



AEI Consultants

Environmental & Engineering Services

June 19, 2019

Washington Department of Ecology
Voluntary Cleanup Program – NWRO
3190 160th Avenue SE
Bellevue, Washington 98008

Attention Ms. Heather Vick

Subject: Workplan for Monitoring Well Installation
837 North 34th Street
Seattle, Washington 98103
AEI Project No. 307024

Dear Ms. Vick:

AEI Consultants (AEI) has prepared this workplan for the installation of two (2) groundwater monitoring wells at 837 North 34th Street in Seattle, Washington (the "Site"). This workplan was prepared in response to Washington Department of Ecology's (Ecology's) request for additional data for considering the issuance for a No Further Action status for the Site. Information regarding the Site description, background, scope of work, and project schedule for the investigation is provided in the following sections.

1.0 SITE DESCRIPTION

The Site is located to the south of North 34th Street and to the west of Aurora Avenue North/State Route (SR) 99 within a commercial area of Seattle, Washington. The location of the Site is shown on Figure 1. The Site totals 1.79 acres and is improved with a multi-tenant commercial office building, identified as the Lakeview Building, and an associated sub-grade parking garage. The entirety of the building and majority of the land area at the Site is underlain by parking structures. The only portion of the property not underlain by a parking structure is along the east side of the northeastern corner of the building. An access ramp located under the SR 99 Bridge provides access from North 34th Street. On-site operations are primarily corporate office functions. Appendix A depicts the property boundary and extent of lowest level of parking.

The lowest level of the sub-grade parking structure is equipped with four (4) "wells" and a storm water vault. Surface water runoff from the building drainage system and parking areas are directed into these "wells" and vault, which represent a closed drainage system for the building. None of these "wells" and vault are known to intersect the groundwater table. These features also are not expected to alter groundwater flow conditions (i.e., flow direction and/or gradient) beneath the building. The approximate locations of these features are presented on the Survey Map in Appendix A.

2.0 BACKGROUND

The Site has undergone several phases of environmental investigation and remediation as part of prior developments. A detailed history of the Site has been reviewed with Ecology, along with the review of other available information. Previous investigation areas depicting soil sample locations and exploratory test pits are shown on the Site Map, Figure 2. The results of environmental investigation and remedial activities were presented in the following documents:

- *Independent Remedial Action Report (IRAR), Lakeview Building, Seattle, Washington* prepared by AESI dated July 7, 2008.
- *Phase I Environmental Site Assessment (ESA), Lakeview Building, 837 North 34th Street, Seattle, Washington* (Parcel Number 197320-0389), prepared by AEI Consultants, dated April 27, 2012.
- *Subsurface Investigation for the Lakeview Building, 837 North 34th Street, Seattle, Washington*, prepared by AEI Consultants, dated September 26, 2014.
- *McRoberts & Associates, P.C., Correspondence Re: Response to Ecology's Opinion Pursuant to WAC 173-340-515(5) on Remedial Action for the Following Hazardous Waste Site: Fremont Lake View, 837 North 34th Street, Seattle, WA 98103, Facility No.: 5471899, VCP No.: NW2977, Cleanup Site ID: 11902* dated January 31, 2017.

Based on AEI review of Ecology correspondence, it was found the Site would be eligible for a No Further Action status, subject to a Restrictive Covenant, pending favorable results of limited groundwater testing. Reportedly, the issues of concern for groundwater include 1) the historical presence of pentachlorophenol (PCP) detected in Dewatering Wells W-2 and W-5 at concentrations as high as 1.26 micrograms per liter ($\mu\text{g/l}$) in 2000, and 2) the historical presence of petroleum hydrocarbons in soils at the southeastern corner of the building.

3.0 GEOLOGY AND HYDROGEOLOGY

According to the AEI's *Phase I ESA*, the area surrounding the subject property is underlain by Pleistocene-aged glacial drift deposits. AEI's subsurface investigation results also show the Site is underlain by fill materials consisting of dredge spoils associated with the construction of the nearby Lake Washington Ship Canal. The fill materials consist of coarse-grained gravelly sands with intermittent layers of silty clays within the southeast portion of the Site.

