Sampling and Analysis Plan
State Route (SR) 520 Eastbound Off-Ramp to Montlake Vicinity
Phase II Environmental Site Assessment
Seattle, Washington

2625 East Montlake Place East
Seattle, Washington

October 5, 2016

Prepared For:

Washington State Department of Transportation
SR520 Bridge Replacement and HOV Program
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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal is affixed below.

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SAMPLING AND ANALYSIS PLAN
STATE ROUTE 520 EASTBOUND OFF-RAMP TO MONTLAKE VICINITY
SEATTLE, WASHINGTON

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
°C	degree Celsius
COPC	contaminant of potential concern
DRO	diesel range organics
Ecology	Washington State Department of Ecology
EDC	Dichloroethane, 1-2
EDB	Dibromoethane 1-2
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
GRO	gasoline range organics
HCID	hydrocarbon identification
HVOCs	halogenated volatile organic compounds
IDW	investigation-derived waste
INNOVEX	Innovex Environmental Management, Inc.
MTBE	Methyl tertiary-butyl ether
MTCA	Model Toxics Control Act
NWTPH	Northwest Total Petroleum Hydrocarbons
OnSite	OnSite Environmental Inc.
PCBs	Polychlorinated biphenyls
PP-13	Priority Pollutant Metals
PROGRAM	SR520 Bridge Replacement and HOV Program
QA	quality assurance
QC	quality control
SAP	Sampling and Analysis Plan
SOPs	standard operating procedures
SVOCs	semi-volatile organic compounds
TOC	total organic carbon
TPH	Total Petroleum Hydrocarbon
USTs	underground storage tanks
VOC	volatile organic compound
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

SAMPLING AND ANALYSIS PLAN
STATE ROUTE 520 EASTBOUND OFF-RAMP TO MONTLAKE VICINITY
2625 MONTLAKE PLACE EAST
SEATTLE, WASHINGTON

1.0 PROJECT BACKGROUND

INNOVEX Environmental Management (INNOVEX) has been tasked to conduct a Phase II Environmental Site Assessment (ESA) of City of Seattle and WSDOT right-of-way in the vicinity of 2625 East Montlake Place East, Seattle, Washington for the Washington State Department of Transportation (WSDOT) SR520 Bridge Replacement and HOV Program (PROGRAM).

The Phase II ESA is to determine if petroleum related contamination is present in the subsurface of right-of-way adjacent to the property at 2625 East Montlake Place East due to releases from the underground storage tanks (USTs) and/or the auto body/service station.

This Sampling and Analysis Plan (SAP) has been prepared to describe the Phase II ESA activities for WSDOT. The SAP serves as a guide for field activities, including explorations, field testing, soil and groundwater sampling, and the handling of investigation-derived waste (IDW). It also incorporates field and laboratory quality assurance/quality control (QA/QC) requirements. This SAP describes the procedures that will be followed in conducting field sampling.

2.0 SAMPLING OBJECTIVES

Soil and groundwater samples will be collected to determine if petroleum related contamination is present in the soil and groundwater beneath the site.

If petroleum related contamination is detected, additional samples will be collected to determine the vertical and horizontal extent of the contamination plume when possible.

3.0 DATA QUALITY OBJECTIVES

Industry standard for data collection and QC will be used during the investigation process to produce data that are scientifically valid, sufficient for environmental decision making and legally defensible.

QC samples will be collected to support the sampling activity. This includes field QC, confirmation, and laboratory QC samples.

Analytical testing will be performed by OnSite Environmental (OnSite), using Washington Department of Ecology (Ecology) and U.S. Environmental Protection Agency (EPA) approved methods. Laboratory detection limits are determined by test method. Any QC issues will be reported by the laboratory in the analytical report.

3.1 Field Quality Control Samples

Field QC samples are intended to help evaluate conditions resulting from field activities and accomplish two primary goals: (1) assessment of contamination during transport, and (2) assessment of sampling variability. Variability due to sampling technique and instrument performance as well as variability possibly caused by the heterogeneity of the matrix being sampled are assessed by replicate sample collection.

3.1.1 Trip Blanks

Trip blanks will accompany all groundwater samples to identify if volatile contaminants may have been introduced during sample shipment. Deionized water will be placed in glassware by the laboratory. Care will be taken to prevent bubbles in the sealed vial. The trip blanks will accompany the water samples from the field to the laboratory, and they are analyzed as part of the testing process. The trip blanks that are collected will be analyzed for gasoline-range petroleum hydrocarbons and volatile organic compounds (VOCs).

