB NO. G-3279 | DATE 6/6/2012 | PLATE A2

DRAFT

BORING NO. B - 101

Logged By: KJ Date Drilled: 5/17/2012 Surface Elev. 367' approx.
Drilled By: Boretec

Depth ft.	Elevation	USCS Code	Description	Sample Loc.	Sample No.	SPT Blow Counts	Water Content %	Other Tests/ Comments
		SM	Gray SILTY SAND, wet, very dense, sample consists of interbedded finer-grained silty sand and less silty fine to medium grained strata. Occasional minor coarse sand.			4,30,50 (N=80)	14.3	Driller began using bentonite mud in hole hole to prevent heave.
30		SM	Gray SILTY SAND with GRAVEL, wet, very dense, well graded with some rock fragments, limited sample recovery.			13/50-3" (N=50+)	13.5	
35		SP-SM	Olive brown-gray SAND to SILTY SAND, wet, medium dense, trace oxide staining and rounded fine gravel, fine to medium grained, stratified.			3,3,13 (N=16)	22.5	
40		SM	As above, somewhat more silty.			5,6,13 (N=19)	21.8	
45		SP/SM	Olive-brownish gray SAND and SILTY SAND, thickly bedded, wet, medium dense, consists of fine-grained silty sand and mostly medium-grained nonsilty sand strata.			3,8,16 (N=24)	21.9	
50								

LEGEND: 2" O.D. SPT Sampler; 3" O.D. California Sampler; Water Level noted during drilling; Water Level measured at later time, as noted

GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

BORING LOG

PROPOSED SIX-STORY MIXED-USE BUILDING
1420 E. MADISON ST.
SEATTLE, WASHINGTON

JOB NO. G-3279 **DATE** 6/6/2012 **PLATE** A3

DRAFT

BORING NO. B - 101

Logged By: KJ Date Drilled: 5/17/2012 Surface Elev. 367' approx.
Drilled By: Boretec

Depth ft.	Elevation	USCS Code	Description	Sample Loc.	Sample No.	SPT Blow Counts	Water Content %	Other Tests/ Comments
		SP-SM	Gray and brownish gray SAND to SILTY SAND, wet, very dense, interbedded fine grained and medium grained strata, occasional reddish oxidation blobs.			6,26,30 (N=56)	20.6	
55		SP-SM	Gray SAND, wet, very dense, fine grained, massive.			21,50 (N=50+)	20.9	
60		SP-SM	Brown and gray SAND, wet, very dense, fine to medium grained, 5% fines but increasing fines toward bottom of sample, Compressed damp fibrous organics and silty sand at bottom of sample.			11,21,30 (N=51)	19.6	
65			Depth of boring: 61.5 feet. Drilling Method: Hollow-stem auger. Sampling Method: 2-inch-O.D. standard penetration sampler driven using a 140 lb. hammer with a 30-inch drop (cathead). Groundwater encountered at approximately 20 feet during drilling, and measured at approximately 13 feet in nearby well MW-14.					
70								
75								

LEGEND: 2" O.D. SPT Sampler; 3" O.D. California Sampler; Water Level noted during drilling; Water Level measured at later time, as noted

GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists, & Environmental Scientists

BORING LOG

PROPOSED SIX-STORY MIXED-USE BUILDING
1420 E. MADISON ST.
SEATTLE, WASHINGTON

JOB NO. G-3279 **DATE** 6/6/2012 **PLATE** A4

DRAFT

01-0609-b gb01.vsd

Depth in feet	BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0				Surface: Asphalt, 4" thick underlain w/crushed rock				Well Not Installed
				Loose, gravelly-silty SAND, well-graded, brown-gray to light brown, brick fragments		SM		
5					0			
10	16 20 41		GB01-10	Dry and Dense Silty SAND	70		0.0	
15	37 50/5"		GB01-15	Becoming moist	60		0.0	
				Soil from the bottom of drilling plug was wet but no standing water in the boring				
20	27 50/6"		GB01-20	Pushed a rock, soil is dry at bottom of sampler	50		0.0	
25	29 50/6"		GB01-25	Slightly moist	50		0.0	
30	31 43 50/5"		GB01-30	Drilling has become difficult, drilling plug is wet Wet	70		0.0	
35	29 40 50/4"		GB01-35		70		0.0	
40	50/5"		GB01-40	Gravelly SAND, little to no fines, coarse, poorly-graded, loose, light brown to gray-brown, wet	60	GP	0.0	
45	21 30 50/5"		GB01-45	Fine SAND, little to no fines, poorly-graded, loose, light brown to gray-brown, wet	90	SP	0.0	
50	13 50/5"		GB01-50	Silty fine SAND (no gravel) wet, light brown to gray EOB at 50.5'	60	SM	0.0	

Drilling Method:	Hollow-stem auger	**Date:** 1-3-2009	**Other Information:** Attempted to place a well in boring. Sand heaving caused the well screen to bind within the auger. The well would not stay in place while retrieving the auger. Abandoned hole with bentonite chips.
Drilling Company:	Boretec	**Weather:** Overcast, 36 degrees F	
Boring Diameter:	8 Inches	**Page** 1 of 1	
Logged By:	Rob Harrison		

g-logics

Boring/Well Log
Taco Time
1420 East Madison
Seattle, WA

GB01

DRAFT

01-0609-b gb02 mw07.vsd

Depth in feet	BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0				Surface: Asphalt, 4" thick underlain w/crushed rock				8" Boring
						SM		Well Box, Concrete Seal, Locking Plug
5	5 4 4		GB02-5	Loose, silty SAND, well-graded, little gravels, brown-gray to light brown, dry	30		0.0	Bentonite Seal
10	43 50/4"		GB02-10	Gravelly fine SAND, little to no fines, loose, brown to light brown, dry, rock in sampler caused poor recovery	20	SP	0.0	2" PVC Blank
15	50/5"		GB02-15		10		0.0	
20	50/5"		GB02-20	Increasing silt content	10		0.0	
25	50/5"		GB02-25	Gravelly fine SAND, some silt, loose, brown to light brown, wet	30		0.0	Sand
30	45 50/5"		GB02-30	Loose, silty SAND, poorly-graded, brown-gray to light brown, very wet	60	SM	0.0	2" PVC Screen, 2" PVC Plug
35	12 16 18		GB02-35	EOB at 35.5'	80		0.0	Heaving Native Sands
40								
45								
50								

