Preliminary Geotechnical Report

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

for
Washington State Department of Enterprise Services

April 7, 2023

GeoEngineers
Earth Science + Technology

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Olympia, Washington

File No. 21127-007-00

April 7, 2023

Prepared for:

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GeoEngineers

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1.0 INTRODUCTION

This report summarizes the preliminary results of GeoEngineers' geotechnical engineering services for the proposed Pritchard Rehabilitation and Expansion Project. The site is bounded by 15th Avenue SW and the O'Brien building to the north, a public parking lot to the east, 16th Avenue SW to the south and a steep slope to Capitol Lake to the west. The site is shown in the Vicinity Map, Figure 1 and the Site Plan, Figure 2.

The purpose of this study is to provide preliminary geotechnical engineering conclusions and recommendations for the design and construction of the planned development. The proposed development consists of a seismic retrofit of the existing building, construction of a three-story building basement to the east of the existing building, and ground improvement for slope stabilization to the west of the existing building. GeoEngineers' geotechnical engineering services for this study were completed in general accordance with our services agreement executed December 21, 2022.

2.0 SCOPE OF SERVICES

GeoEngineers' scope of services for this report included the following:

1. Review of available reports and studies for the site and surrounding area available from our files.
2. Drill two borings to further characterize subsurface soil and groundwater conditions.
3. Perform geophysical testing to measure the shear wave velocity profile of the site.
4. Perform geotechnical laboratory testing, prepare boring logs and cross-sections.
5. Complete engineering analyses to develop preliminary seismic parameters and geotechnical foundation design recommendations.
6. Provide recommendations regarding groundwater conditions, including estimated groundwater elevation.
7. Prepare this report.

3.0 PROJECT DESCRIPTION

The Pritchard Rehabilitation and Expansion project consists of a seismic retrofit of the existing building, construction of a three-story building basement to the east of the existing building, and ground improvement for slope stabilization to the west of the existing building. Based on our conversations with the project team, we understand that the proposed retrofit and new three-story building with basement will be founded on shallow foundations. GeoEngineers is also leading the effort for slope stabilization west of the existing building. Current plans for slope stabilization consist of installing 18- to 24-inch-diameter rigid inclusions at the top of the slope to a depth of approximately 56 to 65 feet from ground surface.

4.0 FIELD EXPLORATIONS AND LABORATORY TESTING

4.1. Field Explorations

Subsurface conditions near the existing building were explored on February 11, 2023 by GeoEngineers after completing two standard penetration test (SPT) borings GEI-1 and GEI-2 to depths of 130 feet below existing ground surface (bgs). Borings were drilled on the west side of the building near the slope to further evaluate the subsurface soil and groundwater conditions along the steep slope area west of the Pritchard Building. The approximate locations of the explorations are shown in Figure 2. A description of the GeoEngineers field exploration program and the boring logs are presented in Appendix A.

4.2. Laboratory Testing

Soil samples were obtained during drilling and delivered to GeoEngineers' soils laboratory for further evaluation. Selected samples were tested for the determination of moisture content, fines content, particle size gradation and Atterberg limits. A description of the laboratory testing, and the test results are presented in Appendix B.

5.0 PREVIOUS SITE EVALUATIONS

In addition to the explorations completed as part of this evaluation, the logs of selected explorations from previous studies in the project vicinity were reviewed as included in the MITHUN 2022 LCM Addendum Report. The explorations we reviewed included SPT borings GB-2 completed on August 3, 2009 and GB-3 completed on June 22, 2010 by Golder Associates to depths of 104 feet and 102 feet bgs, respectively. SPT boring S-1 was completed on April 29, 2001 by Shannon & Wilson, Inc. to a depth of 101.5 feet bgs. The logs of explorations from previous projects referenced for this study are presented in Appendix C.

6.0 SITE CONDITIONS

6.1. Surface Conditions

The site is located at the top of a slope with existing grades at approximate Elevation 133 feet. A steep slope is mapped immediately to the west of the existing building. The slope grades from approximately Elevation 133 feet to Elevation 30 feet over approximately a distance of 400 feet.

Numerous utilities are located within and near the project site. Utilities include, but are not limited to, electrical, telecommunication, gas, overhead power, water, sanitary sewer and storm drain.

6.2. Subsurface Soil Conditions

GeoEngineers' understanding of subsurface conditions at the site is based on the SPT borings completed near the near the project site as described in previous section. The soils encountered at the site generally consist of fill, Vashon recessional deposits and glacially consolidated soils, described in more details below:

- **Fill** soils were encountered below the existing grade for an approximate depth ranging from 0 to 5 feet at most of the exploration locations. The fill generally consisted of loose fine to medium silty sand and occasional organic matter.

- **Vashon recessional deposits** consist of loose to dense sand with varying amounts of silt content, and silt. In general, loose sands and medium stiff silts were encountered at depths ranging from 5 to 12 feet below existing site grades followed by stiff silt and medium dense sand with varying amounts of silt content at depths ranging from 12 to 50 feet below existing site grades. Medium dense to dense sand and stiff to very stiff silts were encountered at depths ranging from approximately 50 to 95 feet below existing site grades.
- **Glacially consolidated soils** were encountered below the Vashon recessional deposits and generally consist of dense to very dense sand and gravel with variable silt content and very stiff silt.

6.3. Groundwater Conditions

Groundwater was not observed at the time of drilling in previous explorations and those completed by GeoEngineers in 2023. Groundwater conditions were monitored at monitoring wells installed at GEI-1 and GEI-2 in February and March, 2023. Table 1 shows groundwater reading information. Groundwater was correlated to depths of approximately 84 to 124 feet below existing ground surface, corresponding to approximate Elevations 39 to 45 feet (NAVD88 [North American Vertical Datum of 1988]). Groundwater levels may vary as a function of precipitation, season and other factors. We will continue to monitor groundwater levels in the coming months.

TABLE 1. GROUNDWATER READINGS

Monitoring Well ID	Date of Reading	Ground Surface Elevation (feet)	Groundwater Depth (feet)	Groundwater Elevation (feet)
GEI-1	2/16/2023	128	87.6	40.4
GEI-1	2/23/2023	128	84.3	43.7
GEI-1	3/15/2023	128	88.9	39.1
GEI-2	2/16/2023	141	96.1	44.9
GEI-2	2/23/2023	141	124.1	16.9
GEI-2	3/15/2023	141	96.5	44.5

6.4. Geophysical Survey

We completed a geophysical testing program at the site consisting of three two-dimensional (2D) passive-source microtremor array method (MAM) and one one-dimensional (1D) regional MAM survey. The 2D MAM surveys were completed to determine the Vs30 of the site soil and American Society of Civil Engineers (ASCE) 7 Site Class for use in the seismic design. The site is classified as Site Class D based on the shear wave velocity measurements performed at the site.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1. Summary

A summary of the primary geotechnical considerations is provided below. The summary is presented for introductory purposes only and should be used in conjunction with the complete recommendations presented in this report.

- The site is designated as seismic Site Class D per ASCE 7-16.
- The regional groundwater table was not encountered at the time of explorations, but later identified in the monitoring wells installed between elevations 16.9 and 44.5 feet. However, perched groundwater may be encountered within basement or utility excavation depths within the more permeable sand layers and near the geologic unit contacts. Perched groundwater that flows into the site excavations can be controlled by means of casual dewatering using sumps and pumps.
- Shallow foundations may be used and should bear on compacted existing granular soils or a minimum of 2-foot-thick import structural fill. For shallow foundations bearing directly on compacted existing granular soils, an ultimate soil bearing pressures per Tables 3 and 4 in Section 7.3.1. may be used in design.

Our specific geotechnical recommendations are presented in the following sections of this report.

7.2. Earthquake Engineering

The following section summarizes liquefaction hazard at the site and mapped seismic parameters.

7.2.1. Liquefaction

Liquefaction refers to the condition by which vibration or shaking of the ground, usually from earthquake forces, results in the development of excess pore pressures in saturated soils with subsequent loss of strength. In general, soils that are susceptible to liquefaction include very loose to medium dense, clean to silty sands that are below the water table.

Perched groundwater levels at the site are within the dense to very dense glacially consolidated soils. Our analysis indicates that the soils that underlie the proposed building area have a low risk of liquefying because of the depth to groundwater, and the density and gradation of the soils underlying the building.

7.2.2. Other Seismic Hazards

Due to the location of the site and the site's topography and subsurface and groundwater conditions, the risk of adverse impacts resulting from differential settlement is low. Seismically-induced slope instability and lateral spreading will be addressed through the implementation of a ground improvement program consisting of rigid inclusions along the west side of the existing building and top of the slope as described in Section 8.0.

7.2.3. ASCE 7-16 and ASCE 41-17 Mapped Seismic Parameters

Tables 2 and 3 present the ASCE 7-16 and ASCE 41-17 mapped seismic parameters.

TABLE 2. ASCE 7-16 MAPPED PARAMETERS (LATITUDE 47.0344°N, LONGITUDE 122.9048°W)

Parameter	Mapped
Site Class	D
Short-period mapped MCE_R spectral response acceleration, S_S (g)	1.407
Long-period mapped MCE_R spectral response acceleration, S_1 (g)	0.523
Short-period site coefficient, F_a	1.0
Long-period site coefficient, F_v	1.78
Short-period MCE_R spectral response acceleration adjusted for site class, S_{MS} (g)	1.407
Long-period MCE_R spectral response acceleration adjusted for site class, S_{M1} (g)	1.396[2]
Short-period design spectral response acceleration adjusted for site class, S_{DS} (g)	0.938
Long-period design spectral response acceleration adjusted for site class, S_{D1} (g)	0.931
Long-period transition period, T_L (sec)	16

Notes:

1. Per ASCE 7-16 Section 21.3.
2. Scaled by 1.5 per ASCE 7-16 Supplement 3 Section 11.4.8.

TABLE 3. ASCE 41-17 MAPPED PARAMETERS (LATITUDE 47.0344°N, LONGITUDE 122.9048°W)

Parameter	Mapped
Site Class	D
BSE-2N design short-period spectral response acceleration parameter, S_{XS} (g)	1.407
BSE-2N design spectral response acceleration parameter at 1-s period, S_{X1} (g)	1.396
BSE-1N design short-period spectral response acceleration parameter, S_{XS} (g)	0.938
BSE-1N design spectral response acceleration parameter at 1-s period, S_{X1} (g)	0.931

7.3. Shallow Foundations

The planned building can be supported on shallow foundations bearing on competent compacted existing granular soils or compacted structural fill.

Based on the data obtained from the borings completed at the site and the current design concept, the foundation levels will extend into the Vashon recessional deposits. Fill soils are anticipated at the foundation subgrade elevation when proper compaction is not feasible on existing granular soils.

7.3.1. Ultimate Bearing Pressure

Ultimate soil bearing pressures were computed for a range of footing sizes and embedment depths given that footing design is not yet finalized. Figure 3 presents ultimate bearing capacity for square footings and Figure 4 ultimate bearing capacity for strip footings.

7.3.2. Settlement

Provided that all loose soil is removed and that the subgrade is prepared as recommended under "Construction Considerations" below, we estimate that the total settlement of shallow spread footings will be about 1 inch or less. The settlements will occur rapidly, essentially as loads are applied. Differential

settlements between footings could be half of the total settlement. Note that smaller settlements will result from lower applied loads.

7.3.2.1. Lateral Resistance

Lateral foundation loads may be resisted by passive resistance on the sides of footings and by friction on the base of the shallow foundations. For shallow foundations supported on native soils, the allowable frictional resistance may be computed using a coefficient of friction of 0.45 applied to vertical dead-load forces.

The allowable passive resistance may be computed using an equivalent fluid density of 260 pounds per cubic foot (pcf) (triangular distribution). These values are appropriate for foundation elements that are poured directly against compacted existing granular soils or structural fill.

The above coefficient of friction and passive equivalent fluid density values incorporate a factor of safety of about 1.5.

7.3.2.2. Construction Considerations

We recommend that the condition of all subgrade areas be observed by GeoEngineers to evaluate whether the work is completed in accordance with our recommendations and whether the subsurface conditions are as anticipated.

If foundation construction is completed during periods of wet weather, foundation subgrades are recommended to be protected with a rat slab consisting of 2 to 4 inches of lean/structural concrete or crushed rock.

If soft areas are present at the footing subgrade elevation, the soft areas should be removed and replaced with lean concrete at the direction of GeoEngineers. Where lean concrete is used, the zone of lean concrete or crushed rock may be limited to the foundation footprint.

8.0 SLOPE STABILIZATION PROGRAM

In the effort to mitigate the risk that the steep slope instability poses to the existing and proposed building additions, GeoEngineers evaluated ground improvement options for slope stabilization. Our analysis consisted of performing Newmark analyses of the slope considering the measured groundwater elevations and the seismic loadings per ASCE 7 code. The ground improvement system was designed to keep the slope deformation to an amount that the differential settlement of the building foundation is less than ½ inch to 1 inch over a horizontal distance of 20 feet. Our schematic ground improvement design consisted of reinforced concrete columns constructed to reinforce the soil such that the seismic deformation of the ground is within the tolerable amount. Figures 5 and 6 present the two schematic ground improvement design layouts for use in the upper bound and lower bound construction cost estimates.

8.1. Rigid Inclusions

Rigid inclusions for this project should consist of 18- to 24-inch-diameter lean or structural concrete columns installed for slope stabilization on the west side of the existing building. Rigid inclusions spacing and length should be determined such that the rigid inclusions provide enough resistance for to maintain

stability of the slope during an earthquake event. For preliminary design purposes, we proposed the two schematic design layouts previously referenced.

Rigid inclusions are constructed using similar techniques for installing drilled shafts or augercast piles. Where augercast methods are used, the rigid inclusion casting process consists of drilling a continuous flight auger to the specified tip elevation of the column and pumping grout from bottom up through the hollow section of the auger. For drilled shaft installation methodology, the shaft is drilled to the specified tip elevation, the bottom of the shaft is cleaned out, and concrete is placed in the drilled shaft. Measures to maintain shaft stability, such as the use of a water head, polymer slurry or temporary casing may be required depending on the ground conditions. Where water is present in the drilled shaft, the concrete should be placed using a tremie pipe.

The layout/design of the rigid inclusions will be completed once during final design. For preliminary design and pricing purposes, we provide the following preliminary design information for ground improvement:

- Eighteen-inch-diameter, 56-foot-long columns (lower bound estimate) and 24-inch-diameter, 65-foot-long columns (upper bound estimate);
- Five-foot triangular rigid inclusion spacing (lower bound estimate), and 5- and 4-foot triangular rigid inclusion spacing (upper bound estimate);
- The concrete mixture for the rigid inclusions should have a minimum compressive strength (f_c') at 28 days of 4,000 pounds per square inch (psi).
- Rigid inclusions should be overlain by a 1.5-foot-thick layer of controlled-density fill (CDF) to act as a load transfer pad (LTP) for uniform load distribution on the rigid inclusions.

During final slope stabilization design, GeoEngineers will prepare a final ground improvement plan and specifications.

8.2. Slab-on-Grade Floors

Conventional slabs-on-grade are appropriate where located over undisturbed native soils or compacted structural fill. Recommendations for conventional slabs-on-grade are provided below.

8.2.1. Subgrade Preparation

The exposed subgrade should be evaluated after site grading is complete. Probing should be used to evaluate the subgrade. The exposed soil should be firm and unyielding, and without significant groundwater. Disturbed areas should be recompacted if possible or removed and replaced with compacted structural fill.