3.2 Laboratory QC Samples

Analytical testing will be performed using Ecology- and EPA-approved methods. Laboratory QC samples are analyzed as part of standard laboratory practice. Laboratory instruments will be calibrated and maintained in accordance with procedures listed in the laboratory's QA/QC plan and standard operating procedures (SOPs) (OnSite 2015). Laboratory internal quality control checks, performance evaluation monitoring, standards, preventative maintenance, and corrective actions, as described in their QA/QC plan and SOPs, will be implemented. The laboratory will provide a standard data package, including laboratory QC samples discussed below.

The laboratory monitors the precision and accuracy of the results of its analytical procedures through analysis of QC samples. Laboratory QC will include the analysis of a method blank, laboratory control sample, laboratory duplicate, and matrix spike with each QC batch (maximum of 20 samples per batch), and a surrogate analysis with each organics sample. The term "matrix" refers to use of the actual media collected in the field (e.g., routine soil, water, and gas samples). Laboratory QC samples are an aliquot (subset) of the field sample. They are not a separate sample, but a special designation of an existing sample. A description of each type of QC sample is provided below:

- Method Blanks
  - A sample of clean matrix (i.e., soil, water, etc.) is run to determine if the analytical equipment is contaminated.
- Surrogates
  - Surrogate compounds are compounds similar to the organic analytes of interest that are added to every sample at known concentrations in order to track the accuracy of the sample extraction and analysis. "Surrogate Recovery" is the measure of the effectiveness of this process on a sample-specific basis.
- Matrix Spike/Matrix Spike Duplicates
  - A sample of the matrix is taken and "spiked" with a known mass of a contaminant of interest and analyzed, as is a duplicate.
  - Matrix spike samples are used to make sure the analytes of interest can be accurately recovered from the sample matrix. The matrix spike duplicate is also used to make sure the analytes can be repeatedly recovered in an accurate and precise manner.

- Laboratory Control Sample
  - A sample of clean matrix to which known concentrations of analytes have been added. This sample is used to assess method accuracy.
- Laboratory Duplicates
  - A second aliquot from a sample is analyzed to examine the reproducibility of the sample result.

4.0 POTENTIAL CONTAMINANTS OF CONCERN

Based on the historical and current site use as a gasoline and service station and the presence of USTs identified in the Phase I ESA, Table 830-1 of the Method Toxic Control Act (MTCA) was used to identify which contaminants of concern should be evaluated. Table 1 summarizes the applicable MTCA recommendations.

Table 1. Recommended Analytes for UST Sites

	Gasoline Range Organics (GRO)	Diesel Range Organics (DRO)	Heavy Oil (DRO)	Waste Oil
Volatile Petroleum Compounds				
Benzene	x	x		x
Toluene	x	x		x
Ethyl Benzene	x	x		x
Xylene	x	x		x
n-Hexane	x			
Fuel Additives and Blending Compounds				
Dibromoethane, 1-2 (EDB); and Dichloroethane, 1-2 (EDC)	x			x
Methyl tertiary-butyl ether (MTBE)	x			x
Total Lead and Other Additives	x			x
Other Petroleum Components				
Carcinogenic PAHs		x	x	x
Naphthalenes	x	x	x	x
Other Compounds				
Polychlorinated Biphenyls (PCBs)			x	x
Halogenated Volatile Organic Compound (HVOCs)				x
Other	x	x	x	x
Total Petroleum Hydrocarbon				
NWTPH-Gx/Dx	x	x	x	x

5.0 SAMPLING LOCATIONS

Five soil borings are planned to assess the subsurface condition within City of Seattle and WSDOT right-of-way in the vicinity of 2625 East Montlake Place East. The planned boring locations are shown in Figure 2.

The borings will be advanced using WSDOT drilling crew and an auger drill rig. Split-spoon soil samples will be collected approximately every five vertical feet for lithologic identification and field screening. Environmental samples will be collected by placing a portion of each recovered split-spoon sample into laboratory supplied labeled jar(s). Additional discrete soil samples may be collected based on field observations. All borings will penetrate to five feet below the groundwater table or to a maximum depth of 30 feet below ground surface (bgs).