Drilling Method:	Hollow-stem auger	Date: 1-3-2009	Other Information: Well screen is machine slotted, 0.010" slots. Sand is 10x20 size.
Drilling Company:	Boretec	Weather: Overcast, 36 degrees F	
Boring Diameter:	8 Inches	Page 1 of 1	
Logged By:	Rob Harrison		

g-logics

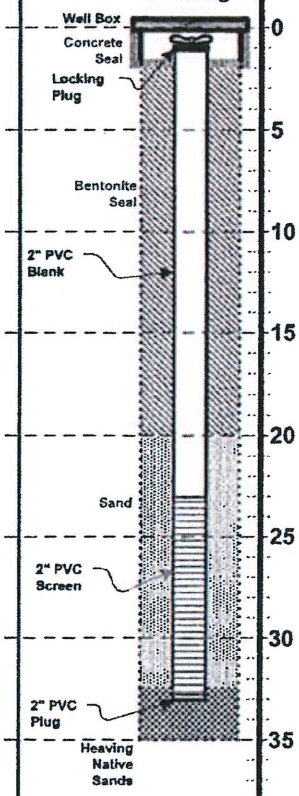
Boring/Well Log
Taco Time
1420 East Madison
Seattle, WA

GB02 / MW-7

DRAFT

01-0609-b gb03 mw08.vsd

Depth in feet	BLOWS/6 Inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)
0				Surface: Asphalt, 4" thick underlain w/crushed rock			
				Silty SAND with crushed rock (fill), brown-gray to light brown		SM	
				Encountering wood/timber			
5				No sample attempted due to presence of wood	-		0.0
				Driller states the bit is beyond the wood			
				Cuttings turn gray and exhibit diesel-TPH odor			
10	50/6"		GB03-10	Chunk of wood in sampler, small amount of gray silty SAND w/gravels, loose, dry, diesel-TPH odor	5		0.0
				Cuttings are gray and exhibit diesel-TPH odor			
15	34 50/4"		GB03-15	Silty SAND with gravels, gray, loose, dry, TPH odor still present, large chunk of wood in sampler (driller thinks it was carried down from above)	20		0.0
20	44 50/3"		GB03-20	Color change to brown-gray / light brown, no TPH odor, shredded wood present, wet	30		0.0
25	50/2"		GB03-25	Wood chunks preventing good sample recovery, sampler is wet	5		0.0
30	49 50/5"		GB03-30	Loose, silty SAND, poorly-graded, brown-gray to light brown, very wet	60		0.0
				Plug became bound in auger due to heaving sands, could not sample at this depth			
35				EOB at 35'			0.0
40							
45							
50							



WELL CONSTRUCTION

Drilling Method:	Hollow-stem auger
Drilling Company:	Boretec
Boring Diameter:	8 Inches
Logged By:	Rob Harrison
Date:	1-4-2009
Weather:	Overcast, 36 degrees F
Page	1 of 1

Other Information:
Well screen is machine slotted, 0.010" slots.
Sand is 10x20 size.

g-logics

Boring/Well Log
Taco Time
1420 East Madison
Seattle, WA

GB03 / MW-8

DRAFT

01-0609-b gb04 mw9.vsd

Depth in feet	BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0				Surface: Asphalt, 4" thick underlain w/crushed rock				6" Boring
				Silty SAND with crushed rock (fill), brown-gray to light brown		SM		Well Box, Concrete Seal, Locking Plug
				Driller notes wet zone from 2' to 3.5'				
5	4 7 20		GB04-5	Brown-gray to light brown silty SAND, moist	75		0.0	Bentonite Seal
	13 14 33		GB04-7.5	Loose silty/gravelly SAND, fine to medium, wet, gray-brown to light brown	70		0.0	
10	50/5"			Sampler is wet, no obvious signs of contamination noted while drilling	15		0.0	1" PVC Blank, Sand
15				No sample attempted. Sands beginning to heave.				1" PVC Screen
				No sample attempted. Sands beginning to heave. EOB at 20'				1" PVC Plug
20								
25								
30								
35								
40								
45								
50								

Drilling Method:	Hollow-stem auger	Date:	1-26-2009
Drilling Company:	Boretec	Weather:	Partly Cloudy, 33 degrees F
Boring Diameter:	6 Inches	Page	1 of 1
Logged By:	Rob Harrison		

Other Information:

Well screen is machine slotted, 0.010" slots.
Sand is 10x20 size.
Skipped sample at 15' & 20' to avoid possible sand intrusion into the auger that could bind.

g-logics

Boring/Well Log
Taco Time
1420 East Madison
Seattle, WA

GB04 / MW-9

DRAFT

01-0809-b gb05 mw10.vsd

Depth in feet	BLOWS/6 Inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0				Surface: Asphalt, 4" thick underlain w/crushed rock Silty SAND with crushed rock (fill), brown-gray to light brown		SM		6" Boring Well Box Concrete Seal Locking Plug
5	8 7 6		GB05-5	Brown-gray to light brown silty SAND w/gravels	60		0.0	Bentonite Seal
10	8 10 12		GB05-10	Cuttings from approximately 10' to 15 feet have become gray and exhibit diesel-TPH odor	60		0.0	1" PVC Blank
15	50/4"		GB05-10/15	With no recovery, collected sample from cuttings Sampler is wet Somewhere around 15' to 17' there is a color change to brown-gray / light brown, no TPH odor, wet	0		0.0	1" PVC Screen
20								Sand
25	50/4"			No sample recovery. Sands beginning to heave. EOB at 25'	0		0.0	1" PVC Plug
30								
35								
40								
45								
50								