The site should be rough graded to approximately 1 foot above slab subgrade elevation prior to foundation construction in order to protect the slab subgrade soils from deterioration from wet weather or construction traffic. After the foundations and below slab drainage system have been constructed, the remaining soils can be removed to final subgrade elevation followed by immediate placement of the capillary break material.

8.2.2. Design Parameters

Conventional slabs may be supported on-grade, provided the subgrade soils are prepared as recommended. We recommend that the slab be founded on either existing compacted granular soils or on structural fill placed over the existing granular soils. For slabs designed as a beam on an elastic foundation, a modulus of subgrade reaction of 150 pounds per cubic inch (pci) may be used for subgrade soils prepared as recommended.

We recommend that the slab-on-grade floors be underlain by a 6-inch-thick capillary break layer consisting of material meeting the requirements of Mineral Aggregate Type 22 (¾-inch crushed gravel), City of Seattle Standard Specification 9-03.14.

Provided that loose soil is removed and the subgrade is prepared as recommended, we estimate that slabs-on-grade will not settle appreciably.

8.3. Below-Grade Walls

The following section presents below-grade walls recommended lateral soil pressures and drainage.

8.3.1. Permanent Below-Grade Walls

Conventional cast-in-place walls may be necessary for small retaining structures or below-grade building walls located on site. The lateral soil pressures acting on conventional cast-in-place subsurface walls will depend on the nature, density and configuration of the soil behind the wall, and the amount of lateral wall movement that can occur as backfill is placed.

For walls that are free to yield at the top at least 0.1 percent of the height of the wall, soil pressures will be less than if movement is limited by such factors as wall stiffness or bracing. Assuming that the walls are backfilled and drainage is provided as outlined in the following paragraphs, we recommend that yielding walls supporting horizontal backfill be designed using an equivalent fluid density of 35 pcf (triangular distribution), while non-yielding walls supporting horizontal backfill be designed using an equivalent fluid density of 55 pcf (triangular distribution). For seismic loading conditions, a rectangular earth pressure equal to 11H pounds per square foot (psf) (where H is the height of the wall in feet) should be added to the active/at-rest pressures. Other surcharge loading should be applied as appropriate.

Lateral resistance for conventional cast-in-place walls can be provided by frictional resistance along the base of the wall and passive resistance in front of the wall. For walls founded on native soils, the allowable frictional resistance may be computed using a coefficient of friction of 0.42 applied to vertical dead-load forces. The allowable passive resistance may be computed using an equivalent fluid density of 260 pcf (triangular distribution). The above coefficient of friction and passive equivalent fluid density values incorporate a factor of safety of about 1.5.

The above soil pressures assume that wall drains will be installed to prevent the buildup of hydrostatic pressure behind the walls, as discussed below.

8.3.2. Drainage

Drainage behind the permanent below-grade walls is typically provided using prefabricated drainage board attached to the shoring walls. Weep pipes that extend through the permanent below-grade wall should be

installed around the perimeter of the building at the footing elevation. The weep pipes should have a minimum diameter of 2 inches. The weep pipes through the permanent below-grade wall should be spaced no more than 8 feet on-center and should be hydraulically connected to the sump. These weep pipes may be designed for a hard connection to the perimeter drains.

The earth pressures for permanent below-grade walls assume that adequate drainage is provided behind the wall. Prefabricated geocomposite drainage material, such as Aquadrain 15X, should be installed vertically to the face of the lagging/shotcrete.

Full wall face coverage is recommended to minimize seepage and/or wet areas at the face of the permanent wall. Full wall face coverage should extend from 2 feet below the weep pipe elevation up to about 3 to 5 feet below the top of the wall to reduce the potential for surface water to enter the wall drainage system. Although the use of full wall face coverage will reduce the likelihood of seepage and/or wet areas at the face of the permanent wall, the potential still exists for these conditions to occur. If this is a concern, waterproofing should be specified.

Positive drainage should be provided behind cast-in-place retaining walls by placing a minimum 2-foot-wide zone of "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the Washington State Department of Transportation (WSDOT) Standard Specifications with the exception that the percent passing the U.S. No. 200 sieve is to be less than 3 percent. A perforated drainpipe should be placed near the base of the retaining wall to provide drainage. The drainpipe should be surrounded by a minimum of 6 inches of Mineral Aggregate Type 22 (¾-inch crushed gravel) or Type 5 (1-inch washed gravel), City of Seattle Standard Specification 9-03.14, or an alternative approved by GeoEngineers. The Type 22 or Type 5 material should be wrapped with a geotextile filter fabric meeting the requirements of construction geotextile for underground drainage, WSDOT Standard Specification 9-33. The wall drainpipe should be connected to a header pipe and routed to a sump or gravity drain. Appropriate cleanouts for drainpipe maintenance should be installed. A larger-diameter pipe will allow for easier maintenance of drainage systems.

8.4. Earthwork

The following section presents material and earthwork procedures recommendations.

8.4.1. Subgrade Preparation

The exposed subgrade in structure and hardscape areas should be evaluated after site excavation is complete. Disturbed areas below slabs should be recompacted if the subgrade soil consists of granular material. If the subgrade soils consist of disturbed soils, it will likely be necessary to remove and replace the disturbed soil with structural fill unless the soil can be adequately moisture-conditioned and compacted.

8.4.2. Structural Fill

Fill placed to support structures, placed behind retaining structures, and placed below pavements and sidewalks will need to be specified as structural fill as described below:

- If structural fill is necessary beneath building slabs, the fill should meet the requirements of "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications.

- If structural fill is necessary beneath building foundations, the fill should consist of CDF, lean concrete or structural concrete.
- Structural fill placed behind retaining walls should meet the requirements of "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications.
- Structural fill placed within utility trenches and below pavement and sidewalk areas should consist of CDF, or fill meeting the requirements of "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications.
- Structural fill placed around perimeter footing drains, underslab drains and cast-in-place wall drains should meet the requirements of pea gravel or "gravel backfill for drains" as described in Section 9-03-12(4) of the WSDOT Standard Specifications.
- Structural fill placed as capillary break material should meet the requirements of Mineral Aggregate Type 22 (¾-inch crushed gravel), City of Seattle Standard Specification 9-03.14.
- Structural fill placed as crushed surfacing base course (CSBC) below pavements and sidewalks should meet the requirements of 1¼-inch-minus crushed rock as described in Section 9-03.9(3) of the WSDOT Standard Specifications.

8.4.2.1. On-site Soils

The fill soils required for the project have specific gradation requirements. If the contractor elects to use on-site soils for structural fill, GeoEngineers can evaluate the on-site soils for suitability as structural fill, as required.

8.4.2.2. Fill Placement and Compaction Criteria

Structural fill should be mechanically compacted to a firm, non-yielding condition. Structural fill should be placed in loose lifts not exceeding 1 foot in thickness. Each lift should be conditioned to the proper moisture content and compacted to the specified density before placing subsequent lifts. Structural fill should be compacted to the following criteria:

- Structural fill placed in building areas (supporting slab-on-grade floors) and in pavement and sidewalk areas (including utility trench backfill) should be compacted to at least 95 percent of the maximum dry density (MDD) estimated in general accordance with ASTM International (ASTM) Standard Practices Test Method D 1557.
- Structural fill placed against below-grade walls should be compacted to between 90 and 92 percent. Care should be taken when compacting fill against subsurface walls to avoid overcompaction and hence, overstressing the walls.

We recommend that GeoEngineers be present during probing of the exposed subgrade soils in building and pavement areas, and during placement of structural fill. We will evaluate the adequacy of the subgrade soils and identify areas needing further work, perform in-place moisture-density tests in the fill to verify compliance with the compaction specifications and advise on any modifications to the procedures that may be appropriate for the prevailing conditions.

8.4.2.3. Weather Considerations

Portions of the on-site soils contain a sufficient percentage of fines (silt and clay) to be moisture-sensitive. When the moisture content of these soils is more than a few percent above the optimum moisture content,

these soils become muddy and unstable, and operation of equipment on these soils is difficult. Additionally, disturbance of near-surface soils should be expected if earthwork is completed during periods of wet weather. During wet weather, we recommend the following:

- The ground surface in and around the work area should be sloped so that surface water is directed away from the work area. The ground surface should be graded such that areas of ponded water do not develop. The contractor should take measures to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.
- Slopes with exposed soils should be covered with plastic sheeting or similar means.
- The site soils should not be left uncompacted and exposed to moisture. Sealing the surficial soils by rolling with a smooth-drum roller prior to periods of precipitation will reduce the extent to which these soils become wet or unstable.
- Construction traffic should be restricted to specific areas of the site, preferably areas that are surfaced with materials not susceptible to wet weather disturbance.
- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practicable.

8.4.3. Temporary Slopes

Temporary slopes may be used around the site to facilitate early installation of shoring or in the transition between levels at the base of the excavation. We recommend that temporary slopes constructed in the fill and be inclined at 1½H:1V (horizontal to vertical) and that temporary slopes in the glacially consolidated soils be inclined at 1H:1V. Flatter slopes may be necessary if seepage is present on the face of the cut slopes or if localized sloughing occurs. For open cuts at the site, we recommend that:

- No traffic, construction equipment, stockpiles or building supplies be allowed at the top of the cut slopes within a distance of at least 5 feet from the top of the cut;
- Exposed soil along the slope be protected from surface erosion by using waterproof tarps or plastic sheeting;
- Construction activities be scheduled so that the length of time the temporary cut is left open is reduced to the extent practicable;
- Erosion control measures be implemented as appropriate such that runoff from the site is reduced to the extent practicable;
- Surface water be diverted away from the slope; and
- The general condition of the slopes is observed periodically by the geotechnical engineer to confirm adequate stability.

Because the contractor has control of the construction operations, the contractor should be made responsible for the stability of cut slopes, as well as the safety of the excavations. Shoring and temporary slopes must conform to applicable local, state and federal safety regulations.

9.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington Department of Enterprise Services (DES) and their authorized agents for the Pritchard Rehabilitation and Expansion project in Olympia, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix D for additional information pertaining to the use of this report.

10.0 REFERENCES

American Society of Civil Engineers 7-16 (ASCE). 2016. "American Society of Civil Engineers, Minimum Design Loads and Associated Criteria for Buildings and Other Structures."

American Society of Civil Engineers 41-17 (ASCE). 2017. "Seismic Evaluation and Retrofit of Existing Buildings."

American Society for Testing and Materials (ASTM) D-1557. "Standard Testing Method for Laboratory Compaction Characteristics of Soil Using Modified Effort," ASTM International.

City of Seattle. 2017. "Standard Specifications for Road, Bridge and Municipal Construction."

MITHUN. 2022. "Legislative Campus Modernization Predesign Report Addendum: Pritchard Rehabilitation/Expansion Validation Study for the State of Washington Department of Enterprise Services Project No. 2018-527 dated March 31, 2022."

WSDOT. 2023. "Standard Specifications for Road, Bridge, and Municipal Construction." Washington State Department of Transportation.

FIGURES

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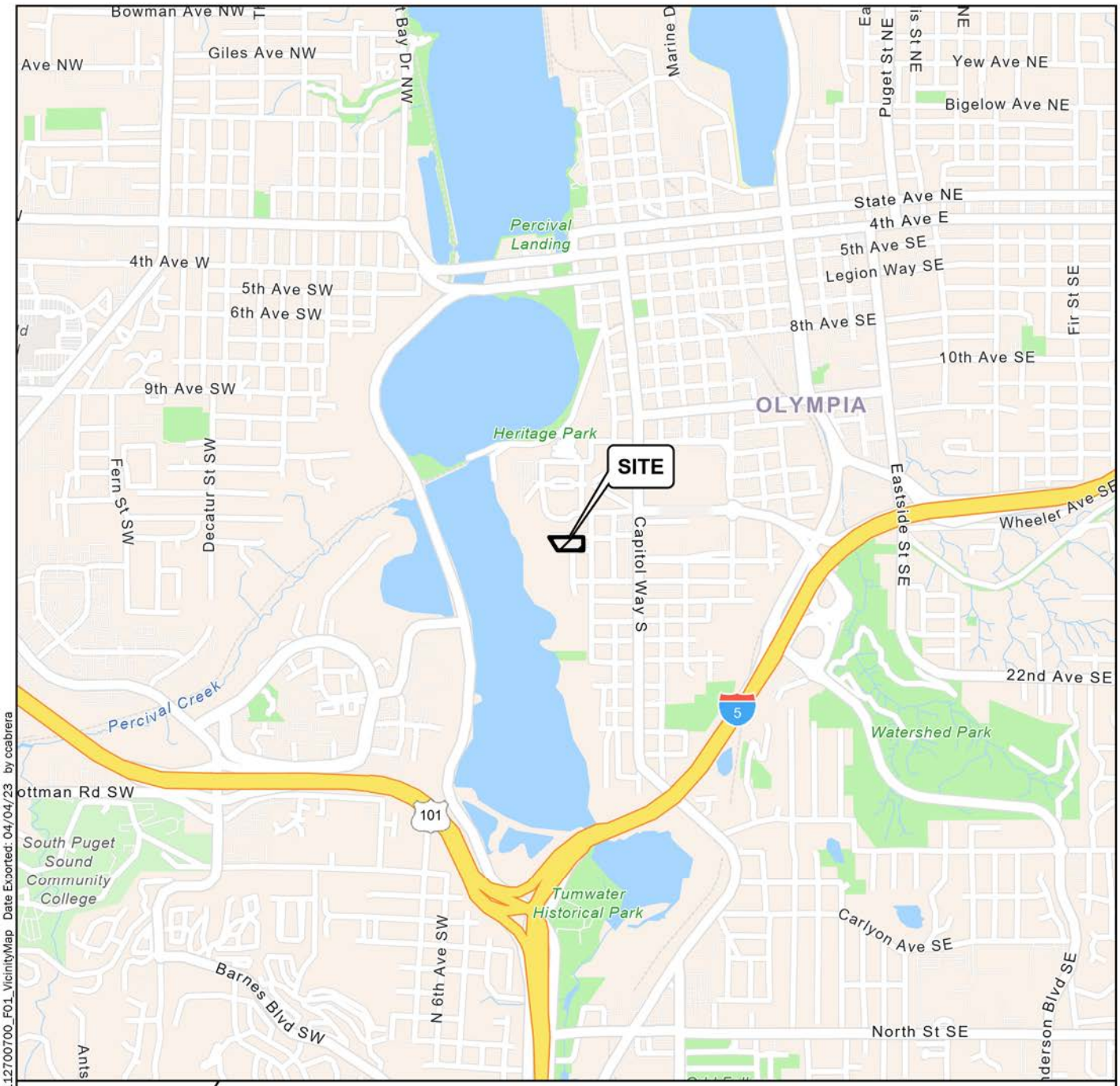

Source(s):
- ESRI

Coordinate System: NAD 1983 UTM Zone 10N

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.

Vicinity Map

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

GeoEngineers

Figure 1

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Legend

- GEI-1 — Boring by GeoEngineers, Inc., 2023
- GB-2 — Boring by Golder Associates, 2009
- S-1 — Boring by Shannon & Wilson, 2001
- Joel M. Pritchard Library Building

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Background from KPFF dated 12/19/2022.
Aerial from Google Earth Pro dated 8/6/2022.