Groundwater was encountered at depths of 4 and 10 feet below ground surface (bgs) at Boring SB-4 (advanced within the interior of the underground parking garage) and Boring SB-6 (advanced outside of the building), respectively. The direction of groundwater flow beneath the Site is inferred to be southerly towards the Lake Union Ship Channel, which is located approximately 325 feet to the south. A cross-sectional view of the previous boring and sampling locations is shown on Figure 2.



4.0 SCOPE OF WORK

Based on the specific contaminants of concern discussed with Ecology, the presumed groundwater flow direction, and physical constraints of the Site, two (2) groundwater monitoring wells are proposed for installation within the southeast and southwest corners of the Site. The wells will be installed within the lowest level of the existing parking garage. Upon well installation, the wells will be developed, followed by groundwater sampling. After the first round of groundwater monitoring data is received, the findings will be shared with Ecology to determine whether further groundwater monitoring is appropriate and/or if the Site can proceed towards No Further Action in conjunction with the issuance of the Restrictive Covenant.

5.0 FIELD ACTIVITIES

5.1 Health and Safety Plan and Notice of Intent

A Site-specific health and safety plan (HASp) will be prepared, reviewed by onsite personnel, and kept onsite for the duration of the fieldwork.

A Notice of Intent will be filed with Ecology by the selected drilling subcontractor for this investigation at a minimum of 72 hours in advance of field work.

5.2 Utility Clearance

The proposed well locations will be marked on the ground surface with white paint. Upon marking, the Washington Utilities Notification Center (WUNC) will be contacted, who, in turn, will notify subscribing utility companies of the planned investigation work and for their underground utility locations to be marked on the ground surface. The locations of the underground utilities will also be located and confirmed by a private utility locator under subcontract to AEI. The location of the proposed monitoring wells may be shifted by the utility locator depending upon the location(s) of underground utilities.

5.3 Drilling

Two (2) groundwater monitoring wells (MW-1 and MW-2) will be installed at the Site. The borings for the monitoring wells installation will be advanced with a limited access direct push drilling rig. The wells will be installed to a maximum depth of 14 feet (which is a depth below the lowest level of the sub-grade parking garage) depending upon subsurface conditions. Drilling will be performed by a qualified, experienced, State of Washington-licensed drilling company under subcontract to AEI. Drilling operations will be overseen by an experienced AEI environmental professional under the direct oversight of an AEI State of Washington Licensed Geologist (LG). The location of the proposed monitoring wells are shown on Figure 2. Also included is Figure 3 representing cross-section A-A'.

5.3.1 Soil Sampling

The borings will be continuously sampled throughout its entire depth for the purposes of lithologic logging, field screening (headspace testing), and laboratory analyses. During drilling operations, soil samples will be obtained using a single-walled coring system approximately 2.25 inches in diameter and 4 feet in length containing plastic liners. The coring system will be connected to 1-inch diameter, flush-jointed drill rods hydraulically driven by the rig to each target sample depth. Upon retrieval from each sample depth interval, the coring system will be opened, and the liners will be removed and cut for visual inspection and lithologic logging purposes. Upon retrieval from each sample depth interval, the sampling system will be opened for visual inspection, headspace testing, and lithologic logging. Recovered soil samples will be examined for soil classification and described on detailed boring logs in general conformance with the Unified Soil Classification System (USCS). Additional lithologic descriptions and drilling information will be recorded on the boring logs.

Soil samples from the drilling activities will be obtained for potential laboratory analyses and placed on hold with the analytical laboratory. The samples will be retained either in plastic liners or 4-ounce glass mason jars (provided by the analytical laboratory). Upon collection (if the samples are retained in plastic liners), the ends of the tubes will be covered with Teflon tape and capped. The samples will be labeled with the project name, project number, boring number, sample depth, and sampling date/time of sampling. Upon labelling, the samples will be placed into a chilled ice chest containing crush ice for transport to the analytical laboratory. Chain-of-custody documentation will accompany the samples to the analytical laboratory.

It is also assumed , at a minimum, one (1) composite soil sample of the soil cuttings generated during drilling operations will be submitted for laboratory analyses. This composite sample will be analyzed for waste profiling purposes.