Drilling Method:	Hollow-stem auger	**Date:**	1-26-2009
Drilling Company:	Boretec	**Weather:**	Partly cloudy, 38 degrees F
Boring Diameter:	6 Inches	**Page**	1 of 1
Logged By:	Rob Harrison		

Other Information:
Well screen is machine slotted, 0.010" slots.
Sand is 10x20 size.
Skipped sample at 20' to avoid possible sand intrusion into the auger that could bind.

g-logics

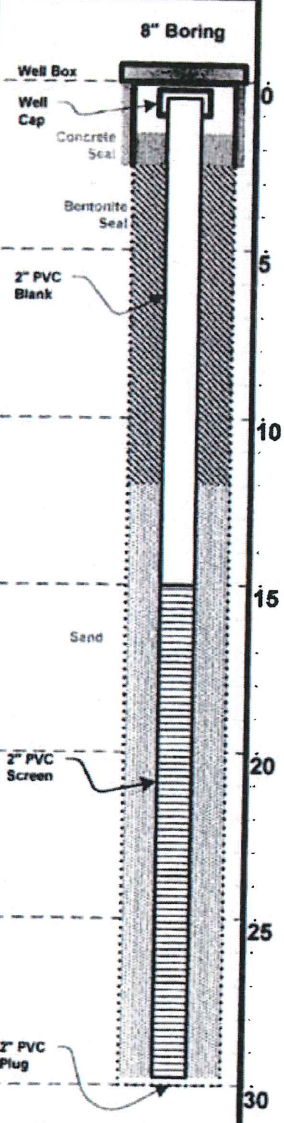
Boring/Well Log
Taco Time
1420 East Madison
Seattle, WA

GB05 / MW-10

DRAFT

01-0609-e-boring mw11.vsd

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)
			Surface: 12" Concrete			
2 3 4			Large void under slab Pea-Gravel No Sample	10	GP	
5 10 15		MW11-10	Light brown gravelly Sand with some burn debris	50	SW	1.5
42 50		MW11-15	Damp/Wet at 14 to 15 feet	60	SM	1.5
			Olive-brown silty sand with gravel			
46 50		MW11-20		60		1.8
50 50		MW11-25		60		2.3
50/6		MW11-30	EOB at 30'	60		1.6



Depth in feet

Drilling Method: Hollow-stem auger	Date: 2/15/2010	Other Information:	
Drilling Company: Cascade Drilling	Weather:	10-slot screen, 2/12 Sand	
Boring Diameter: Two inches	Page 1 of 1		
Logged By: Rob Roberts			

g-logics

Boring/Well Log
Taco Time
1420 East Madison Street
Seattle, WA

MW-11

DRAFT

01-0609-e-boring mw12.ved

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
			Surface: 12" Concrete				8" Boring; Well Box; Well Cap; Concrete Seal
5 6 6		MW12-5	Light brown gravelly silty Sand (w/brick frags)	60	SM	0.5	Bentonite Seal; 2" PVC Blank
5 8 9		MW12-10	Brown Very Gravely sand	70	SW	0.8	
			Damp				
42 56		MW12-15		71		0.9	
		MW12-17	Slight fuel odor in cuttings?			1.3	Sand
46 58		MW12-20		70		0.5	
			Gray damp silty very gravelly Sand		SW-SM		2" PVC Screen
50/6		MW12-25		40		0.8	
50/6		MW12-30	EOB at 30'	40		1.0	2" PVC Plug

0 5 10 15 20 25 30

Depth in feet

Drilling Method: Hollow-stem auger	Date: 2/15/2010	Other Information:	
Drilling Company: Cascade Drilling	Weather:	10-slot screen, 2/12 sand	
Boring Diameter: Two inches	Page 1 of 1		
Logged By: Rob Roberts			

g-logics

Boring/Well Log
Taco Time
1420 East Madison Street
Seattle, WA

MW-12

DRAFT

01-0609-e-boring mw13.vsd

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
			Surface: 12" Concrete				8" Boring
2 3 3		MW13-5	Brown slightly silty very gravely Sand		SM / SP	0.0	Well Box, Well Cap, Concrete Seal, Bentonite Seal, 2" PVC Blank
5 6 6		MW13-10	Organics and gravel – Wet Damp brown gravelly Sand		GP SM	0.0	
37 30 25		MW13-15	Damp olive silty gravelly sand		SM/ SP	0.0	Sand
36 50/6		MW13-20	Wet olive-gray silty very gravelly sand			0.0	2" PVC Screen
50/6		MW13-25				0.0	
50/6		MW13-30	EOB at 30'			0.2	2" PVC Plug

Depth in feet

Drilling Method: Hollow-stem auger	Date: 2/15/2010	Other Information: None	
Drilling Company: Cascade Drilling	Weather:		
Boring Diameter: Two inches	Page 1 of 1		
Logged By: Rob Roberts			

g-logics

Boring/Well Log
Taco Time
1420 East Madison Street
Seattle, WA

NW-13

DRAFT

01-0609-f-boring mw14pg1.ved

Depth in feet	BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0				Surface: Asphalt				8" Boring; Well Box; Well Cap; Concrete Seal; Bentonite Seal
5	4 50/6"		MW-14-6	Gravelly silty sand, Light brown	30	SM	6.8	2" PVC Blank
10	37 50/5"		MW-14-11		30		1.7	
15	50/5"			Rock in sampler	0		-	Sand
20	44 50/5"		MW-14-21	Gravelly silty sand, Gray	60	SM/ SW	1.9	2" PVC Screen
25	42 50/5"		MW-14-26	Gravelly silty sand, Gray, Wet	30		0.5	2" PVC Plug
30								