Projection: NAD83 Washington State Planes, South Zone, US Foot

N
W E
S

80 0 80
Feet

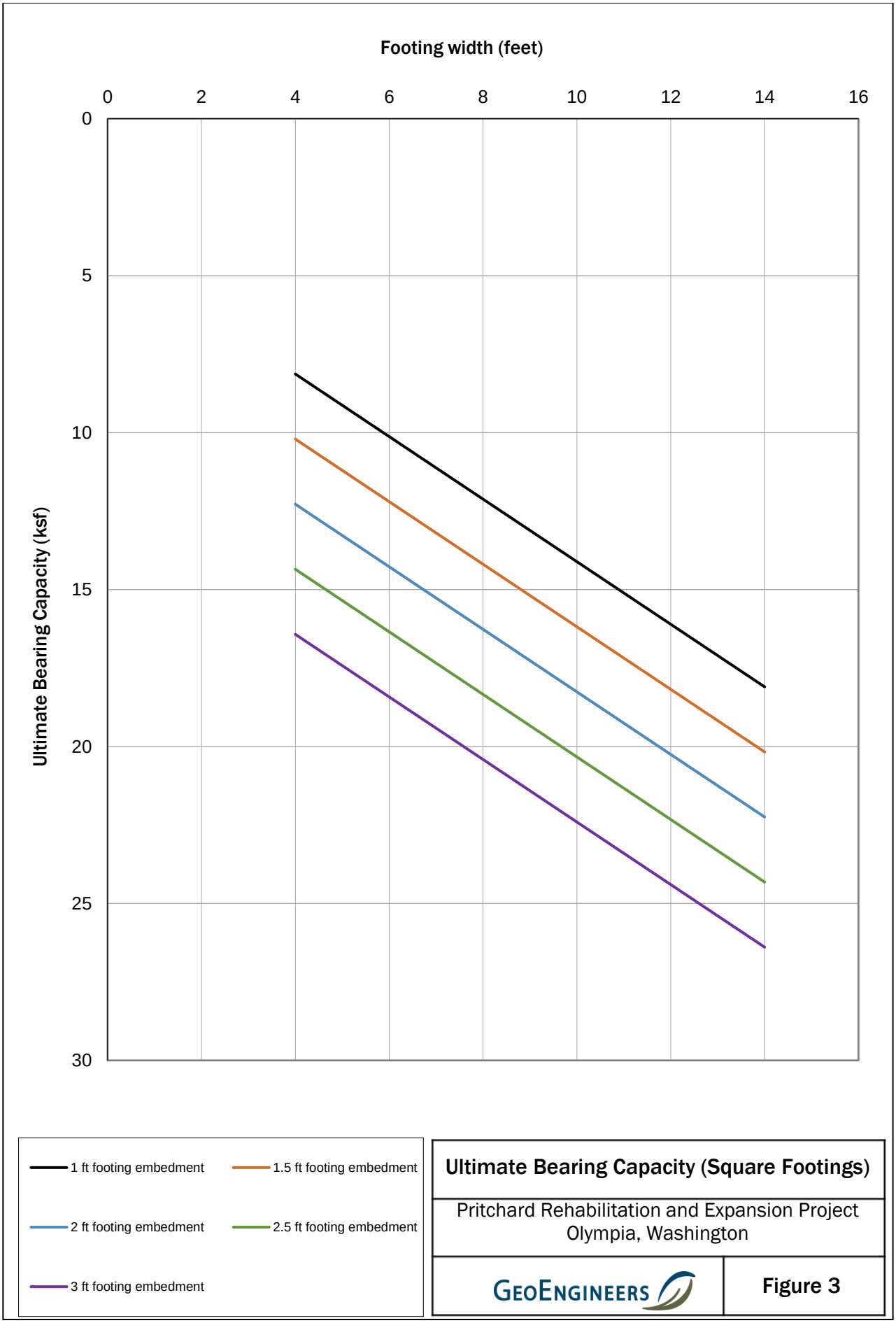
Site Plan

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

GeoEngineers

Figure 2

\\geoengineers.com\WAN\Projects\21\21127007\CAD\00\Geotech\21127700700_F02_Site Plan.dwg F02 Date Exported:4/4/2023 4:18 PM - by Michael R. Woods



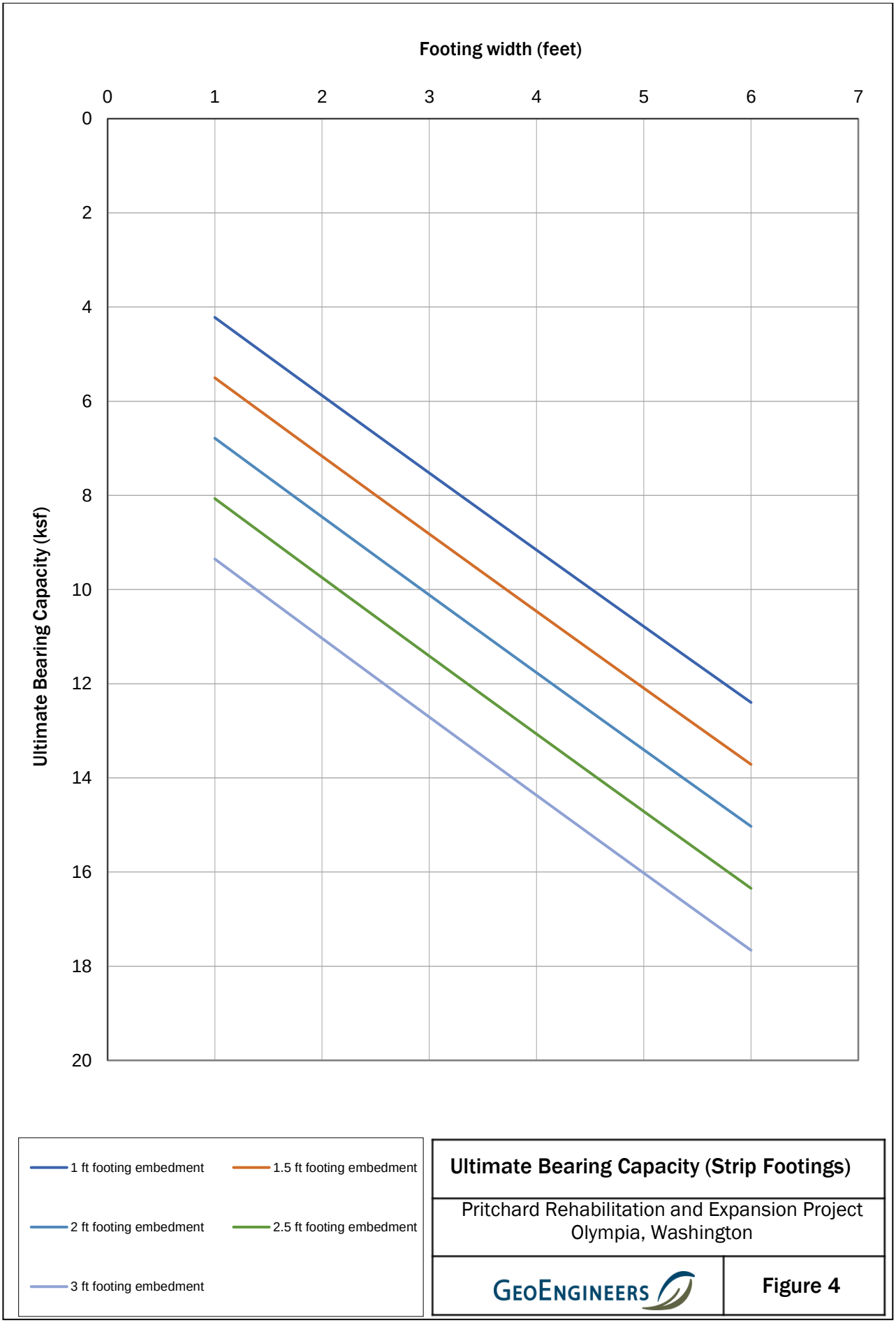
Ultimate Bearing Capacity (Square Footings)

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

GeoEngineers

Figure 3

21127-007-00 Date: 3/9/2023



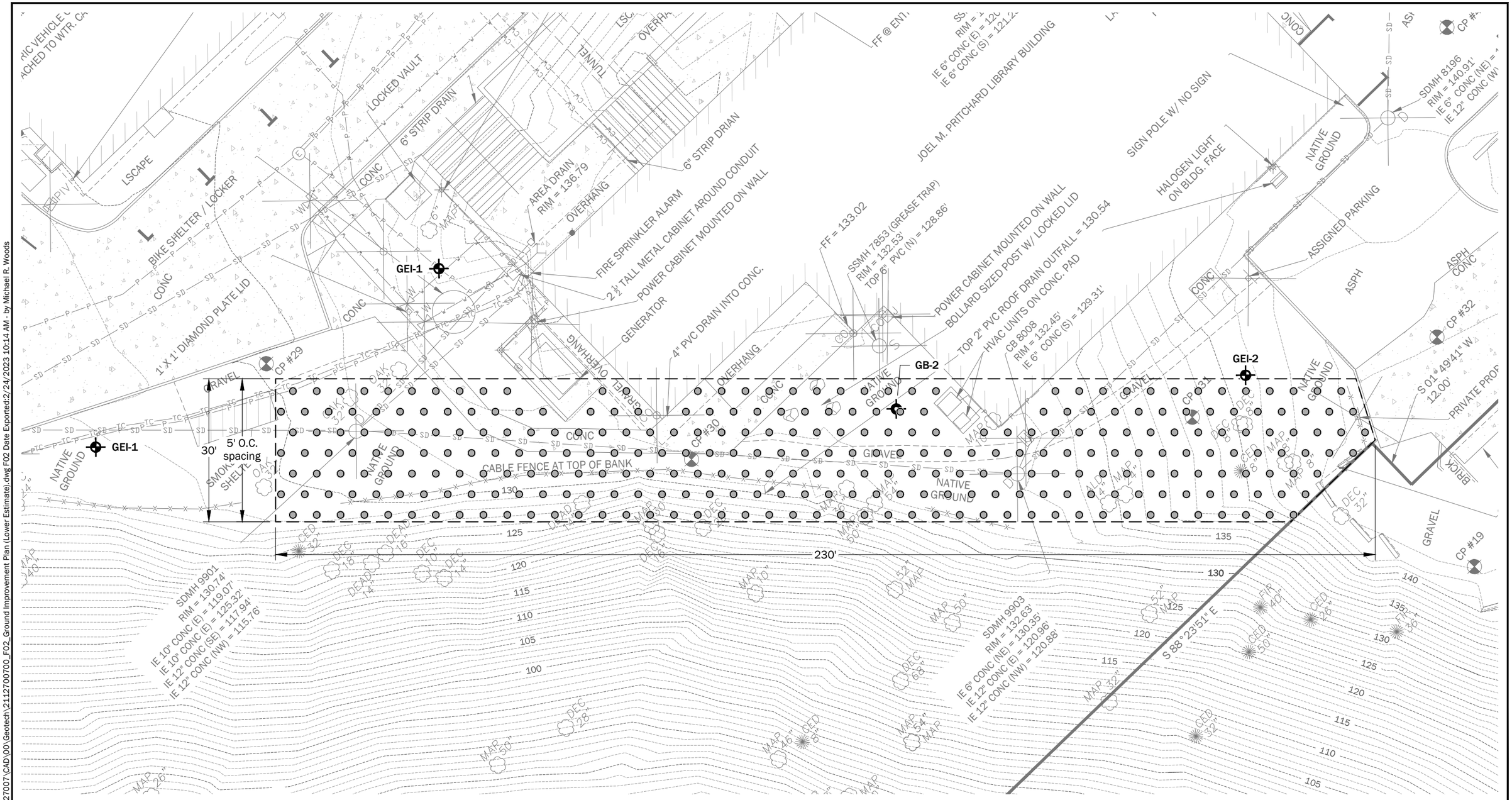
Ultimate Bearing Capacity (Strip Footings)

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

GeoEngineers

Figure 4

21127-007-00 Date: 3/9/2023



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Background from KPFF dated 12/19/2022.
Aerial from Google Earth Pro dated 8/6/2022.

Projection: NAD83 Washington State Planes, South Zone, US Foot

Legend

- **GEI-1** — Boring by GeoEngineers, Inc., 2023
- **GB-2** — Boring by Golder Associates, 2009
- 18" Dia. 4,000 PSI Concrete, 56' long (298)

20 0 20
Feet

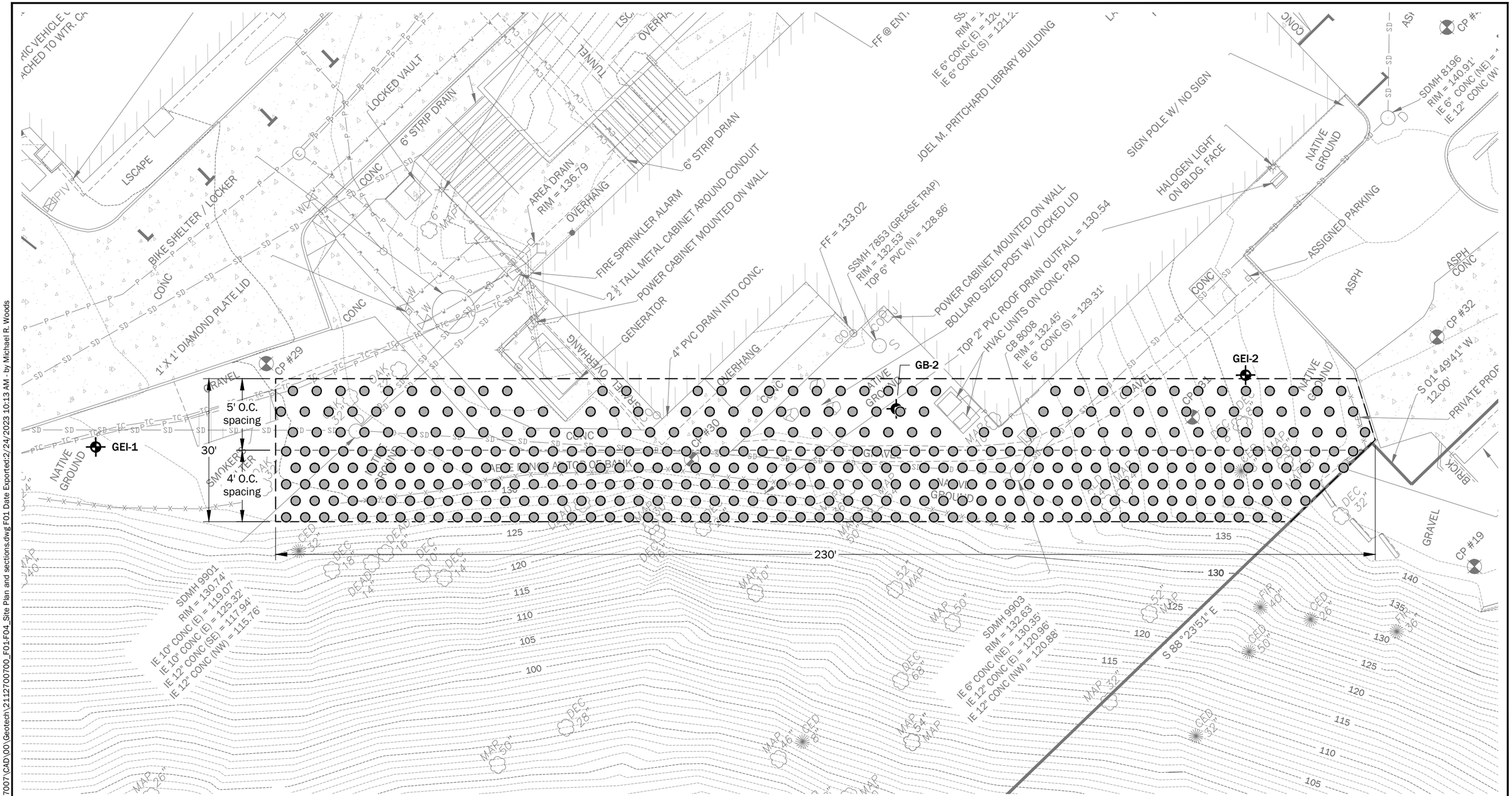
Ground Improvement Plan
(Lower Bound Cost Estimate)

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

GeoEngineers

Figure 5

\\geoengineers.com\WAN\Projects\21\21127007\CAD\00\Geotech\2112700700_F02_Ground Improvement Plan (Lower Estimate).dwg F02 Date Exported:2/24/2023 10:14 AM - by Michael R. Woods



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Background from KPFF dated 12/19/2022.
Aerial from Google Earth Pro dated 8/6/2022.