5.3.2 Headspace Testing

During drilling activities, headspace testing will be performed with a photo-ionization detector (PID) equipped with an electrodeless 10.6 eV ultraviolet lamp or equivalent for detecting the potential presence of total volatile organic compounds (VOCs) in the soil samples. To initiate the headspace testing procedure, soil samples will be removed from the sampling or coring system, placed into labeled, plastic bags, and sealed for conducting the tests. After sufficient time has elapsed for vapor build-up inside the bags, each bag will be punctured with the probe tip of the PID to allow for measurement of the headspace. Measurements of the headspace will be obtained in the parts per million per volume (ppmv) range for total VOCs. The results of the headspace tests (PID readings) will be recorded on the boring logs.

5.4 Monitoring Well Construction

The monitoring wells will be constructed with a pre-packed ¾-inch diameter monitoring well. The well screen will have a maximum length of 10 feet with 0.010-inch slots. Annular spaces around the well screen will be filter-packed with State of Washington-approved sands and extend approximately 1 to 2 feet above the top of the well screen.



After pre-packed monitoring well placement, the bentonite seal will be hydrated prior to installing the grout seal within the remainder of the annular space. Upon hydration, a neat cement grout will be placed along the remainder of the annulus and extend upward to an elevation slightly below grade. The grout will consist of Portland cement Types II, or III with a ratio of up to six (6) gallons of potable water for every sack of cement. A schematic showing the monitoring well construction is shown on Figure 4.

Following well installation, a small V-notch will be cut into the north side of the well casing to serve as a common reference point for future groundwater level measurements. An expandable locking cap will also be installed at the top of the well casings. The monitoring wells will be completed below grade and encased inside a flush-mounted, traffic-proof well vault.

Prior to installing the well vault, a cylindrical-or rectangular-shaped hole larger than the outer diameter of the well vault will be excavated around the newly-installed well casing to allow installation of the well vault and surface seal. The top of each vault will be positioned slightly above the ground surface to divert surface water away from the vault and to minimize potential leakage around the well casing. The surface seal around each well vault will consist of concrete.

5.5 Well Development

Upon completion of well installation, the wells will be developed using conventional development procedures. Well development will take place at least 24 hours after the completion of the well installation. The well will be developed to remove fine-grained materials inside the filter pack and well casing, to stabilize the filter pack around the well screen, and to allow for the collection of representative groundwater samples. The well will be developed using a combination of surging, swabbing, and bailing methods. Groundwater parameters, including pH, conductivity, temperature, and turbidity, will be monitored. Well development procedures will continue until at least five to ten volumes of standing water are removed, and groundwater parameters have stabilized.

5.6 Groundwater Monitoring and Sampling

Groundwater monitoring and sampling activities will be performed upon completion of the well development. Prior to sampling activities, a groundwater level will be obtained for measuring the depth to groundwater. Groundwater purging and sampling will then be performed to evaluate the water quality. Groundwater monitoring and sampling procedures will be documented on a Groundwater Sampling Log.

5.6.1 Groundwater Level Measurement

Prior to sampling activities, the groundwater level will be measured at the wells with an electronic water level sounder capable of recording measurements to the nearest +/- 0.01 foot. The measurement will be referenced to an established reference point (V-notch) at the top of the well casing. The groundwater level measurement will be recorded on the Groundwater Sampling Log.



5.6.2 Groundwater Purging

Well purging will be performed to remove standing water from the well casing and to allow fresh groundwater within the vicinity of the well screen to enter the well casing. Prior to purging, the standing water volume inside the well will be calculated to estimate the purge volume based upon the difference between depth to water and monitoring well depth.

At least three (3) volumes of groundwater will be purged from the well prior to sampling. Field parameters, including pH, temperature, conductivity, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity, will be measured recorded on the Groundwater Sampling Log, and monitored until those parameters stabilize. The appearance of the purged water, such as clarity (color) and odor, also will be noted on the Groundwater Sampling Log. If suspended solids or sediment appear to be present in water during purging, then provisions will be taken to ensure representative sample quality. Low flow purging, instead of conventional groundwater purging, may be utilized to purge the wells prior to sampling, which will be dependent upon field conditions. The sample will be obtained upon stabilization of the field parameters.

The wells will be purged in a consistent manner to ensure the collection of a representative groundwater sample and that the sample will not be affected by interactions with the atmosphere or well materials. After the purging is completed, the wells will be allowed to recover adequately prior to sample collection.