Drilling Method: Hollow-stem auger	Date: 08/18/2010	Other Information: 10-slot screen
Drilling Company: Boretec	Weather: Clear and cool	
Boring Diameter: 8"	Page 1 of 2	
Logged By: Rob Roberts		

g-logics

Boring/Well Log
Taco Time
1420 East Madison Street
Seattle, WA

MW-14

DRAFT

01-0609-f-boring mw14pg2.vsd

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
			Surface: Asphalt				See Well drawing on Pg 1
30 47 50/5"			Gravelly silty sand, Gray, Wet	60	SM		
			EOB at 31.5'				
35							

Depth in feet

Drilling Method: Hollow-stem auger	Date: 8/18/10	Other Information:
Drilling Company: Boretec	Weather: Clear and warm	
Boring Diameter: 8"	Page 2 of 2	
Logged By: Rob Roberts		

g-logics

Boring Log
Taco Time
1420 East Madison Street
Seattle, WA

MW-14

DRAFT

01-0608-f-boring mw15pg1.vsd

Depth in feet	BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
0				Surface: Asphalt				8" Boring; Well Box; Well Cap; Concrete Seal; Bentonite Seal
5	8 10 13		MW-15-6	Gravelly silty sand, Light brown, No odors	70	SM	1.8	2" PVC Blank
10	12 50/3"		MW-15-11		30		1.2	
15	49 50/5"		MW-15-16	Grades to very gravelly, Gray	25		2.0	Sand
20	11 47 50/5"		MW-15-21	Gravelly silty sand, Gray, Moist, No odor	40	SW-SM	0.5	2" PVC Screen
25	50/3"			No recovery rock in sampler, Wet	0			2" PVC Plug
30					60		1.0	

Drilling Method:	Hollow-stem auger	Date: 8/18/20	Other Information: 10-slot screen
Drilling Company:	Boretec	Weather:	
Boring Diameter:	8"	Page 1 of 2	
Logged By:	Rob Roberts		

g-logics

Boring/Well Log
Taco Time
1420 East Madison Street
Seattle, WA

MW-15

DRAFT

01-0609-f-boring mw15pg2.vsd

BLOWS/6 inches	INTERVAL	SAMPLE NUMBER	SOIL DESCRIPTION	Recovery %	USCS	PID (ppmv in headspace)	WELL CONSTRUCTION
			Surface: Asphalt				See Well drawing on Pg 1
30 40 50/6"		MW-15-31	Silty Sand, Gray, Moist	40	SM	1.2	30
			EOB at 31.5'				
35							35

Depth in feet

Drilling Method: Hollow-stem auger	Date: 8/18/10	Other Information:
Drilling Company: Boretec	Weather: Clear and warm	
Boring Diameter: 8"	Page 2 of 2	
Logged By: Rob Roberts		

g-logics

Boring Log
Taco Time
1420 East Madison Street
Seattle, WA

MW-15

ATTACHMENT B
BORING LOG

SoundEarth Strategies

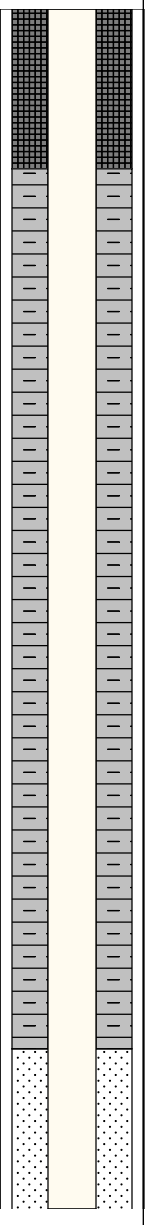
Project: Madison Taco Time
Project Number: 1002-003
Logged by: JSL
Date Started: 3/12/14
Surface Conditions: Concrete
Well Location N/S: 4' S of NE corner of brick wall on Madison Street
Well Location E/W: 17' E of NE corner of brick wall on Madison Street
Reviewed by: DRAFT
Date Completed: 3/12/14

BORING LOG | SESB01 MW16

Site Address: 901 West McGraw Street, Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs
Water Depth After Completion: 21 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
0								**Concrete (8 inches thick). Hand cleared to 4 feet below ground surface.**	
5		2 1 2	20	0.1	SESB01-05	SM		**Moist, very loose, silty, gravelly SAND, light brown, no hydrocarbon odor.**	
10		22 40 46	60	0.3	SESB01-10	SM		**Moist, very dense, gravelly SAND with some silt, brown, no hydrocarbon odor.**	
15									



Drilling Co./Driller:	Boretec / Juan		**Well/Auger Diameter:**	2/4.25 i.d.	inches	**Notes/Comments:**
Drilling Equipment:	HSA		**Well Screened Interval:**	15 - 25	feet bgs	
Sampler Type:	Split-spoon		**Screen Slot Size:**	0.010	inches	
Hammer Type/Weight:	140	lbs	**Filter Pack Used:**	#2/12 Silica Sand		
Total Boring Depth:	26	feet bgs	**Surface Seal:**	Concrete		
Total Well Depth:	25	feet bgs	**Annular Seal:**	Bentonite		
State Well ID No.:	BHX 331		**Monument Type:**	Flush Mount		

SoundEarth Strategies

Project: Madison Taco Time
Project Number: 1002-003
Logged by: JSL
Date Started: 3/12/14
Surface Conditions: Concrete
Well Location N/S: 4' S of NE corner of brick wall on Madison Street
Well Location E/W: 17' E of NE corner of brick wall on Madison Street
Reviewed by: DRAFT
Date Completed: 3/12/14