Projection: NAD83 Washington State Planes, South Zone, US Foot

Legend

GEI-1 — Boring by GeoEngineers, Inc., 2023

GB-2 — Boring by Golder Associates, 2009

24" Dia. 4,000 PSI Concrete, 65' long (396)

N W E S

20 0 20
Feet

Ground Improvement Plan
(Upper Bound Cost Estimate)

Pritchard Rehabilitation and Expansion Project
Olympia, Washington

GeoEngineers

Figure 6

\\geoengineers.com\WAN\Projects\21\21127007\CAD\00\Geotech\2112700700_F01-F04_Site Plan and sections.dwg F01 Date Exported:2/24/2023 10:13 AM - by Michael R. Woods

APPENDICES

GeoEngineers

APPENDIX A
Field Explorations

APPENDIX A
FIELD EXPLORATIONS

The subsurface conditions at the site were evaluated by drilling two borings and installing monitoring wells (GEI-1 and GEI-2) to depths ranging from 131½ to 131¼ feet below existing site grades. The borings were completed by Western States Soil Conservation, Inc. and Holocene Drilling, Inc., on February 11, 2023. The approximate locations of the explorations are shown in the Site Plan, Figure 2. Descriptions of the field exploration program and the boring logs are presented in this appendix.

The locations of the explorations were estimated by taping/pacing from existing site features and coordinates were determined with a cellphone global positioning system (GPS). The approximate exploration locations are shown in Figure 2. Elevations for the ground surface at the boring locations were estimated from the existing site survey provided by the project team dated December 19, 2022 and should be considered approximate.

Borings

Borings were completed using track-mounted, continuous-flight, hollow-stem auger drilling equipment. The borings were continuously monitored by a geotechnical engineer or geologist from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions and prepared a detailed log of each exploration.

The soils encountered in the borings were generally sampled at 2½- and 5-foot vertical intervals with a 2-inch-outside-diameter split-barrel standard penetration test (SPT) sampler. The disturbed samples were obtained by driving the sampler 18 inches into the soil with a 140-pound automatic hammer free-falling 30 inches. The number of blows required for each 6 inches of penetration was recorded. The blow count ("N-value") of the soil was calculated as the number of blows required for the final 12 inches of penetration. This resistance, or N-value, provides a measure of the relative density of granular soils and the relative consistency of cohesive soils. Where very dense soil conditions precluded driving the full 18 inches, the penetration resistance for the partial penetration was entered on the logs. The blow counts are shown on the boring logs at the respective sample depths.

Soils encountered in the borings were visually classified in general accordance with the classification system described in Figure A-1. A key to the boring log symbols is also presented in Figure A-1. The logs of the borings are presented in Figures A-2 and A-3. The boring logs are based on our interpretation of the field and laboratory data and indicate the various types of soils and groundwater conditions encountered. The logs also indicate the depths at which these soils or their characteristics change, although the change may actually be gradual. If the change occurred between samples, it was interpreted. The densities noted in the boring logs are based on the blow count data obtained in the borings and judgment based on the conditions encountered.

Groundwater was not encountered during the time of drilling, but readings were taken in the days and weeks after drilling and these readings are included in the boring logs.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel / Dames & Moore (D&M)

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
UU	Unconsolidated undrained triaxial compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

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Figure A-1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	2/11/2023	2/11/2023	131.5	AVD	LH/BZ	Western States Soil Conservation, Inc.	Mud Rotary

Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	CME-75 Truck-mounted drill rig
Surface Elevation (ft) Vertical Datum	128	Top of Casing Elevation (ft)	128.00
Latitude Longitude	47.034586 -122.905596	Horizontal Datum	Decimal Degrees WGS84

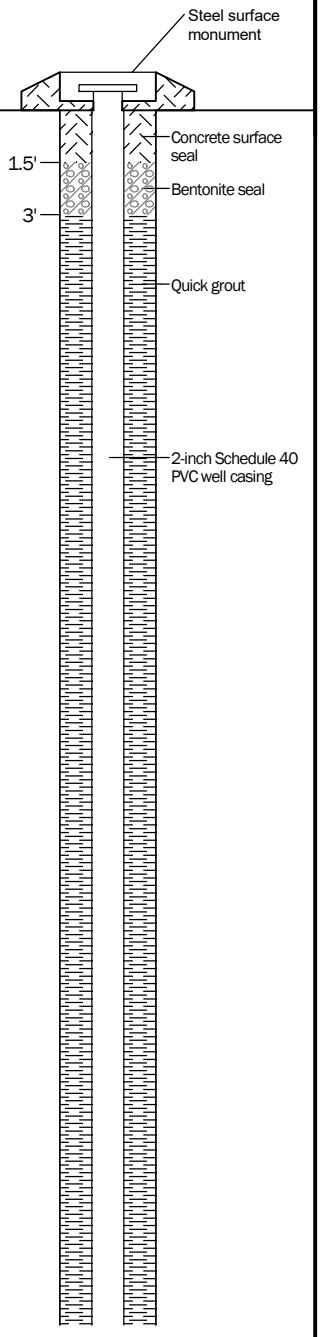
DOE Well I.D.: BPQ-324
A 2-in well was installed on 2/11/2023 to a depth of 130 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
2/16/2023	87.60	40.40

Notes: Boring had a well installed to 130 feet; groundwater was measured at 84.3 feet on 2/23/2023 with groundwater elevation at 43.7 feet

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								SOD	Sod/forest duff		
									SM	Brown silty fine to medium sand with gravel; occasional fine roots (loose, wet) (fill)		
125			9	4		1					NS	
	5								ML	Brown sandy silt with occasional sand and gravel, occasional fine roots (medium stiff, wet)		
			9	6		2					NS	
120										Medium stiff, moist		
			12	6		3					NS	
	10								ML	Brown sandy silt with gravel and occasional organic matter (burnt wood) (stiff, moist)		
			12	9		4					NS	
115									ML	Brown sandy silt; oxidation staining (stiff, moist) (MC = 14%; %F = 59)		
			4	17		5 %F					NS	
	15								ML	Brown sandy silt (stiff, moist) (MC = 16%; %F = 68)		
			12	10		6 SA					NS	
110												
	20								SP-SM	Brown fine sand with silt (medium dense, moist) (MC = 12%; %F = 7)		
			9	14		7 %F						
105												
	25								SM	Brown silty fine sand (medium dense, moist) (MC = 17%; %F = 13)		
			9	12		8 %F						
100									SP-SM	Brown fine sand with silt (medium dense, moist)		
	30											
			12	16		9						
95									ML	Gray silt; oxidation staining (medium stiff, moist)		
	35											

WELL LOG



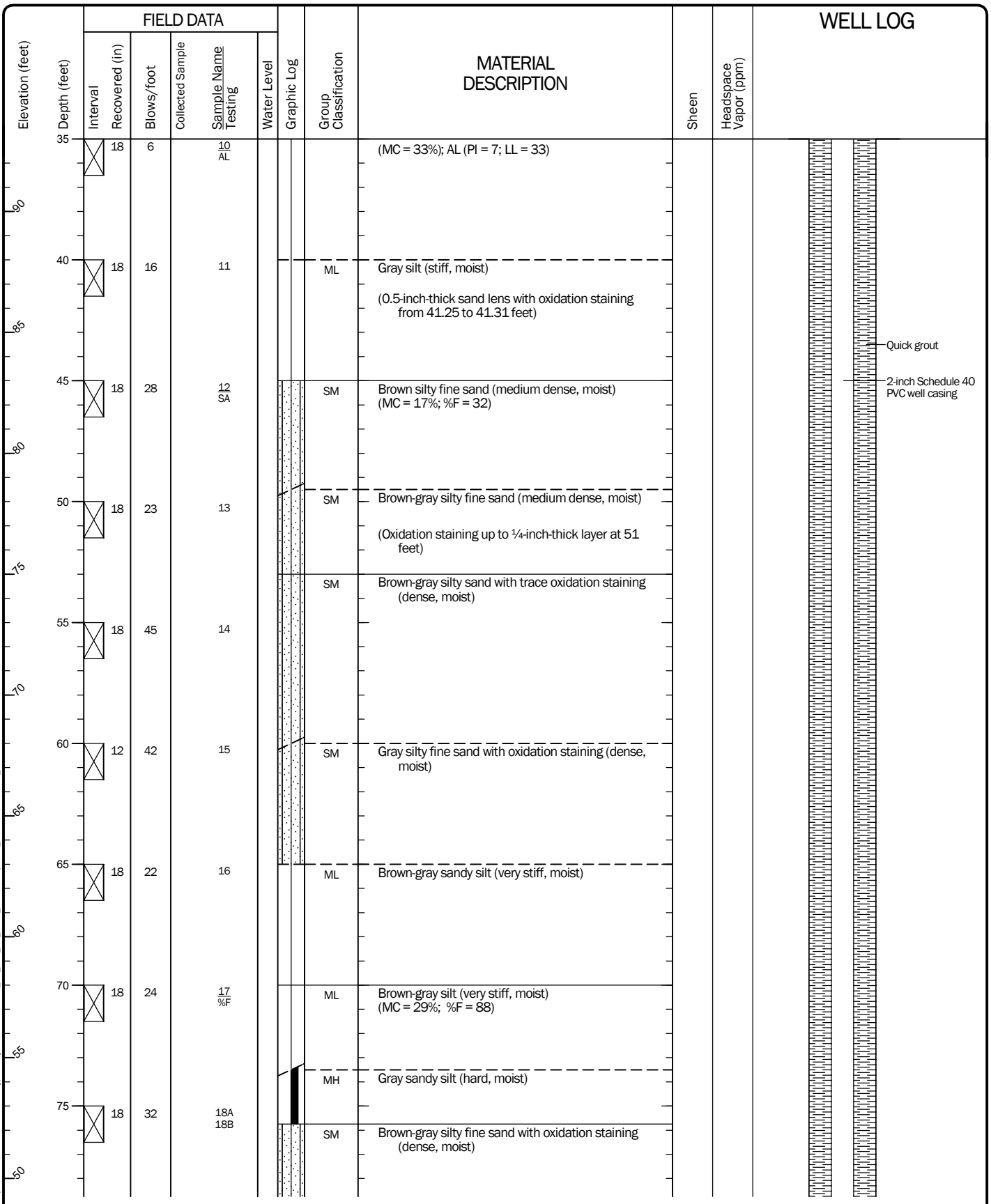
Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on . Vertical approximated based on .

Log of Boring with Monitoring Well GEI-1

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-2
Sheet 1 of 4



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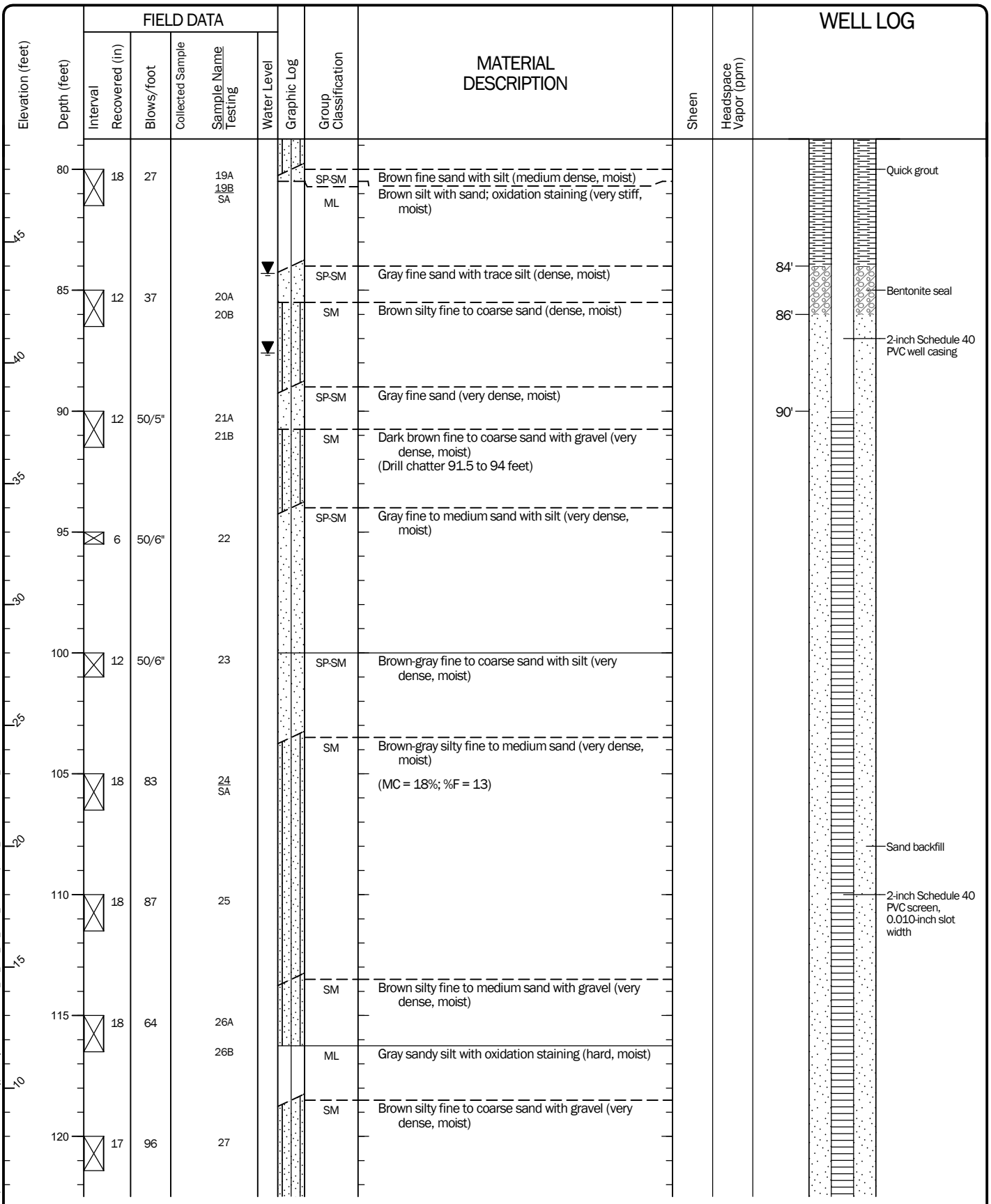
Log of Boring with Monitoring Well GEI-1 (continued)