5.6.3 Groundwater Sampling

Groundwater samples will be obtained using a clean, disposable sample bailer or using a low-flow, micro-purging sampling device. Upon collection, the groundwater samples will be poured from the bailer or other sampling device(s) (from the micro-purging method) into appropriate laboratory-supplied containers. The sample container(s) will be labeled with the project name, project number, well number, sampling date, sampler's initials, analysis to be performed, preservatives used, and other pertinent information that may be useful to ensure proper sample identification. Upon labelling, the sample container(s) will then be placed on crushed ice inside a pre-chilled cooler capable of maintaining a temperature no greater than 4 degrees Centigrade for transportation to the analytical laboratory with formal chain-of-custody (COC) documentation.

5.7 Decontamination and Waste Containerization

Drilling equipment will be steam-cleaned or pressure-washed within a self-contained decontamination unit located at a designated, centralized onsite area during drilling activities. Cleaning of the drilling equipment will occur prior to or after drilling each boring during field activities. Sampling equipment will be cleaned either by pressure-washing or using a triple rinse method. The triple rinse method consists of cleaning the sampling equipment initially with an Alconox and water solution, followed by two (2) tap water rinses (second and final rinses).

Soil cuttings generated during drilling will be placed into appropriate, sealed and labeled waste containers [Washington Department of Transportation (DOT)-approved 55-gallon waste drums]



for temporary storage onsite pending receipt of the analytical results. Decontamination water will be also contained within DOT-approved 55-gallon waste drums for temporary storage onsite pending receipt of the analytical results.

Groundwater purging equipment will be cleaned prior to and after groundwater sample collection. The equipment will be cleaned using a triple rinse method, as previously described. Purge and decontamination water will be placed into 55-gallon waste drums for temporary storage onsite pending receipt of the analytical results.

6.0 LABORATORY ANALYSES

Soil and groundwater samples will be analyzed by a State of Washington-certified analytical laboratory accredited through the State of Washington Department of Ecology Accreditation Program. The groundwater samples will be analyzed for the following chemical constituents:

- Diesel and Lube Range Organics by Method NWTPH-Dx
- PCP by EPA Method 604

The composite soil sample obtained from the drummed soil cuttings will be analyzed for the same chemical constituents, mentioned above, as well as for other chemical groups that may be required for laboratory analyses and waste profiling prior to disposal at an appropriate, offsite landfill facility. The samples will be analyzed over a standard turnaround schedule between five (5) and ten (10) business days and within published analytical method hold times.

7.0 REPORT PREPARATION

Upon completion of the field activities and receipt of the laboratory analytical data, AEI will prepare a technical report, which will include a description of the Site conditions, summary of investigative methodologies, analytical results, findings, conclusions, and recommendations. The report will include tables showing the analytical results, figures showing well locations and distribution of laboratory analytical results, as appropriate, and appendices for groundwater sampling log, chain-of-custody documentation, certified analytical results, and other pertinent information.

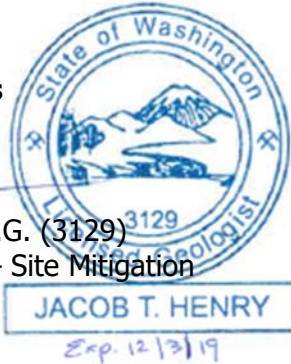
8.0 PROJECT SCHEDULE

Pre-field activities for this investigation are expected to commence in July 2019. It is anticipated that the well installation and sampling work will occurring in July or August 2019 with the report to following within one month of receipt of analytical results. Scheduling of the pre-field activities, field activities, and report preparation will be contingent upon access arrangements, subcontractor availability, and receipt of laboratory analyses.

We trust the information presented in this workplan meets your needs at this time. If you have any questions or comments regarding this workplan, please do not hesitate to contact Peter McIntyre at pmcintyre@aeiconsultants.com or Jacob Henry at jhenry@aeiconsultants.com.