All soil samples collected will be delivered to the analytical laboratory, OnSite Environmental Inc. (OnSite) in Redmond, Washington. The soil sample with the highest field screening result from each boring will be submitted for laboratory analysis. The sample at the soil-water interface will be analyzed, if the presence of petroleum compounds is not indicated by the field screening for the samples in a boring. Additional samples may be analyzed based on field screening results or analytical laboratory results with the approval of the WSDOT project manager.

One grab groundwater sample will be collected for each of the boring locations if sufficient groundwater is present.

Drill cuttings and other IDW will be collected and stored in drums during drilling. The drums will be labeled with date, contents, and contact information.

6.0 SAMPLING AND DECONTAMINATION METHODS

6.1 Soil Sampling

Field personnel will field screen soil samples for potential contamination. Typical field screening includes photoionization detector screening for VOCs, sheen testing, and visual and olfactory inspection for evidence of contamination. Selected soil samples will be submitted to the laboratory as described in Section 5.0.

Field personnel will collect soil samples in accordance with EPA Method 5035 (EPA 2008). Two 40-milliliter vials with MeOH preservative, two unpreserved 40-milliliter vials, and one unpreserved 8-ounce jar will be collected for each sample. The sample containers will be placed in a cooler with ice and maintained below 6 degrees Celsius (°C) for transport to the analytical laboratory. The samples will be transported by courier or shipped overnight to OnSite in Redmond, Washington, under Chain-of-Custody.

6.2 Groundwater Sampling

After collecting the last soil sample in each boring at the total depth of exploration, a grab groundwater sample will be collected using bailer. Groundwater will be allowed to infiltrate into the augers where it will then be sampled by lowering a clean disposable bailer inside the augers. The collected water will then be retrieved and decanted into laboratory-supplied sample

containers. The samples will be placed in a cooler with ice and maintained below 6 °C for transport to the analytical laboratory under Chain-of-Custody.

6.3 Decontamination Procedures

Decontamination of sampling equipment must be conducted consistently to ensure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All non-disposable sampling equipment will be pre-cleaned prior to field activities. Items such as hand tools and other reusable equipment will be decontaminated prior to arrival in the field and between uses at different sampling locations.

Any drilling equipment that may have come in contact with subsurface soil will be cleaned using a high-pressure steam cleaner between boreholes and before leaving the property. All water will be contained in drums.

The decontamination procedures for re-usable sampling equipment are as follows:

- Scrape off the gross material from sampler, if necessary
- Wash and scrub in diluted laboratory grade detergent such as Alconox®
- Rinse with tap water
- Change gloves

The wash and rinse water will be collected in 5-gallon buckets and transferred to a drum for storage pending disposal.

7.0 ANALYTICAL METHODS

The contaminants of potential concern (COPCs) identified for the site include petroleum hydrocarbon related constituents. Soil and groundwater samples will be analyzed to determine the concentrations of these COPCs using the following methods:

- Hydrocarbon Identification (HCID) – Northwest Total Petroleum Hydrocarbon (NWTPH) HCID (Soil and water)
- Gasoline-range hydrocarbons –NWTPH-Gx (soil and water)
- Diesel-range petroleum hydrocarbons – NWTPH-Dx (soil and water)
- Oil-range petroleum hydrocarbons – NWTPH-Dx (soil and water)
- Polychlorinated Biphenyls (PCBs) – EPA Method 8082 (soil and water)
- Volatile Organic Compounds (VOCs) – EPA Method 8260 (soil and water)
- Semi-volatile Organics (SVOCs) – EPA Method 8270 (soil and water)
- Priority Pollutant Metals (PP-13) – EPA Method 6010 (soil and water)

The PP-13 metals are; antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc. Groundwater samples for metals analysis will be filtered by OnSite.