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-2
Sheet 2 of 4



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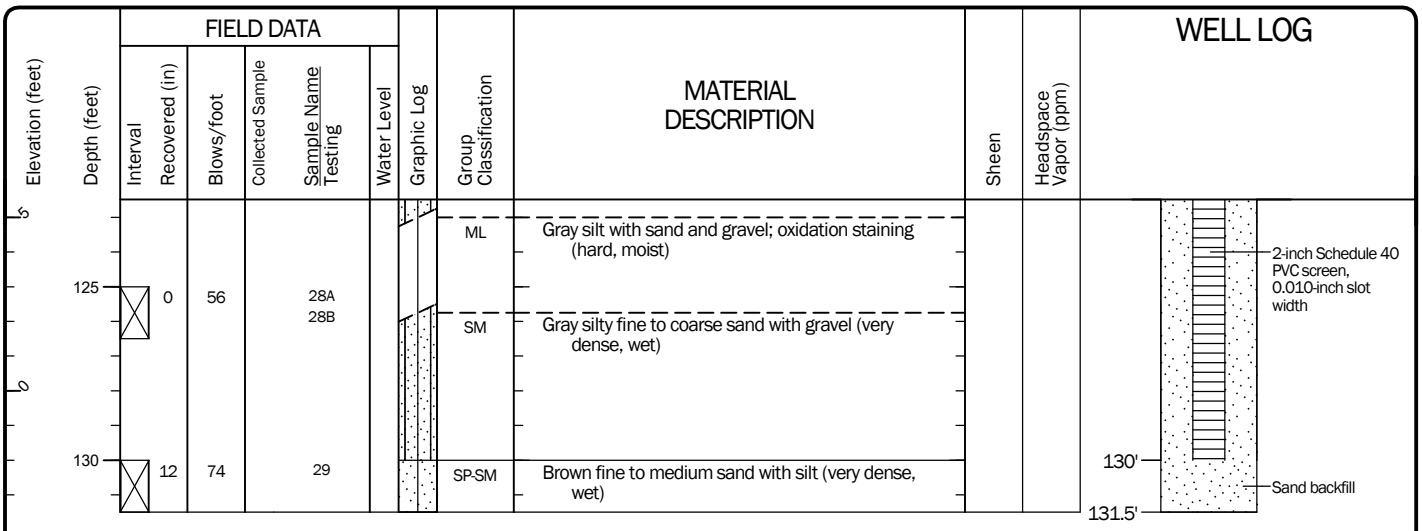
Log of Boring with Monitoring Well GEI-1 (continued)

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-2
Sheet 3 of 4



Log of Boring with Monitoring Well GEI-1 (continued)

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-2
Sheet 4 of 4

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
2/11/2023	2/11/2023	131.25	LSP / LH/BZ	Holocene Drilling, Inc.	Mud Rotary

Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D50 Turbo mounted truck
Surface Elevation (ft) Vertical Datum	141	Top of Casing Elevation (ft)	141.00
Latitude / Longitude	47.034158 / -122.904855	Horizontal Datum	Decimal Degrees WGS84

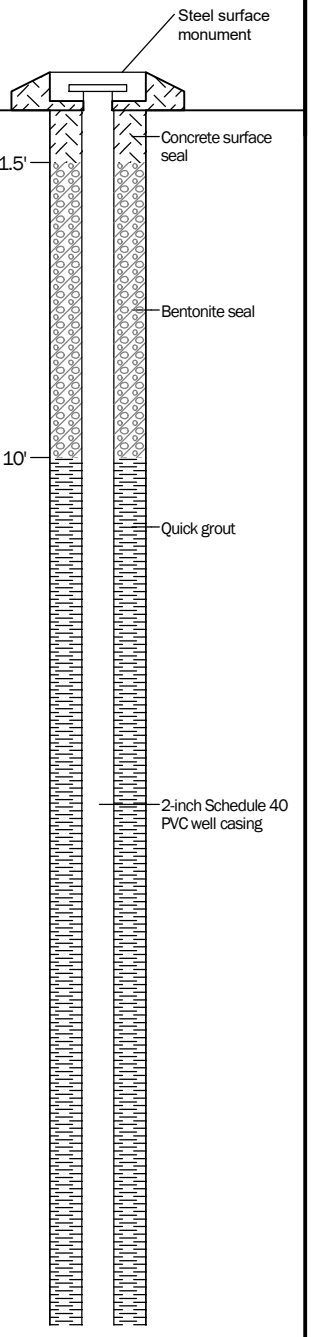
DOE Well I.D.: BPQ-472
A 2-in well was installed on 2/11/2023 to a depth of 130 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
2/16/2023	96.05	44.95

Notes: Boring had a well installed to 130 feet; groundwater was measured at 124.1 feet on 2/23/2023 with groundwater elevation at 16.9 feet

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
140	0								SOD	Sod, forest duff and quarry spalls in the top 6 inches		
									SM	Brown silty fine sand with occasional fine roots (loose, moist) (near ML)		
		1	13	5		1						
135	5	2	14	6		2A						
						2B			ML	Brown silt with occasional sand (stiff, moist)		
									SP-SM	Grayish brown fine sand with silt (loose, moist)		
		3	15	6		3A			ML	Brown silt (soft, moist)		
						3B						
130	10	4	14	4		4			ML	Grayish brown silt; moderate oxidation (soft, moist)		
						5A			ML	Grayish brown silt with occasional gravel (stiff, moist) (lightly oxidized)		
		5	13	16		5B			SM	Brownish gray silty fine sand (medium dense, moist)		
125	15	6	14	8		6 AL			ML	Brownish gray silt (medium stiff, moist) (MC = 32%); AL (PI = 5; LL = 29)		
		7	16	9		7				With oxidation staining (stiff, moist)		
120	20	8	14	12		8 SA			ML	Brownish gray silt with sand (stiff, moist) (MC = 27%; %F = 71)		
115	25	9	16	12		9			SM	Brownish gray silty fine sand (medium dense, moist)		
110	30	10	11	12		10			SM	Gray silty fine to medium sand (medium dense, moist)		
	35											

WELL LOG



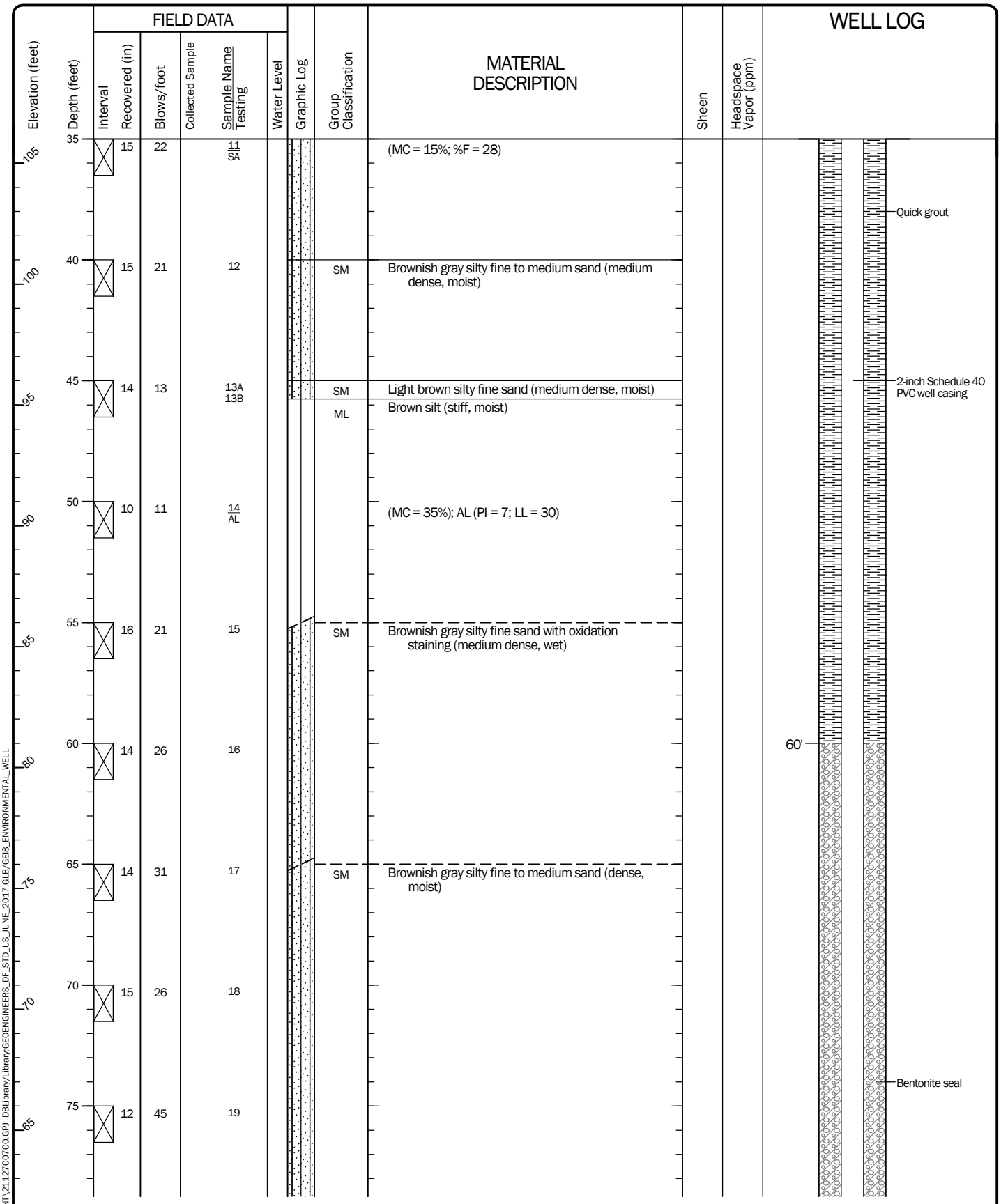
Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on . Vertical approximated based on .

Log of Boring with Monitoring Well GEI-2

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-3
Sheet 1 of 4



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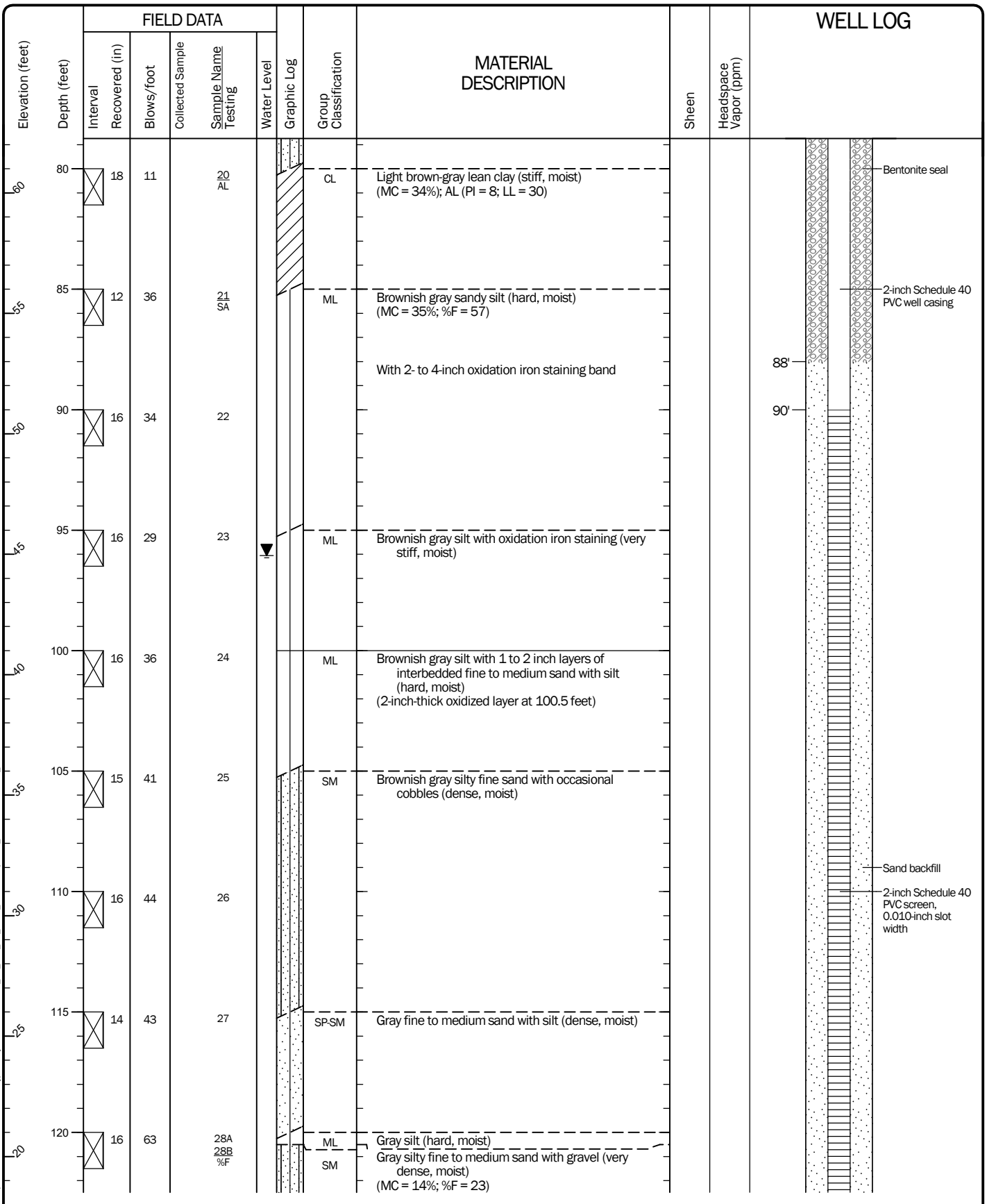
Log of Boring with Monitoring Well GEI-2 (continued)

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-3
Sheet 2 of 4

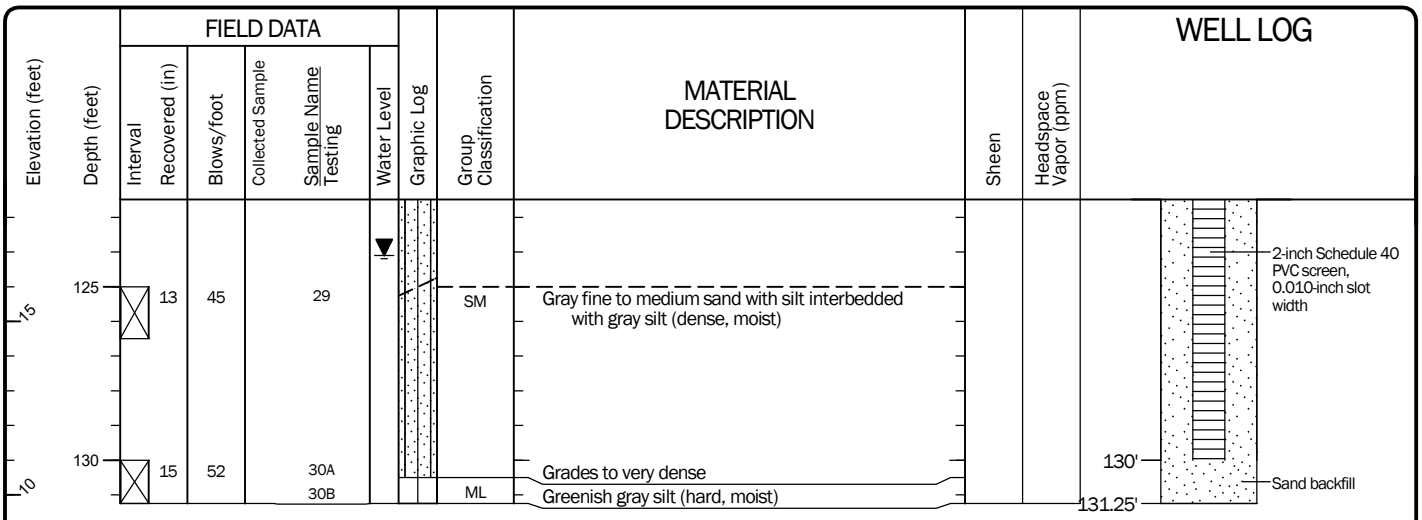


Log of Boring with Monitoring Well GEI-2 (continued)

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-3
Sheet 3 of 4



Log of Boring with Monitoring Well GEI-2 (continued)

GeoEngineers

Project: Pritchard Rehabilitation and Expansion
Project Location: Olympia, Washington
Project Number: 21127-007-00

Figure A-3
Sheet 4 of 4

APPENDIX B
Laboratory Testing

APPENDIX B
LABORATORY TESTING

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate index properties of the soil samples. Representative samples were selected for laboratory testing consisting of the determination of the moisture content and fines content. The tests were performed in general accordance with test methods of the ASTM International (ASTM) or other applicable procedures.