BORING LOG | SESB01 MW16

Site Address: 901 West McGraw Street, Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs
Water Depth After Completion: 21 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
15		50/6"	90	0.4	SESB01-15	SM		**Moist, very dense, gravelly SAND with some silt, brown, no hydrocarbon odor.**	
20		29 50/4"			SESB01-20	SM		**Moist, dense, gravelly SAND with some silt, gray, no hydrocarbon odor.**	
			100	0.5		SP		**Wet, dense, fine to medium SAND, trace silt, gray, no hydrocarbon odor.**	
25		45 50/4"	90	0.5	SESB01-25	SM		**Wet, very dense, gravelly SAND with some silt, gray, no hydrocarbon odor.**	
								Boring terminated at 26' bgs.	
30									

Drilling Co./Driller:	Boretec / Juan		**Well/Auger Diameter:**	2/4.25 i.d.	inches	**Notes/Comments:**
Drilling Equipment:	HSA		**Well Screened Interval:**	15 - 25	feet bgs	
Sampler Type:	Split-spoon		**Screen Slot Size:**	0.010	inches	
Hammer Type/Weight:	140	lbs	**Filter Pack Used:**	#2/12 Silica Sand		
Total Boring Depth:	26	feet bgs	**Surface Seal:**	Concrete		
Total Well Depth:	25	feet bgs	**Annular Seal:**	Bentonite		
State Well ID No.:	BHX 331		**Monument Type:**	Flush Mount		

ATTACHMENT C
LABORATORY ANALYTICAL REPORTS

Friedman & Bruya, Inc. #402434

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Kurt Johnson, B.S.
Eric Young, B.S.

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Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 6, 2014

Audrey Hackett, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms. Hackett:

Included are the results from the testing of material submitted on February 28, 2014 from the SOU_1002-003_20140228, F&BI 402434 project. There are 12 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
SOU0306R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on February 28, 2014 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_1002-003_20140228, F&BI 402434 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
402434 -01	MW12-20140228
402434 -02	MW11-20140228
402434 -03	MW14-20140228
402434 -04	MW10-20140228
402434 -05	MW06-20140228
402434 -06	MW01-20140228
402434 -07	MW08-20140228
402434 -08	MW05-20140228

All quality control requirements were acceptable.

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW12-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-01
Date Analyzed:	03/03/14	Data File:	030312.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW11-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-02
Date Analyzed:	03/03/14	Data File:	030313.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	99	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW14-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-03
Date Analyzed:	03/03/14	Data File:	030314.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	57	121
Toluene-d8	99	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW10-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-04
Date Analyzed:	03/03/14	Data File:	030315.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	57	121
Toluene-d8	97	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW06-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-05
Date Analyzed:	03/03/14	Data File:	030316.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	57	121
Toluene-d8	99	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW01-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-06
Date Analyzed:	03/03/14	Data File:	030317.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	3.3

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW08-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-07
Date Analyzed:	03/03/14	Data File:	030318.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	96	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	5.7

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW05-20140228	Client:	SoundEarth Strategies
Date Received:	02/28/14	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	02/28/14	Lab ID:	402434-08
Date Analyzed:	03/03/14	Data File:	030319.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	97	63	127
4-Bromofluorobenzene	96	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	11

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	SoundEarth Strategies
Date Received:	Not Applicable	Project:	SOU_1002-003_20140228, F&BI 402434
Date Extracted:	03/03/14	Lab ID:	04-0403 mb
Date Analyzed:	03/03/14	Data File:	030307.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	97	60	133

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Date of Report: 03/06/14
Date Received: 02/28/14
Project: SOU_1002-003_20140228, F&BI 402434

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: 402396-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	99	99	69-133	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	98	103	73-132	5

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 – More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc – The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

402434

SAMPLE CHAIN OF CUSTODY ME 2/28/14 V3

Send Report To Audrey Harker

Company SoundEarth Strategies

Address 2811 Fairview Avenue East

City, State, ZIP Seattle, WA 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature)

PROJECT NAME/NO. 1002-005

PO #

REMARKS

GEMS Y / N

Page # 1 of 1

TURNAROUND TIME
Standard (2 Weeks)
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOC's by 8260	SVOC's by 8270	RCRA-8 Metals			Notes
MW12-20140228	MW12	19	01 AB	2/28/14	1220	H2O	2									HOLD
MW11-20140228	MW11	24.5	02		1306		2									
MW14-20140228	MW14	23	03		1307		2									
MW10-20140228	MW10	20	04		1355		2									
MW06-20140228	MW06	30	05		1401		2									
MW01-20140228	MW01	30	06		1440		2									
MW08-20140228	MW08	28	07		1450		2									
MW05-20140228	MW05	30	08		1531		2									

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Liz Fikes	SES	2/26/14	1700
Received by:		Matt Lyster	FBINC	2/28/14	1700
Relinquished by:					
Received by:					

Samples received at 4 °C

FORMS\COC\SESGEMSR1.DOC (Revision 1)

Friedman & Bruya, Inc. **#403161**

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Kurt Johnson, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 17, 2014

Audrey Hackett, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms. Hackett:

Included are the results from the testing of material submitted on March 13, 2014 from the SOU_1002-003_20140313, F&BI 403161 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Jonathan Loeffler
SOU0317R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 13, 2014 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_1002-003_20140313, F&BI 403161 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
403161 -01	SESB01-05
403161 -02	SESB01-10
403161 -03	SESB01-15
403161 -04	SESB01-20
403161 -05	SESB01-25

All quality control requirements were acceptable.