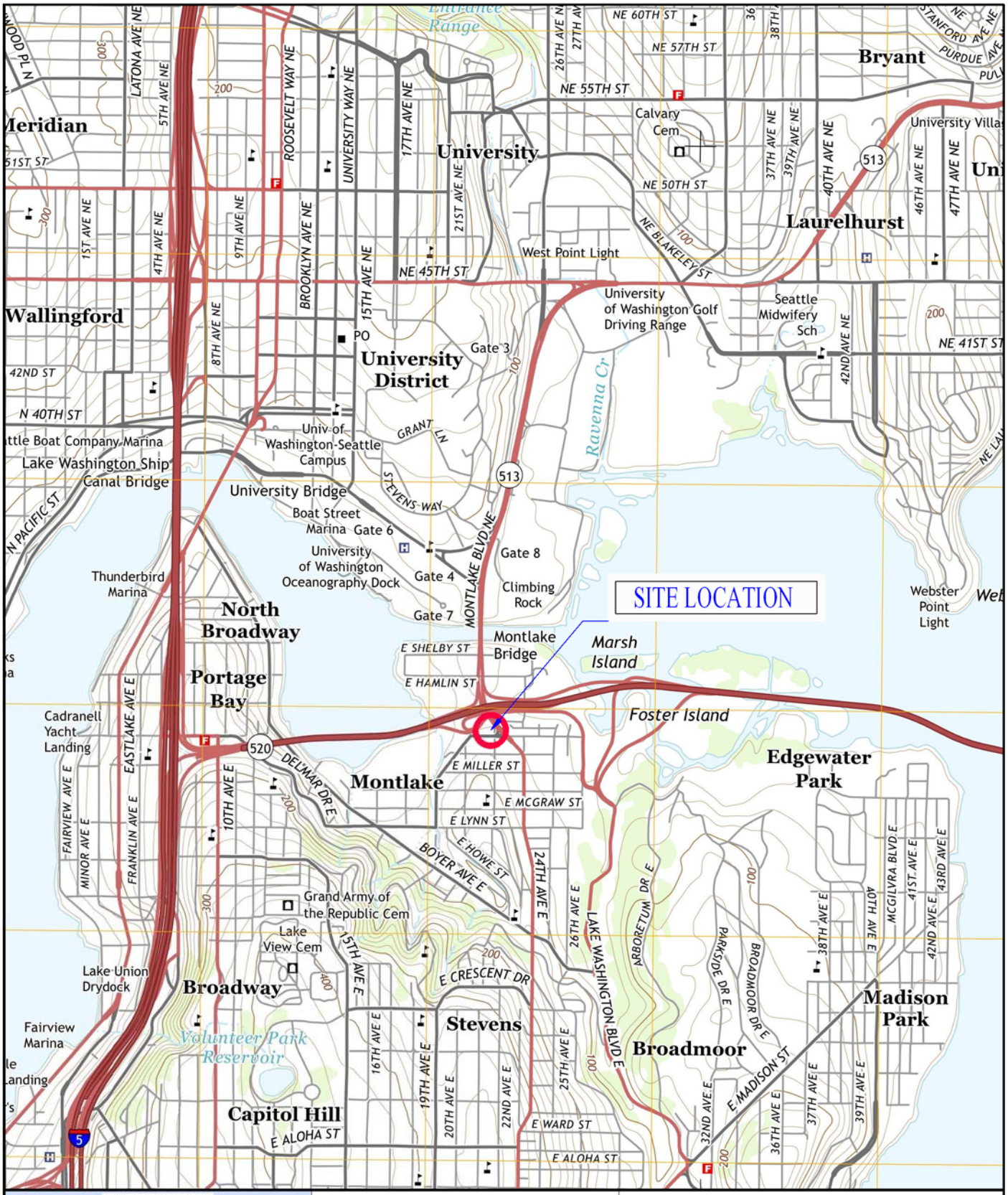
8.0 REFERENCES

Ecology (Washington State Department of Ecology). 2001. The Model Toxics Control Act cleanup regulation, WAC Chapter 173-340. Washington State Department of Ecology Publication No. 94-06. Amended February 12.

EPA (Environmental Protection Agency). 2008. Test methods for evaluating solid waste, physical/chemical methods (SW-846), Hazardous wastes test methods, Revision 3. January. http://www.epa.gov/epawaste/hazard/testmethods/index.htm.

OnSite Environmental Inc., 2015. Quality Assurance Manual. Revision No. 0.4. July 24, 2015.