Moisture Content Testing

Moisture content tests were completed in general accordance with ASTM D 2216 for representative samples obtained from the explorations. The results of these tests are presented in the exploration logs in Appendix A at the depths at which the samples were obtained.

Percent Passing U.S. No. 200 Sieve (%F)

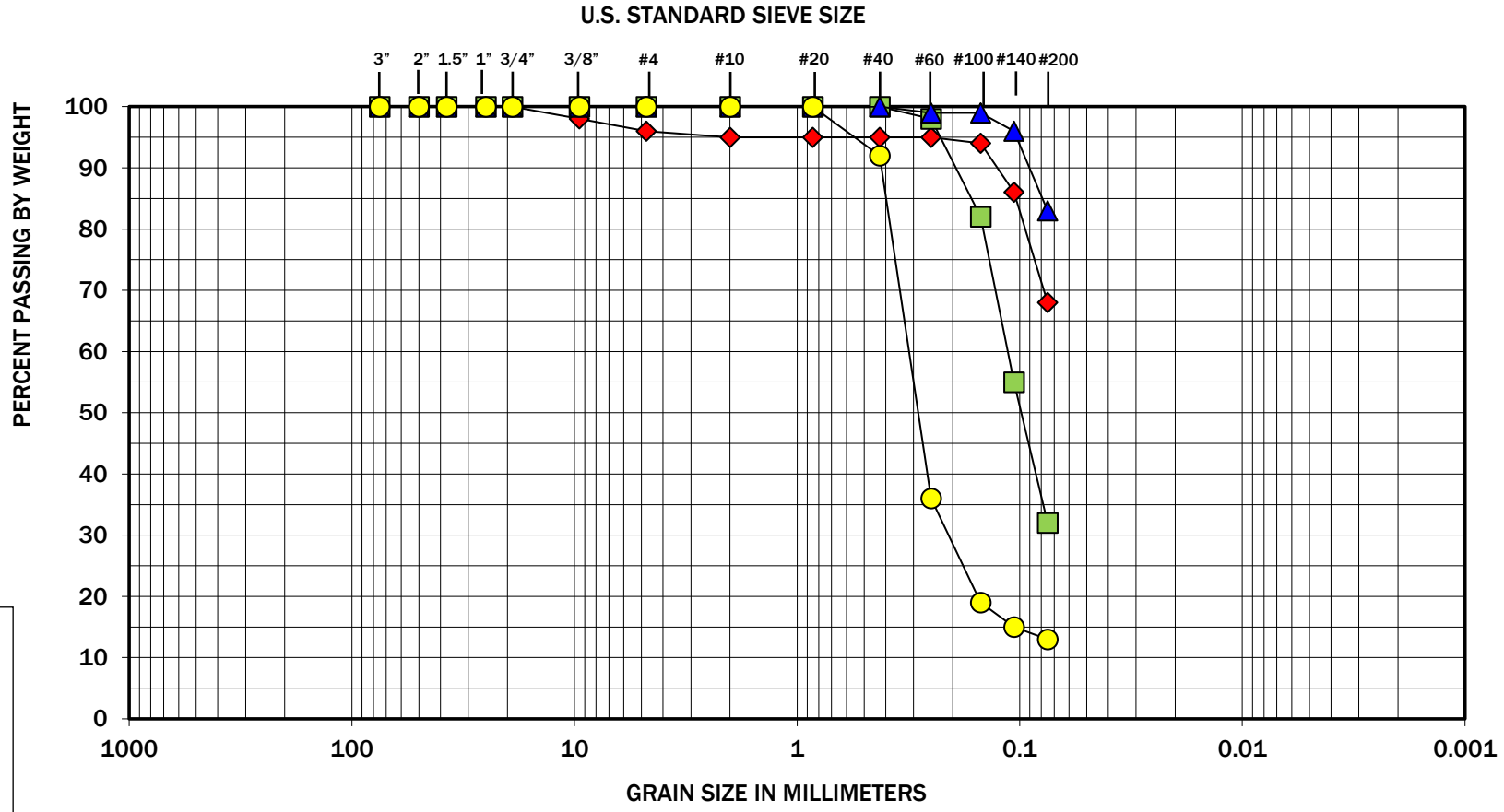
Selected samples were "washed" through the U.S. No. 200 mesh sieve to estimate the relative percentages of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve. These tests were conducted to verify field descriptions and to estimate the fines content for analysis purposes. The tests were conducted in accordance with ASTM D 1140; the results are shown on the exploration logs in Appendix A at the respective sample depths.

Sieve Analyses

Sieve analyses were performed on selected samples in general accordance with ASTM D 422. The wet sieve analysis method was used to determine the percentage of soil greater than the U.S. No. 200 mesh sieve. The results of the sieve analyses were plotted, were classified in general accordance with the Unified Soil Classification System (USCS) and are presented in Figures B-1 and B-2.

Atterberg Limits

Atterberg limits testing was performed on selected fine-grained soil samples. The tests were used to classify the soil as well as to evaluate index properties. The liquid limit and the plastic limit were estimated through a procedure performed in general accordance with ASTM D 4318. The results of the Atterberg limits testing are summarized in Figure B-3.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-01	15	16	Sandy silt (ML)
■	GEI-01	45	17	Silty sand (SM)
▲	GEI-01	80.5	27	Silt with sand (ML)
●	GEI-01	105	18	Silty sand (SM)

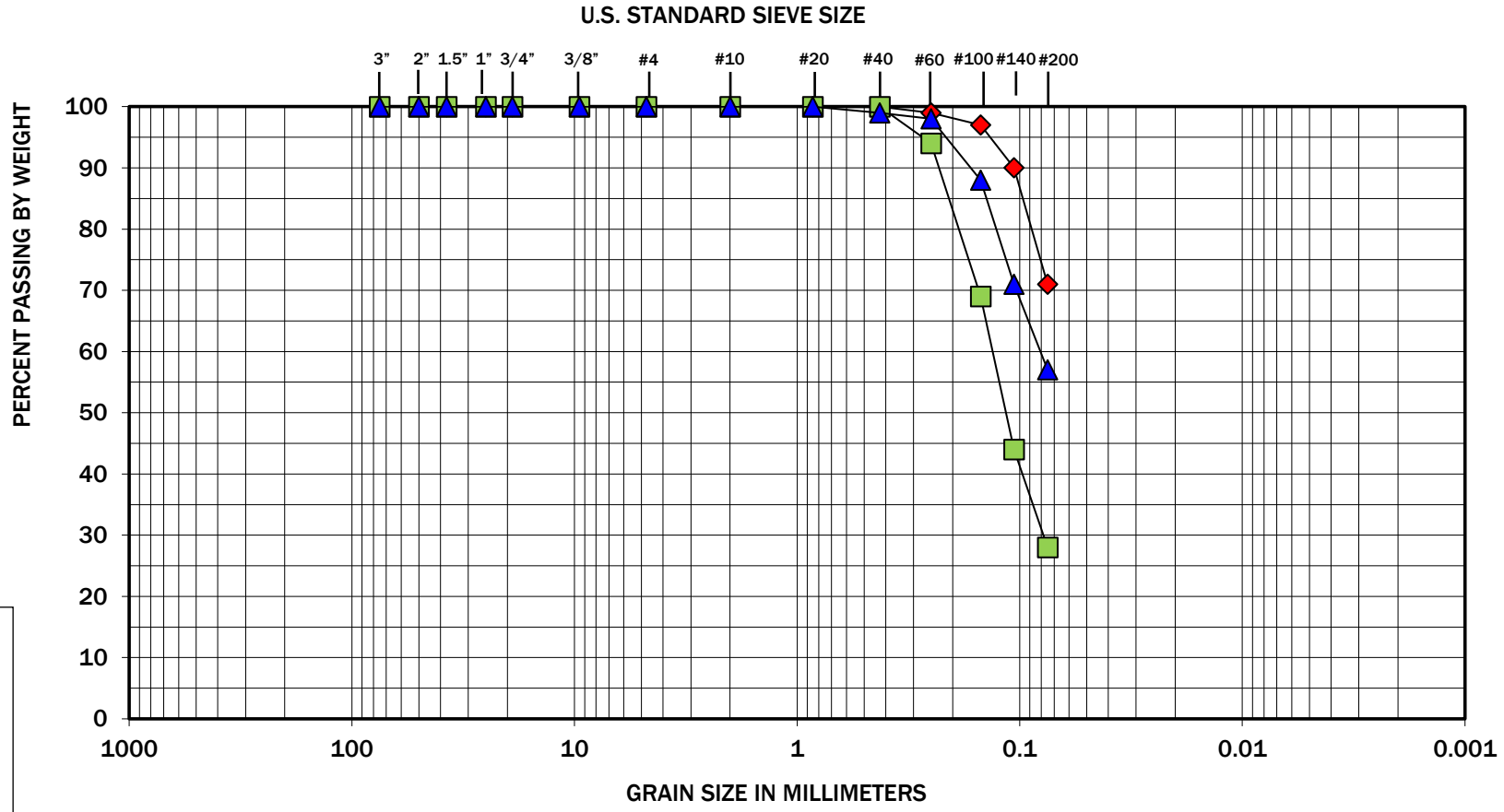
The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

GEOENGINEERS

Figure B-1

Pritchard Rehabilitation and Expansion
Olympia, Washington

Sieve Analysis Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-02	20	27	Silt with sand (ML)
■	GEI-02	35	15	Silty sand (SM)
▲	GEI-02	85	35	Sandy silt (ML)

The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

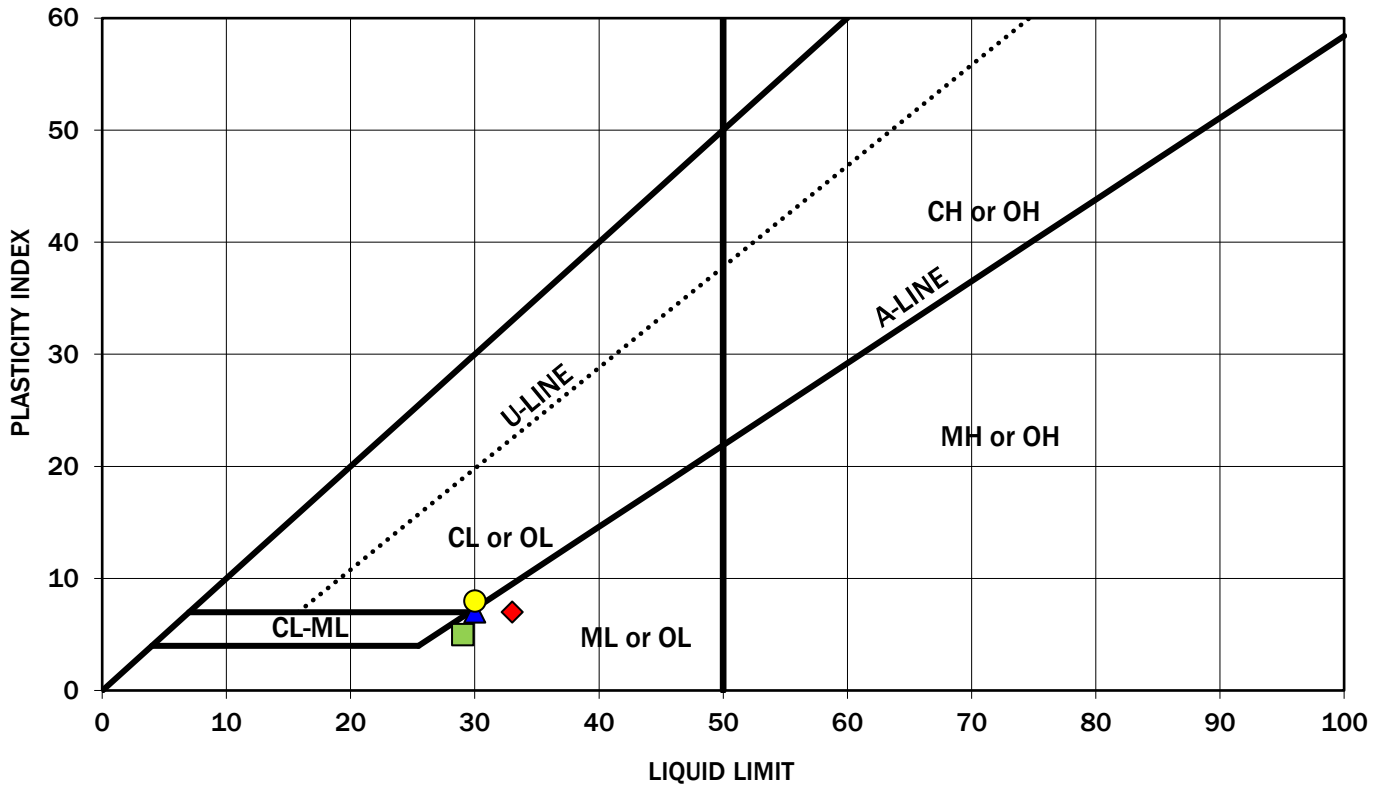
GEOENGINEERS

Figure B-2

Pritchard Rehabilitation and Expansion
Olympia, Washington

Sieve Analysis Results

PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	GEI-01	35	33	33	7	Silt (ML)
■	GEI-02	15	32	29	5	Silt (ML)
▲	GEI-02	50	35	30	7	Silt (ML)
●	GEI-02	80	34	30	8	Lean Clay (CL)

GeoEngineers

Pritchard Rehabilitation and Expansion
Olympia, Washington

Atterberg Limits Test Results

Figure B-3

APPENDIX C
Boring Logs from Previous Studies

APPENDIX C
BORING LOGS FROM PREVIOUS STUDIES

Included in this section are logs from the following previous studies completed in the immediate vicinity of the project site.

- The logs of two borings (GB-2 and GB-3) completed by Golder Associates in 2009 and 2010.
- The log of one boring (S-1) completed by Shannon & Wilson in 2001.