Sincerely,
AEI Consultants

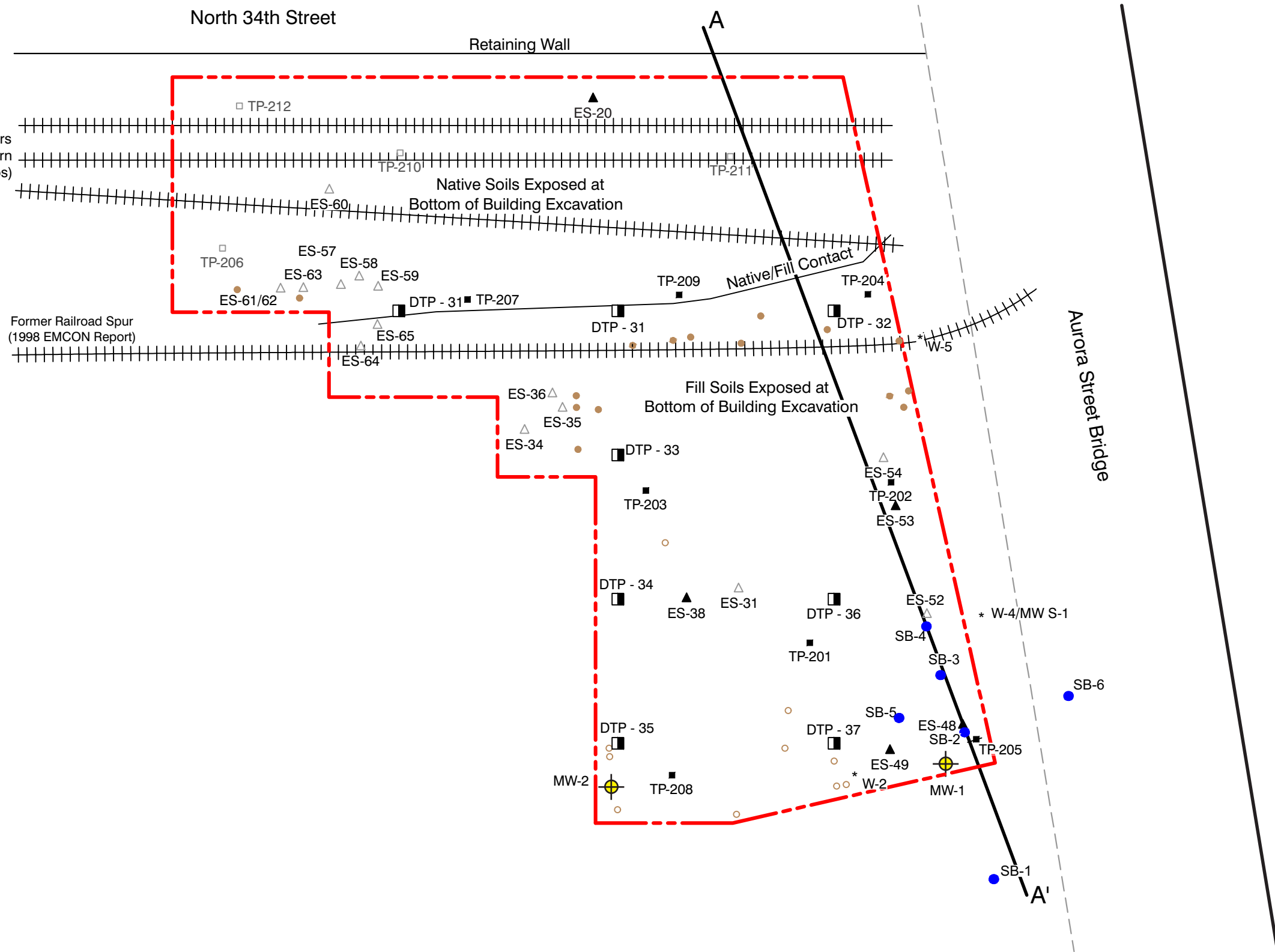
Jacob T. Henry, L.G. (3129)
Senior Geologist – Site Mitigation



Enclosures

- Figure 1 Site Location Map
 - Figure 2 Detailed Site Map
 - Figure 3 A-A' Sample Location Vertical Cross Section
 - Figure 4 Groundwater Monitoring Well Construction Detail
- Appendix A Bush, Roed & Hitchings Inc. Survey Map

P:\Companywide Projects\307000 Series\307024 Seattle, WA\Figures\2016 10 17 - Figures\2016 10 17 - Figure6/18/2016