Date of Report: 03/17/14
Date Received: 03/13/14
Project: SOU_1002-003_20140313, F&BI 403161
Date Extracted: 03/14/14
Date Analyzed: 03/14/14

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 56-165)
SESB01-20 403161-04	<50	<250	80
Method Blank 04-531 MB	<50	<250	83

Date of Report: 03/17/14
Date Received: 03/13/14
Project: SOU_1002-003_20140313, F&BI 403161

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 403061-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	102	104	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	96	79-144

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 – More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc – The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

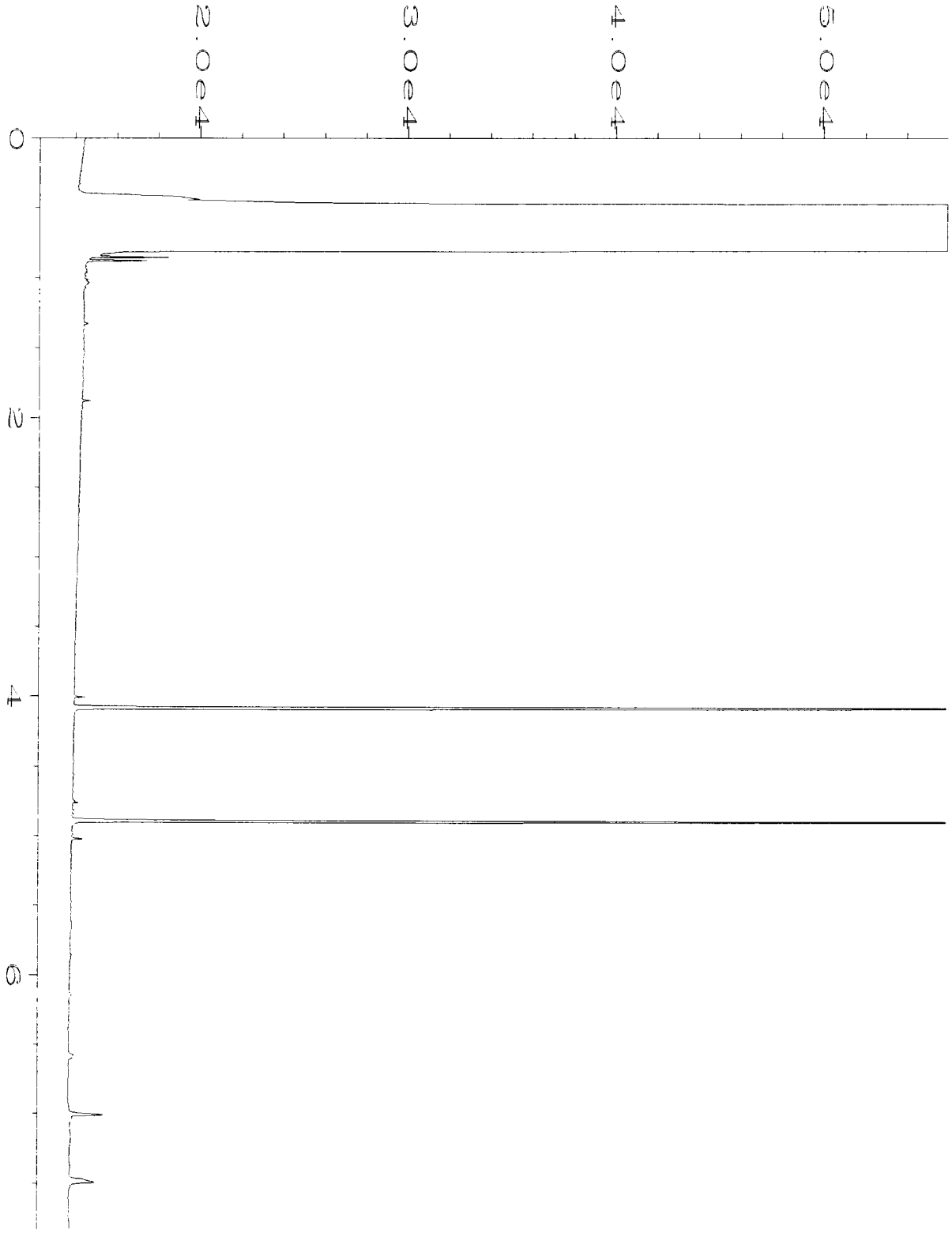
pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