RECORD OF BOREHOLE GB-2

SHEET 1 of 6

PROJECT: WAGA/Hillside Evaluation
PROJECT NUMBER: 083-93287.300
LOCATION: Pritchard Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 5/26&27/09
DRILL RIG: B-61 Truck-Mounted

DATUM: Local
AZIMUTH: N/A
COORDINATES: N: 47.04 E: 122.91

ELEVATION: 133
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
0	4-inch inner diameter mud rotary with 140 lbs auto hammer	0.0 - 1.5 Loose to compact, dark brown, non-stratified, silty fine to medium SAND, some organics, damp (SM) (TOPSOIL/FILL).	SM		131.5							Inclinometer set in flush-mount monument. Concrete used to set monutment.
		1.5 - 4.5 Stiff, brown gray, heterogenous, sandy SILT, sand is fine to coarse, some fine to coarse gravel, iron-oxide stained pockets, trace organic fragments, moist (ML) (FILL) SIEVE	ML		1.5	1	SS	6-7-7	14	1.5/1.5	○ ■	
					128.5							
5		4.5 - 7.0 Firm, gray, stratified, SILT, iron-oxide stained and fine to coarse sand layers, trace fine gravel, moist (ML) (VASHON RECESSIONAL DEPOSITS) ATTERBERG	ML		4.5	2	SS	2-4-3	7	1.5/1.5	■	
					126.0							
		7.0 - 9.5 Firm/loose, brown gray, stratified, SILT and silty fine SAND, trace fine to coarse sand pockets, iron-oxide stained layers, trace fine gravel, damp to moist (ML/SM) (VASHON RECESSIONAL DEPOSITS) MOISTURE CONTENT	ML/SM		7.0	3	SS	2-4-4	8	1.5/1.5	■ H○	
					123.5							
10		9.5 - 12.0 Loose, gray brown, stratified, silty fine to medium SAND, silt lenses, iron-oxide staining, moist (SM) (VASHON RECESSIONAL DEPOSITS)	SM		9.5	4	SS	2-3-6	9	1.0/1.5	■	
					121.0							
		12.0 - 14.5 Stiff, red brown, stratified, SILT, some fine sand, iron-oxide stained layers, moist (ML) (VASHON RECESSIONAL DEPOSITS) SIEVE	ML		12.0	5	SS	2-5-5	10	1.3/1.5	■ ○	
					118.5							
15		14.5 - 17.0 Very soft to soft, stratified, SILT, trace iron-oxide stained lenses, trace coarse sand, moist (ML) (VASHON RECESSIONAL DEPOSITS) ATTERBERG	ML		14.5	6	SS	2-1-1	2	1.5/1.5	■ H○	
					116.0							
		17.0 - 19.5 Loose to compact, gray brown, stratified, silty fine to medium SAND, trace silt layers less than 1/4-inch thick, iron-oxide stained layers near 17.5 ft, moist (SM) (VASHON RECESSIONAL DEPOSITS)	SM		17.0	7	SS	2-4-6	10	1.5/1.5	■	
					113.5							
20			ML		19.5							

Log continued on next page

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: Matt Graham

LOGGED: A. Dennison
CHECKED: D. Ladd
DATE: 8/3/2009

Golder Associates

BOREHOLE RECORD 083-93287.300 BS MAY2009.GPJ GLDR_WA.GDT 12/17/09

RECORD OF BOREHOLE GB-2

SHEET 2 of 6

PROJECT: WAGA/Hillside Evaluation
PROJECT NUMBER: 083-93287.300
LOCATION: Pritchard Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 5/26&27/09
DRILL RIG: B-61 Truck-Mounted

DATUM: Local
AZIMUTH: N/A
COORDINATES: N: 47.04 E: 122.91

ELEVATION: 133
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 In (140 lb hammer 30 Inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
20	4-inch inner diameter mud rotary with 140 lbs auto hammer	19.5 - 22.0 Firm, gray brown, stratified, SILT, trace silt layers less than 1/4-inch thick, iron-oxide stained layers near 20 ft, moist (ML) (VASHON RECESSIONAL DEPOSITS) 20-ATTERBERG *(Continued)*	ML		111.0	8	SS	1-3-5	8	1.5/1.5	■ H○	
		22.0 - 27.0 Loose to compact, brown gray, slightly stratified, sandy SILT, sand is fine to medium, trace iron-oxide stained partings, moist (ML) (VASHON RECESSIONAL DEPOSITS) #200 WASH	ML		22.0	9	SS	4-4-6	10	1.5/1.5	■○	
25						10	SS	4-5-4	9	1.5/1.5	■	
					106.0							
		27.0 - 32.0 Compact, brown gray, slightly stratified, fine to medium SAND, little silt, iron-oxide stained layers, dark brown organic layers, damp to moist (SP-SM) (VASHON RECESSIONAL DEPOSITS) MOISTURE CONTENT	SP-SM		27.0	11	SS	4-9-9	18	1.5/1.5	○ ■	
30						12	SS	11-13-12	25	1.2/1.5	■	
					101.0							
		32.0 - 38.5 Firm to stiff, gray brown, stratified, SILT, little fine sand, moist (ML) (VASHON RECESSIONAL DEPOSITS) 32.5-#200 WASH 35- ATTERBERG	ML		32.0	13	SS	6-6-6	12	1.5/1.5	■○	
35						14	SS	2-3-5	8	1.5/1.5	■ H○	
					94.5							
		38.5 - 39.5 Stiff, light gray, stratified, SILT, trace fine sand, trace iron-oxide stained hard silt layers up to 1/4-inch thick, moist (ML) (VASHON RECESSIONAL DEPOSITS)	ML		38.5	15	SS	2-4-9	13	1.5/1.5	■	
			SM		93.5 39.5							
40												

Log continued on next page

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: Matt Graham

LOGGED: A. Dennison
CHECKED: D. Ladd
DATE: 8/3/2009

Golder Associates

BOREHOLE RECORD 083-93287.300 BS MAY2009.GPJ GLDR_WA.GDT 12/17/09

RECORD OF BOREHOLE GB-2

SHEET 3 of 6

PROJECT: WAGA/Hillside Evaluation
PROJECT NUMBER: 083-93287.300
LOCATION: Pritchard Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 5/26&27/09
DRILL RIG: B-61 Truck-Mounted

DATUM: Local
AZIMUTH: N/A
COORDINATES: N: 47.04 E: 122.91

ELEVATION: 133
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer, 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p ⊢○ W ⊣ W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
40	4-inch inner diameter mud rotary with 140 lbs auto hammer	39.5 - 56.0 Compact, brown gray, slightly stratified, silty fine SAND, trace iron-oxide stained layers, moist (SM) (VASHON RECESSIONAL DEPOSITS) 42.5- MOISTURE CONTENT 47.5- SIEVE *(Continued)*	SM			16	SS	5-9-12	21	1.5/1.5	■	Vibrating Wire Piezometer set 50 ft bgs in grout. 2.75-inch diameter solid PVC inclinometer pipe embedded in grout.
45						17	SS	10-11-14	25	1.5/1.5	○ ■	
						18	SS	10-12-13	25	1.5/1.5	○ ■	
50		-1-inch thick clayey silt layer with trace fine to coarse gravel, socketed.				19	SS	12-13-15	28	1.5/1.5	■	
55		56.0 - 61.0 Hard, brown gray, stratified, SILT, silty fine to medium sand layers 1 to 3 inches thick, iron-oxide stained layers, moist (ML) (VASHON RECESSIONAL DEPOSITS)	ML		77.0 56.0	20	SS	5-12-28	40	1.5/1.5	■	
60		Log continued on next page										

BOREHOLE RECORD 083-93287.300 BS MAY2009.GPJ GLDR_WA.GDT 12/17/09

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: Matt Graham

LOGGED: A. Dennison
CHECKED: D. Ladd
DATE: 8/3/2009

Golder Associates

RECORD OF BOREHOLE GB-2

SHEET 4 of 6

PROJECT: WAGA/Hillside Evaluation
PROJECT NUMBER: 083-93287.300
LOCATION: Pritchard Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 5/26&27/09
DRILL RIG: B-61 Truck-Mounted

DATUM: Local
AZIMUTH: N/A
COORDINATES: N: 47.04 E: 122.91

ELEVATION: 133
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer, 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p ⊢○ W ⊣ W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
60	4-inch inner diameter mud rotary with 140 lbs auto hammer		ML		72.0 61.0							
		61.0 - 71.0 Very stiff to hard, brown gray, slightly stratified, SILT, little fine sand, clayey silt layers, moist (ML) (VASHON RECESSIONAL DEPOSITS) 67.5- MOISTURE CONTENT				21	SS	15-19-22	41	1.5/1.5	■	
65			ML			22	SS	9-13-13	26	1.5/1.5	○ ■	
70		71.0 - 77.5 Very stiff, brown gray, stratified, SILT, little fine sand, iron-oxide staining layers up to 1/4-inch thick, moist (ML) (VASHON RECESSIONAL DEPOSITS)			62.0 71.0	23	SS	8-12-16	28	1.5/1.5	■	
75		77.5 - 79.0 No recovery.	ML		55.5 77.5	24	SS	6-8-11	19	0.0/1.5	■	
80		Log continued on next page	ML		54.0 79.0							

BOREHOLE RECORD 083-93287.300 BS MAY2009.GPJ GLDR_WA.GDT 12/17/09

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: Matt Graham

LOGGED: A. Dennison
CHECKED: D. Ladd
DATE: 8/3/2009

Golder Associates

RECORD OF BOREHOLE GB-2

SHEET 5 of 6

PROJECT: WAGA/Hillside Evaluation
PROJECT NUMBER: 083-93287.300
LOCATION: Pritchard Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 5/26&27/09
DRILL RIG: B-61 Truck-Mounted

DATUM: Local
AZIMUTH: N/A
COORDINATES: N: 47.04 E: 122.91

ELEVATION: 133
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer, 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
80	4-inch inner diameter mud rotary with 140 lbs auto hammer	79.0 - 91.0 Firm to very stiff, medium gray, stratified, SILT, little fine sand, iron-oxide staining layers up to 1/4-inch thick, moist (ML) (VASHON RECESSIONAL DEPOSITS) 82.5- MOISTURE CONTENT 87.5- ATTERBERG *(Continued)*	ML			24c	SS	3-4-4	8	1.5/1.5	■	
85						25	SS	2-4-8	12	1.5/1.5	■	
		-Became olive gray in color.				26	SS	0-7-15	22	1.5/1.5	◐■	
90					42.0							
		91.0 - 96.0 Dense, green gray, stratified, fine to medium SAND, little silt, moist (SP-SM) (PRE-VASHON DEPOSITS)	SP-SM		91.0	27	SS	15-17-22	39	0.8/1.5	■	
95					37.0							
		96.0 - 101.0 Very dense, green gray, stratified, fine to coarse SAND, little silt, trace fine gravel, moist (SP-SM) (PRE-VASHON DEPOSITS)	SP-SM		96.0	28	SS	27-30-30	>50	1.5/1.5	>>■	
100		Log continued on next page										

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: Matt Graham

LOGGED: A. Dennison
CHECKED: D. Ladd
DATE: 8/3/2009

Golder Associates

BOREHOLE RECORD 083-93287.300 BS MAY2009.GPJ GLDR_WA.GDT 12/17/09

RECORD OF BOREHOLE GB-2

SHEET 6 of 6

PROJECT: WAGA/Hillside Evaluation
PROJECT NUMBER: 083-93287.300
LOCATION: Pritchard Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 5/26&27/09
DRILL RIG: B-61 Truck-Mounted

DATUM: Local
AZIMUTH: N/A
COORDINATES: N: 47.04 E: 122.91

ELEVATION: 133
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer, 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
100		96.0 - 101.0 Very dense, green gray, stratified, fine to coarse SAND, little silt, trace fine gravel, moist (SP-SM) (PRE-VASHON DEPOSITS) *(Continued)*	SP-SM		32.0							
		101.0 - 104.0 Very dense, orange brown gray to gray, slightly stratified, fine to medium SAND, some fine gravel, socketing, moist (SM) (PRE-VASHON DEPOSITS)	SM		101.0	29	SS	30-32-50	>50	1.5/1.5	>>■	Grout backfill.
105		Boring completed at 104.0 ft.			29.0 104.0							
110												
115												
120												

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: Matt Graham

LOGGED: A. Dennison
CHECKED: D. Ladd
DATE: 8/3/2009

Golder Associates

BOREHOLE RECORD 083-93287.300 BS MAY2009.GPJ GLDR_WA.GDT 12/17/09

RECORD OF BOREHOLE GB-3

SHEET 1 of 6

PROJECT: WAGA/Hillside Eval. 2010
PROJECT NUMBER: 083-93287.620
LOCATION: O'Brien Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 4/29&30/10
DRILL RIG: D 50 Track

DATUM: Geodetic
AZIMUTH: N/A
COORDINATES: N: 629,652.79 E: 1,040,547.96

ELEVATION: 128.5
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
0	6-inch outer diameter mud rotary w/ 140 lb auto hammer	0.0 - 7.0 Loose, olive gray, non-stratified, fine to medium SAND, little angular fine gravel, trace Silt, trace Organics, moist, (SP) (FILL)	SP									Flush mount monument set ~0.1 ft below existing grade
						1	SPT	3-3-2	5	0.4 / 1.5	■	
5		NO RECOVERY				2	SPT	4-5-3	8	0.0 / 1.5	■	2.75-inch diameter solid PVC inclinometer pipe embedded in grout and bentonite chips.
					121.5 / 7.0							
		7.0 - 12.0 Loose, light olive brown, non-stratified, silty, fine SAND, trace fine gravel, trace organics, trace brick debris, trace charcoal, moist, (SM) (FILL)	SM			3	SPT	3-3-3	6	1.0 / 1.5	■	
10						4	SPT	3-2-2	4	1.3 / 1.5	■	
					116.5 / 12.0							
		12.0 - 13.0 Loose, olive brown, iron oxide stained, stratified, silty, fine SAND, moist, (SM) (VASHON RECESSIONAL DEPOSITS)	SM		115.5 / 13.0	5	SPT	1-2-2	4	1.5 / 1.5	■	
		13.0 - 14.5 Soft, greenish gray, weakly stratified, SILT, little fine sand, moist, (ML) (VASHON RECESSIONAL DEPOSITS)	ML		114.0 / 14.5							
15		14.5 - 17.0 Firm, strong brown to greenish gray, heavy iron oxide stainining from 15.0 ft to 15.5 ft, SILT, moist, (ML) (VASHON RECESSIONAL DEPOSITS) ATTERBERG	ML			6	SPT	2-3-3	6	1.5 / 1.5	■ H○	
					111.5 / 17.0							
		17.0 - 19.5 Firm, light olve brown, stratified, SILT, some fine sand interbeds up to 1 inch thick, moist, (ML) (VASHON RECESSIONAL DEPOSITS)	ML			7	SPT	2-3-5	8	1.5 / 1.5	■	
					109.0 / 19.5							
20			SM									

Log continued on next page

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: T. Knipschield

LOGGED: T. Sager
CHECKED: D. Findley
DATE: 6/22/2010

Golder Associates

RECORD OF BOREHOLE GB-3

PROJECT: WAGA/Hillside Eval. 2010
PROJECT NUMBER: 083-93287.620
LOCATION: O'Brien Building
DRILLING METHOD: Mud Rotary
DRILLING DATE: 4/29&30/10
DRILL RIG: D 50 Track
DATUM: Geodetic
AZIMUTH: N/A
COORDINATES: N: 629,652.79 E: 1,040,547.96
ELEVATION: 128.5
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
20	6-inch outer diameter mud rotary w/ 140 lb auto hammer	19.5 - 22.0 Compact, light olive brown, iron oxide stained, stratified, silty, fine SAND, moist, (SM) (VASHON RECESSIONAL DEPOSITS) *(Continued)*	SM		106.5	8	SPT	4-7-8	15	1.0 / 1.5	■	
		22.0 - 24.5 Dense, olive brown, non-stratified, fine to coarse SAND, little silt, trace fine gravel, moist, (SP-SM) (VASHON RECESSIONAL DEPOSITS) SIEVE	SP-SM		22.0 104.0	9	SPT	9-15-16	31	1.5 / 1.5	○ ■	
25		24.5 - 29.5 Compact, olive brown, weakly stratified, fine SAND, trace silt, moist, (SP) (VASHON RECESSIONAL DEPOSITS)	SP		24.5	10	SPT	12-14-14	28	1.5 / 1.5	■	
						11	SPT	12-12-10	22	1.5 / 1.5	■	
					99.0							
30		29.5 - 32.0 Stiff, grayish brown, iron oxide stained, laminated, SILT, some very fine sand, moist, (ML) (VASHON RECESSIONAL DEPOSITS)	ML		29.5	12	SPT	4-5-8	13	1.5 / 1.5	■	
					96.5							
		32.0 - 37.0 Firm, light olive brown, weakly stratified, SILT to CLAY, becomes non-stratified, SILT below 35 feet, moist to wet, (ML/CL) (VASHON RECESSIONAL DEPOSITS)	ML/CL		32.0	13	SPT	3-2-4	6	1.5 / 1.5	■	
35						14	SPT	2-3-4	7	1.5 / 1.5	■	
					91.5							
		37.0 - 38.1 Compact, olive brown, heavy iron oxide stain from 38.0 ft to 38.1 ft, stratified, silty, fine SAND, moist, (SM) (VASHON RECESSIONAL DEPOSITS)	SM		37.0 90.4	15	SPT	4-7-10	17	1.3 / 1.5	■	
		38.1 - 39.5 Very stiff, bluish gray, non-stratified, SILT, moist, (ML) (VASHON RECESSIONAL DEPOSITS)	ML		38.1 89.0							
40		Log continued on next page	SM		39.5							