- LEGEND**
- Excavation Area Test Pit [1997]
 - ▲ Soil Sample, In Place [May 2007]
 - △ Soil Sample, Removed [May 2007]
 - Exploration Pit, Removed [May 2007]
 - Exploration Pit, In Place [May 2007]
 - Wood Pile, With Creosote [May to Aug 2007]
 - Wood Pile, Without Creosote [May to Aug 2007]
 - AEI Soil Sample [July 2014]
 - ⊕ Proposed Monitoring Well Location



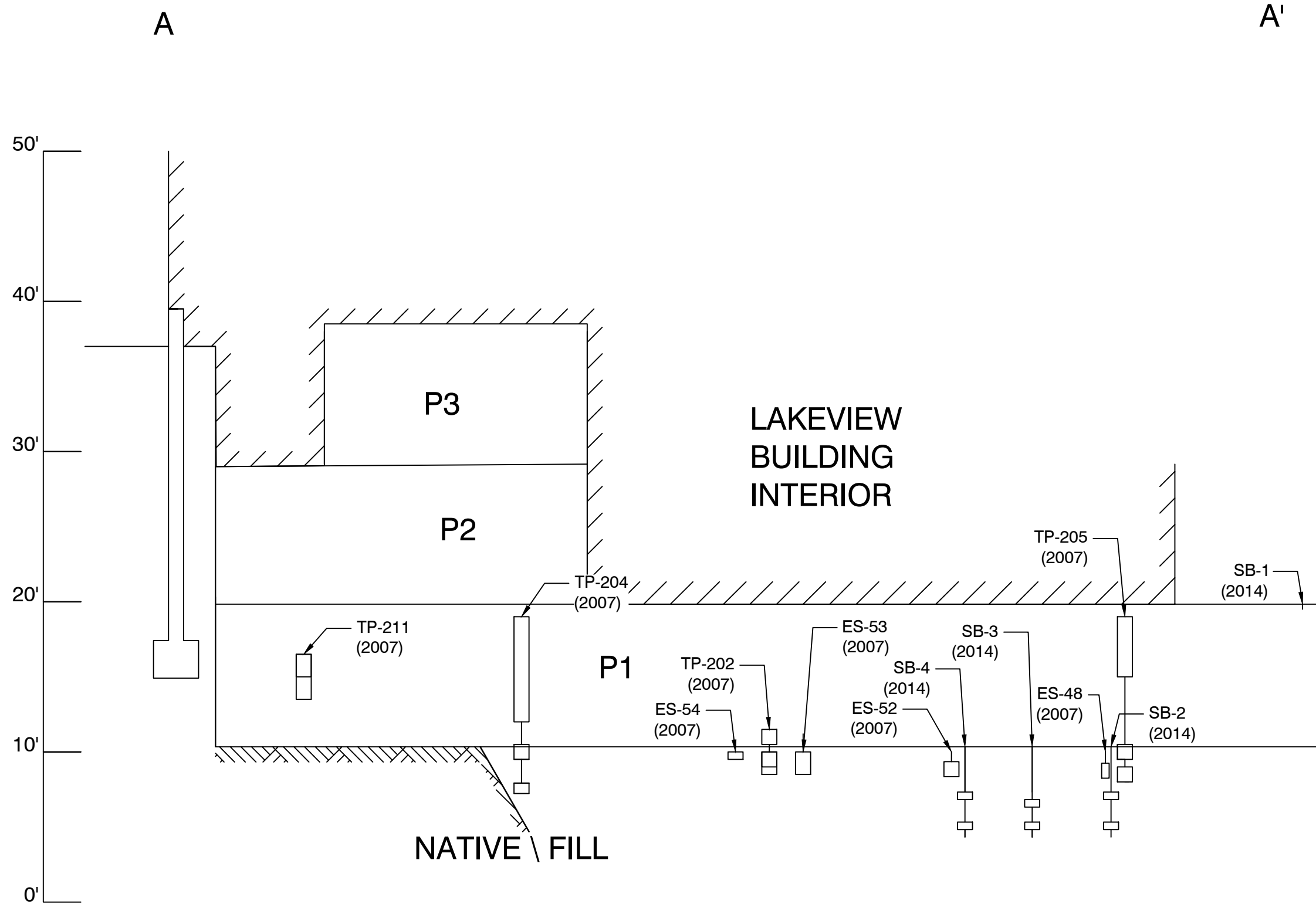
AEI CONSULTANTS
 2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