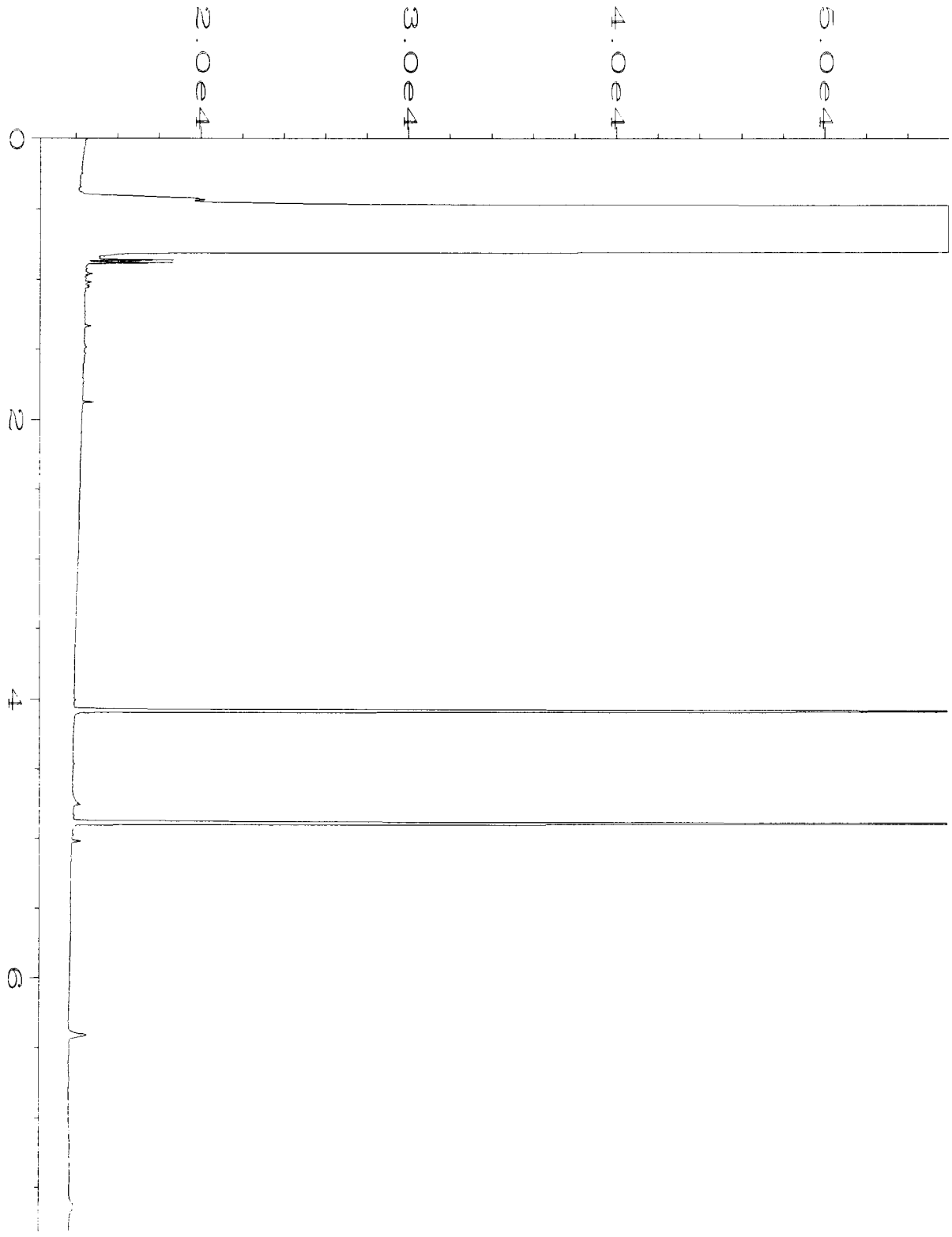
ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

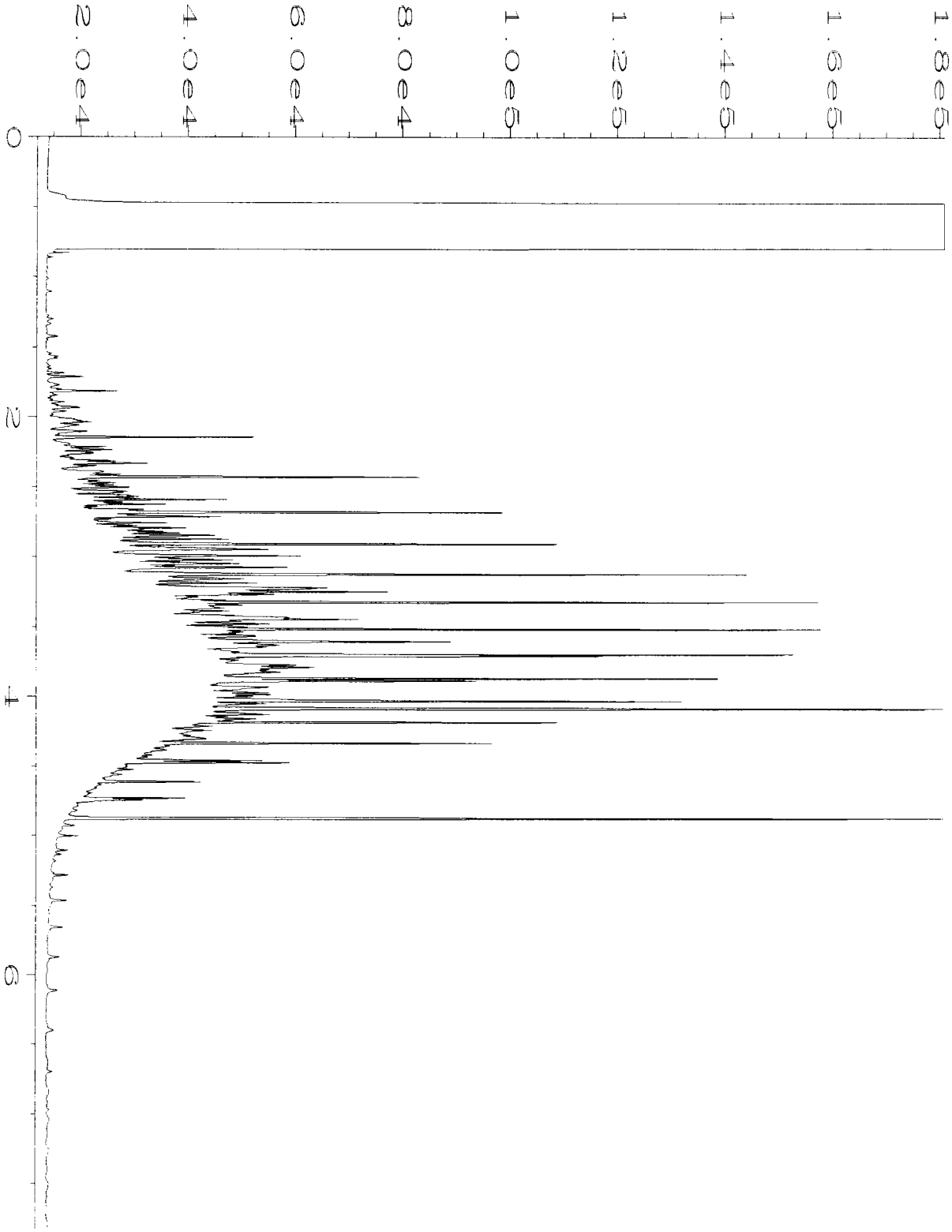
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