FIGURES



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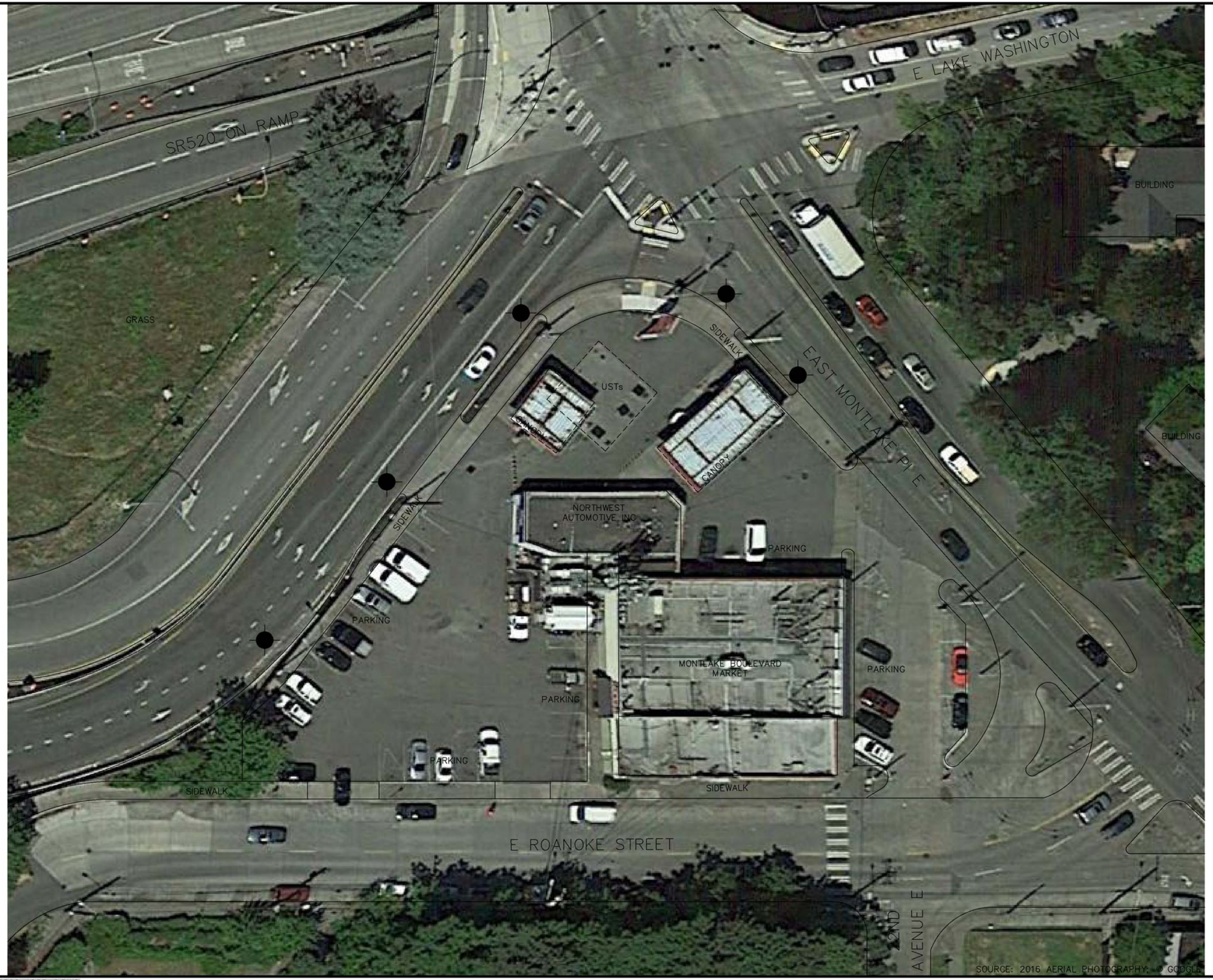
LATTITUDE 47D 38M 38S NORTH
LONGITUDE 122D 18M 15S WEST

US GEOLOGICAL SURVEY - 2014
7.5 MINUTE QUADRANGLE MAP
SEATTLE NORTH, WASHINGTON

FIGURE 1
Site Location Map

STATE ROUTE (SR)520
EASTBOUND OFF-RAMP
TO MONTLAKE VICINITY
2625 MONTLAKE PLACE EAST
SEATTLE, WASHINGTON

SR520_SITELOCATION.DWG



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LEGEND

PROPOSED SOIL BORING LOCATION

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FIGURE 2
Proposed Boring Locations Map

STATE ROUTE (SR) 520
EASTBOUND OFF-RAMP
TO MONTLAKE VICINITY
2625 MONTLAKE PLACE EAST
SEATTLE, WASHINGTON

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