Site Plan

Lakeview Building
 Seattle, WA

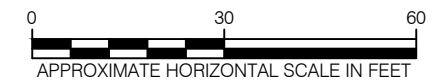
FIGURE 2
 Project No. 307024

Rev. 3/29/19



LEGEND

NOTE:
VERTICAL DATUM AND ELEVATIONS AS DEFINED BY
QUADRANT SHEET A3.1: BUILDING ELEVATIONS DATED
OCTOBER 2, 2000

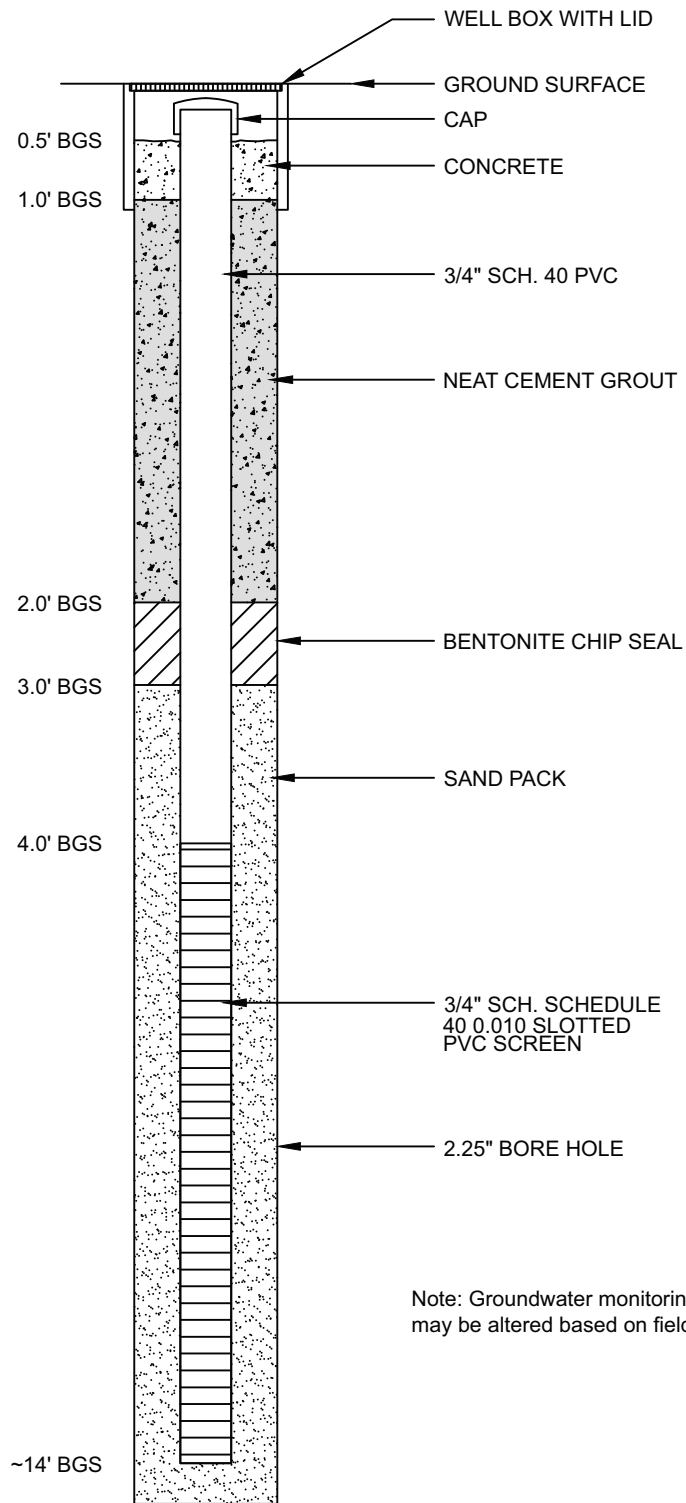


AEI CONSULTANTS
2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

A-A'
**SAMPLE LOCATION VERTICAL
CROSS SECTION**

Lakeview Building
Seattle, WA

FIGURE 3
Project No. 307024



LEGEND

Not to Scale

AEI Consultants

2500 Camino Diablo, Walnut Creek, California

GROUNDWATER MONITORING WELL CONSTRUCTION DETAIL

Lakeview Building
Seattle, Washington

FIGURE 4
Project No. 307024