Data File Name	: C:\HPCHEM\1\DATA\03-14-14\018F0501.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC1	Vial Number	: 18
Sample Name	: 403161-04	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 5
Acquired on	: 14 Mar 14 11:37 AM	Instrument Method	: DX.MTH
Report Created on	: 14 Mar 14 01:07 PM	Analysis Method	: END.MTH



Data File Name	: C:\HPCHEM\1\DATA\03-14-14\019F0501.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC1	Vial Number	: 19
Sample Name	: 04-531 mb	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 5
Acquired on	: 14 Mar 14 11:49 AM	Instrument Method	: DX.MTH
Report Created on	: 14 Mar 14 01:09 PM	Analysis Method	: END.MTH



Data File Name	: C:\HPCHEM\1\DATA\03-14-14\003F0201.D		
Operator	: mwdl	Page Number	: 1
Instrument	: GC1	Vial Number	: 3
Sample Name	: 500 Dx 42-27B	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 14 Mar 14 08:44 AM	Instrument Method	: DX.MTH
Report Created on	: 14 Mar 14 01:08 PM	Analysis Method	: END.MTH

403161

SAMPLE CHAIN OF CUSTODY ME 03/13/14

D02

Page # 1 of 1

Send Report to Audrey Hackett, Jon Loeffler

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature)

PROJECT NAME/NO.: Madison Taco Time 1002-003

PO #

REMARKS

TURNAROUND TIME
Standard (2 Weeks)
✓ RUSH 24hr. TAT
Rush charges authorized by: Audrey Hackett

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	EDC by 8260B	HOLD		Notes
SESB01-05	SESB01	5'	01	3/12/14	1000	SOIL	1									
SESB01-10	"	10'	02	"	1015	"	1									
SESB01-15	"	15'	03 A-B	"	1030	"	2									
SESB01-20	"	20'	04	"	1045	"	1	X								
SESB01-25	"	25'	05	"	1100	"	1									

Samples received at 8 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	JONATHAN LOEFFLER	SOUNDEARTH	3/13/14	1435
Received by:	VINH	FBI	3/13/14	1435
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

8 °C

Friedman & Bruya, Inc. **#403162**

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Kurt Johnson, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 17, 2014

Audrey Hackett, Project Manager
SoundEarth Strategies
2811 Fairview Ave. East, Suite 2000
Seattle, WA 98102

Dear Ms. Hackett:

Included are the results from the testing of material submitted on March 13, 2014 from the SOU_1002-003_20140313, F&BI 403162 project. There are 6 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
SOU0317R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 13, 2014 by Friedman & Bruya, Inc. from the SoundEarth Strategies SOU_1002-003_20140313, F&BI 403162 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	SoundEarth Strategies
403162 -01	MW09-20140313
403162 -02	MW16-20140313

All quality control requirements were acceptable.

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW09-20140313	Client:	SoundEarth Strategies
Date Received:	03/13/14	Project:	SOU_1002-003_20140313
Date Extracted:	03/13/14	Lab ID:	403162-01
Date Analyzed:	03/13/14	Data File:	031317.D
Matrix:	Water	Instrument:	GCMS7
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW16-20140313	Client:	SoundEarth Strategies
Date Received:	03/13/14	Project:	SOU_1002-003_20140313
Date Extracted:	03/13/14	Lab ID:	403162-02
Date Analyzed:	03/14/14	Data File:	031406.D
Matrix:	Water	Instrument:	GCMS7
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	SoundEarth Strategies
Date Received:	Not Applicable	Project:	SOU_1002-003_20140313
Date Extracted:	03/13/14	Lab ID:	04-0506 mb
Date Analyzed:	03/13/14	Data File:	031307.D
Matrix:	Water	Instrument:	GCMS7
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	100	50	150
4-Bromofluorobenzene	103	50	150

Compounds:	Concentration ug/L (ppb)
1,2-Dichloroethane (EDC)	<1

Date of Report: 03/17/14
Date Received: 03/13/14
Project: SOU_1002-003_20140313, F&BI 403162

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: 403124-20 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	101	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	101	102	70-130	1

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 – More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc – The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

403162

SAMPLE CHAIN OF CUSTODY ME 03/13/14

Page # 1 of 1

Send Report to Audrey Hackett, Jon Loeffler

Company SoundEarth Strategies, Inc.

Address 2811 Fairview Avenue E, Suite 2000

City, State, ZIP Seattle, Washington 98102

Phone # 206-306-1900 Fax # 206-306-1907

SAMPLERS (signature)

PROJECT NAME/NO.: Madison Taco Time 1002-003

PO #

REMARKS

TURNAROUND TIME
Standard (2 Weeks)
X RUSH 24 hr. TAT
Rush charges authorized by: Audrey Hackett

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Sample Location	Sample Depth	Lab ID	Date Sampled	Time Sampled	Matrix	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	EDC by 8260B			Notes
MW09-20140313	MW09	10'	01 A-B	3/13/14	1330	H_2O	2						X			
MW16-20140313	MW16	23.3'	02 A-B	3/13/14	1230	H_2O	2						X			

3/13/14

Samples received at 8 °C

Friedman & Bruya, Inc.	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
3012 16th Avenue West	Relinquished by:	JONATHAN LOEFFLER	SOUNDEARTH	3/13/14	1435
Seattle, WA 98119-2029	Received by:	VINH	FBI	3/13/14	1435
Ph. (206) 285-8282	Relinquished by:				
Fax (206) 283-5044	Received by:				

FORMS\COC\COC.DOC

8 °C