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: T. Knipschield
LOGGED: T. Sager
CHECKED: D. Findley
DATE: 6/22/2010

Golder Associates

RECORD OF BOREHOLE GB-3

PROJECT: WAGA/Hillside Eval. 2010
PROJECT NUMBER: 083-93287.620
LOCATION: O'Brien Building
DRILLING METHOD: Mud Rotary
DRILLING DATE: 4/29&30/10
DRILL RIG: D 50 Track
DATUM: Geodetic
AZIMUTH: N/A
COORDINATES: N: 629,652.79 E: 1,040,547.96
ELEVATION: 128.5
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
40	6-inch outer diameter mud rotary w/ 140 lb auto hammer	39.5 - 43.3 Compact, grayish brown, non-stratified, silty, fine SAND, moist, (SM) (VASHON RECESSIONAL DEPOSITS) #200 WASH *(Continued)*	SM			16	SPT	8-9-10	19	1.5 / 1.5	○ ■	
					85.3							
		43.3 - 48.3 Very stiff, light olive brown, non-stratified, SILT, moist, (ML) (VASHON RECESSIONAL DEPOSITS)			43.3							
45			ML			17	SPT	5-7-10	17	1.5 / 1.5	■	
					80.3							
		48.3 - 53.3 Hard, grayish brown, weakly stratified, sandy, SILT, moist, (ML) (VASHON RECESSIONAL DEPOSITS)			48.3							
50			ML			18	SPT	10-15-19	34	1.5 / 1.5	■	2.75-inch diameter solid PVC inclinometer pipe embedded in grout. →
					75.3							
		53.3 - 58.3 Hard, grayish brown, with thin bands up to 1/16-inch thick of Fe oxide staining observed from 50 ft to 51.5 ft, stratifed, SILT, moist, (ML) (VASHON RECESSIONAL DEPOSITS)			53.3							
55			ML			19	SPT	10-13-18	31	1.5 / 1.5	■	
					70.3							
		58.3 - 63.3 Very stiff, grayish brown, Fe oxide staining in thin bands up to 1/16-inch thick below, 61.0 ft, stratified, SILT, trace fine sand as a lens approximately 1/8-inch thick at 61.7 ft, moist, (ML) (VASHON RECESSIONAL DEPOSITS)			58.3							
60			ML									

Log continued on next page

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: T. Knipschield

LOGGED: T. Sager
CHECKED: D. Findley
DATE: 6/22/2010

Golder Associates

RECORD OF BOREHOLE GB-3

SHEET 4 of 6

PROJECT: WAGA/Hillside Eval. 2010
PROJECT NUMBER: 083-93287.620
LOCATION: O'Brien Building

DRILLING METHOD: Mud Rotary
DRILLING DATE: 4/29&30/10
DRILL RIG: D 50 Track

DATUM: Geodetic
AZIMUTH: N/A
COORDINATES: N: 629,652.79 E: 1,040,547.96

ELEVATION: 128.5
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
60	6-inch outer diameter mud rotary w/ 140 lb auto hammer	58.3 - 63.3 Very stiff, grayish brown, Fe oxide staining in thin bands up to 1/16-inch thick below, 61.0 ft, stratified, SILT, trace fine sand as a lens approximately 1/8-inch thick at 61.7 ft, moist, (ML) (VASHON RECESSIONAL DEPOSITS) *(Continued)*	ML		65.3	20	SPT	7-6-11	17	1.5/1.5	■	
65		63.3 - 68.3 Stiff, dark greenish gray, Fe oxide stained band approximately 1-inch thick at 66.4 ft, CLAY, trace fine gravel (dropstones?), moist, (CL) (VASHON RECESSIONAL DEPOSITS)	CL		63.3 60.3	21	SPT	4-6-8	14	1.5/1.5	■	
70		68.3 - 73.3 Very stiff, olive gray, Fe oxide staining from 71.0 to 71.5 ft, non-stratified, SILT, trace fine gravel (dropstones?), moist, (ML) (VASHON RECESSIONAL DEPOSITS)	ML		68.3 55.3	22	SPT	7-11-15	26	1.5/1.5	■	Vibrating Wire Piezometer set 72 ft bgs in grout (S/N 10-2580)
75		73.3 - 78.3 Dense, very dark gray, non-stratified, fine to medium SAND, trace fine gravel, trace silt, moist, (SP) (VASHON RECESSIONAL DEPOSITS)	SP		73.3 50.3	23	SPT	18-17-28	45	1.5/1.5	■	
80		78.3 - 82.0 Compact, grayish brown, weakly stratified, silty, fine SAND, trace fine gravel, moist, (SM) (VASHON RECESSIONAL DEPOSITS) #200 WASH	SM		78.3							

Log continued on next page

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: T. Knipschield

LOGGED: T. Sager
CHECKED: D. Findley
DATE: 6/22/2010

Golder Associates

BOREHOLE RECORD 083-93287.620 APR-MAY2010.GPJ GLDR_WA.GDT 4/15/11

RECORD OF BOREHOLE GB-3

PROJECT: WAGA/Hillside Eval. 2010
PROJECT NUMBER: 083-93287.620
LOCATION: O'Brien Building
DRILLING METHOD: Mud Rotary
DRILLING DATE: 4/29&30/10
DRILL RIG: D 50 Track
DATUM: Geodetic
AZIMUTH: N/A
COORDINATES: N: 629,652.79 E: 1,040,547.96
ELEVATION: 128.5
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
80	6-inch outer diameter mud rotary w/ 140 lb auto hammer	78.3 - 82.0 Compact, grayish brown, weakly stratified, silty, fine SAND, trace fine gravel, moist, (SM) (VASHON RECESSIONAL DEPOSITS) #200 WASH *(Continued)*	SM			24	SPT	18-13-15	28	1.5 / 1.5	○ ■	
					46.5							Driller reported gravel at approximately 82 ft.
		82.0 - 88.0 Very dense, olive gray, non-stratified, faceted, silty, fine GRAVEL and silty, fine to coarse SAND, moist, (GM/SM) (GLACIAL TILL OR PRE-VASHON DEPOSITS)			82.0							
85			GM/SM			25	SPT	50/3	>50	0.3 / 0.3	>>■	
					40.5							Drillder reported easier drilling at 88 ft.
		88.0 - 93.0 Very dense, olive brown, non-stratified, fine SAND, trace silt, moist, (SP) (PRE-VASHON DEPOSITS)			88.0							
90			SP			26	SPT	28-50/4	>50	0.5 / 0.9	>>■	
					35.5							
		93.0 - 102.0 Very dense, olive brown, non-stratified, silty, fine SAND, moist, (SM) (PRE-VASHON DEPOSITS) #200 WASH			93.0							
95			SM			27	SPT	37-50/5	>50	0.7 / 0.9	>>■	
100		Log continued on next page										

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: T. Knipschield

LOGGED: T. Sager
CHECKED: D. Findley
DATE: 6/22/2010

Golder Associates

RECORD OF BOREHOLE GB-3

PROJECT: WAGA/Hillside Eval. 2010
PROJECT NUMBER: 083-93287.620
LOCATION: O'Brien Building
DRILLING METHOD: Mud Rotary
DRILLING DATE: 4/29&30/10
DRILL RIG: D 50 Track
DATUM: Geodetic
AZIMUTH: N/A
COORDINATES: N: 629,652.79 E: 1,040,547.96
ELEVATION: 128.5
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
100		93.0 - 102.0 Very dense, olive brown, non-stratified, silty, fine SAND, moist, (SM) (PRE-VASHON DEPOSITS) #200 WASH *(Continued)*	SM		26.5	28	SPT	45-50/5	>50	0.9 / 0.9	○ >>■	Bentonite/cement grout.
		Boring completed at 102.0 ft.			102.0							
105												
110												
115												
120												

1 in to 3 ft
DRILLING CONTRACTOR: Holocene Drilling
DRILLER: T. Knipschield
LOGGED: T. Sager
CHECKED: D. Findley
DATE: 6/22/2010

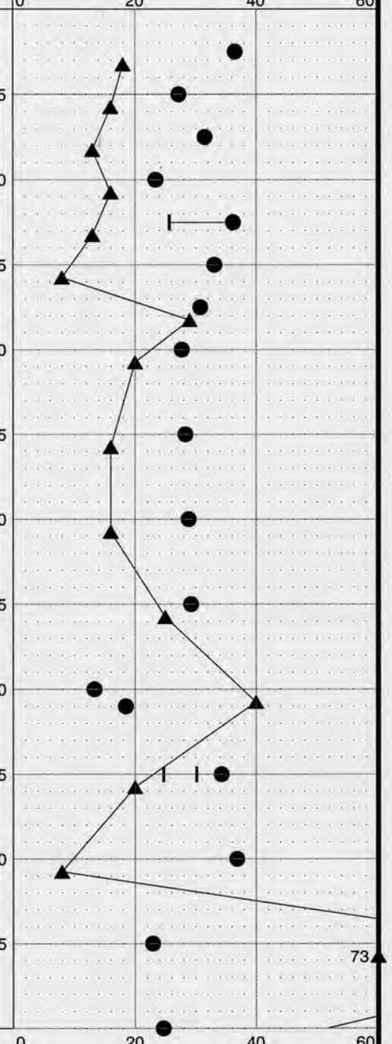
Golder Associates

BOREHOLE RECORD 083-93287.620 APR-MAY2010.GPJ GLDR_WA.GDT 4/15/11

SOIL DESCRIPTION Surface elevation: Approx. 113.5 Ft.	Depth (ft)
CONCRETE	0.6
Medium dense, light gray and brown, mottled, slightly clayey, fine sandy SILT; moist; scattered iron oxide-stained lenses; (Hf) ML.	3.5
Medium dense, brown, slightly fine sandy SILT; moist; abundant iron oxide-stained lenses and partings, abundant slightly clayey silt seams; (Qvrl) ML.	12.0
Stiff, light brown to reddish-brown, clayey SILT; wet; bedded, abundant iron oxide-stained seams, scattered organic fragments; (Qvrl) ML.	19.5
Interbedded, very stiff, brown, clayey SILT and medium dense, fine sandy SILT; moist; (Qvrl) ML.	22.5
Medium dense, brown, fine sandy SILT; moist to wet; locally trace of clay, massive to laminated, scattered fine organic fragments; (Qvrl) ML. - lens of brown to gray, blocky, high plasticity, silty clay from 30.8 to 31.1 feet	
Dense, brown, fine to medium SAND; moist; (Qvro) SP.	39.0 41.0
Dense, brown, slightly fine sandy SILT; moist; massive; (Qvrl) ML.	44.5
Very stiff to stiff, brown to gray, clayey SILT, trace of fine sand; wet; massive, scattered silt lenses; (Qvrl) ML.	52.0
Very dense, brown, fine sandy SILT; moist; massive, trace of clay; (Qpnl) ML.	58.0
CONTINUED NEXT PAGE	

Symbol | Samples | Ground Water | Depth (ft)

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
▽ Ground Water Level ATD

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

Seismic Ground Motion Study
Washington State Legislative Building
Olympia, Washington

LOG OF BORING S-1

September 2001 21-1-09343-002

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

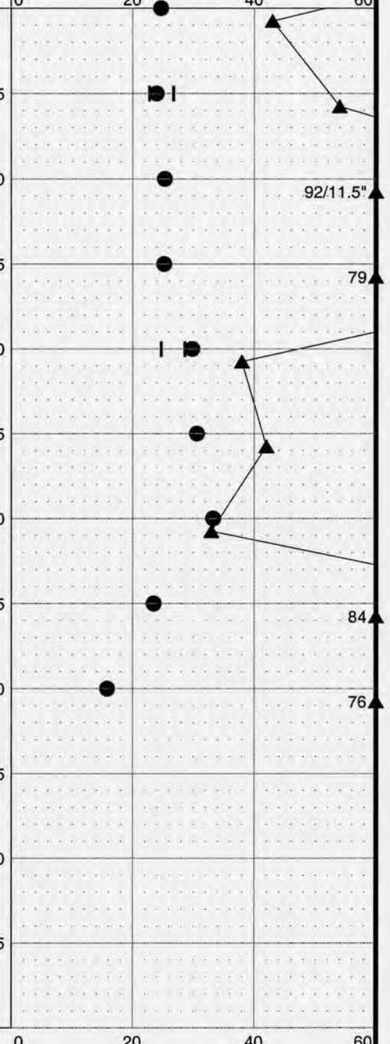
FIG. A-3
Sheet 1 of 2

Log: JER Rev: WDN Typ: MGI
MASTER_LOG 21-09343.GPJ SHAN_WIL.GDT 9/11/01

SOIL DESCRIPTION Surface elevation: Approx. 113.5 Ft.	Depth (ft)
Dense to very dense, brown SILT, trace of fine sand; moist; massive, abundant iron oxide staining, abundant fine organic fragments, locally trace of clay at bottom; (Qpnl) ML.	
Hard, gray, clayey SILT, trace of fine sand; moist to wet; massive, abundant fine organic fragments; (Qpnl) ML.	73.0
Very dense, gray, silty fine SAND; moist; scattered clayey silt pockets, abundant wood debris, massive; (Qpnf) SM.	94.0
Very dense, gray, silty, gravelly SAND, trace of clay; moist; massive; (Qpgt) SM.	98.0
BOTTOM OF BORING COMPLETED ON 04/29/2001	101.5

Symbol | Samples | Ground Water | Depth (ft)

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered
2-inch O.D. Split Spoon Sample
3-inch O.D. Shelby Tube Sample
▽ Ground Water Level ATD

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

Seismic Ground Motion Study
Washington State Legislative Building
Olympia, Washington

LOG OF BORING S-1

September 2001 21-1-09343-002

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 2 of 2

Log: JER Rev: WDN Typ: MGI
MASTER_LOG 21-09343.GPJ SHAN_WIL.GDT 9/11/01

APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Washington Department of Enterprise Services (DES) and other project team members for the Pritchard Rehabilitation and Expansion project. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report Is Based on a Unique Set of Project-specific Factors

This report has been prepared for the Pritchard Rehabilitation and Expansion project in Olympia, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure;
- Elevation, configuration, location, orientation or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

Most Geotechnical and Geologic Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Geotechnical Engineering Report Recommendations Are Not Final

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.

GeoEngineers