Earth
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June 3, 2022
Revised June 10, 2022

Patrick/Dave LLC
3514 Northeast U.S. Grant Place
Portland, Oregon 97212
Attention: David Pietka, Owner

Phone: (503) 206-1071
E-mail: dpietka@msn.com

Subject: **Geotechnical Investigation and Geologic Hazard Report**
Proposed Forest Lawn *3-Lot Partition*
Clatsop County Tax Lot No. 51030DA04100
Intersection of Forest Lawn Road and Hemlock Street
Cannon Beach, Clatsop County, Oregon
EEI Report No. 22-103-1-*R1*

Dear Mr. Pietka,

Earth Engineers, Inc. (EEI) is pleased to transmit our ***revised*** report for the above referenced project. This report includes the results of our field investigation, an evaluation of geotechnical factors and geologic hazards that may influence the proposed construction, and geotechnical recommendations for the proposed ***partition*** and general site development. ***This report has been revised, as requested. Report revisions are denoted in bold, italics font.***

We appreciate the opportunity to perform this geotechnical study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Sincerely,
Earth Engineers, Inc.

Troy Hull, P.E., G.E.
Principal Geotechnical Engineer

Ken Andrieu, R.G.
Senior Geologist

Jacqui Boyer
Geotechnical Engineering Associate

Attachment: Geotechnical Investigation and Geologic Hazard Report

Distribution (electronic copy only): Addressee
Jamie Lerma, Red Crow, LLC (jamie@redcrowgc.com)

GEOTECHNICAL INVESTIGATION AND GEOLOGIC HAZARD REPORT

for the

Proposed Forest Lawn *3-Lot Partition*
Clatsop County Tax Lot No. 51030DA04100
Intersection of Forest Lawn Road
and South Hemlock Street
Cannon Beach, Clatsop County, Oregon

Prepared for

Patrick/Dave LLC
3514 Northeast U.S. Grant Place
Portland, Oregon 97212
Attention: David Pietka, Owner

Prepared by

Earth Engineers, Inc.
2411 Southeast 8th Avenue
Camas, Washington 98607
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1.0 PROJECT INFORMATION

1.1 Project Authorization

Earth Engineers, Inc. (EEI) has completed a geotechnical investigation report for the proposed 3 residential lot development on Clatsop County Tax Lot No. 51030DA04100 in Cannon Beach, Clatsop County, Oregon. Our services were authorized by David Pietka, owner of Patrick/Dave LLC, on April 19, 2022 by signing EEI Proposal No. 22-P182 dated April 18, 2022.

1.2 Project Description

Our current understanding of the project is based on the information Jamie Lerma with Red Crow, LLC provided to EEI Principal Geotechnical Engineer Troy Hull and Principal Engineering Geologist Adam Reese. ***We were also provided the following partition plat via e-mail on June 5, 2022***:

- ***Partition Plan titled "Preliminary Forest Lawn Partition Plat" prepared by S&F Land Services, dated May 13, 2022. This map shows the proposed boundaries of the 3 lots on the subject property with respect to the surrounding properties and streets. See Figure 1 below.***

Briefly, we understand the plan is to develop a 3-lot residential ***partition***. It is our understanding that this project is in its preliminary stages. We have not been provided any detailed construction plans for the project. For the purposes of this report, we are assuming maximum foundation loads of 4 kips per linear foot for wall footings, 40 kips for column footings, and 150 psf for floor slabs. With regard to design grades, we are assuming that cuts and fills will be negligible (i.e. less than 2 feet). Finally, we have assumed that the homes will be constructed in accordance with the 2021 Oregon Residential Specialty Code (ORSC), or the 2019 Oregon Structural Specialty Code (OSSC).

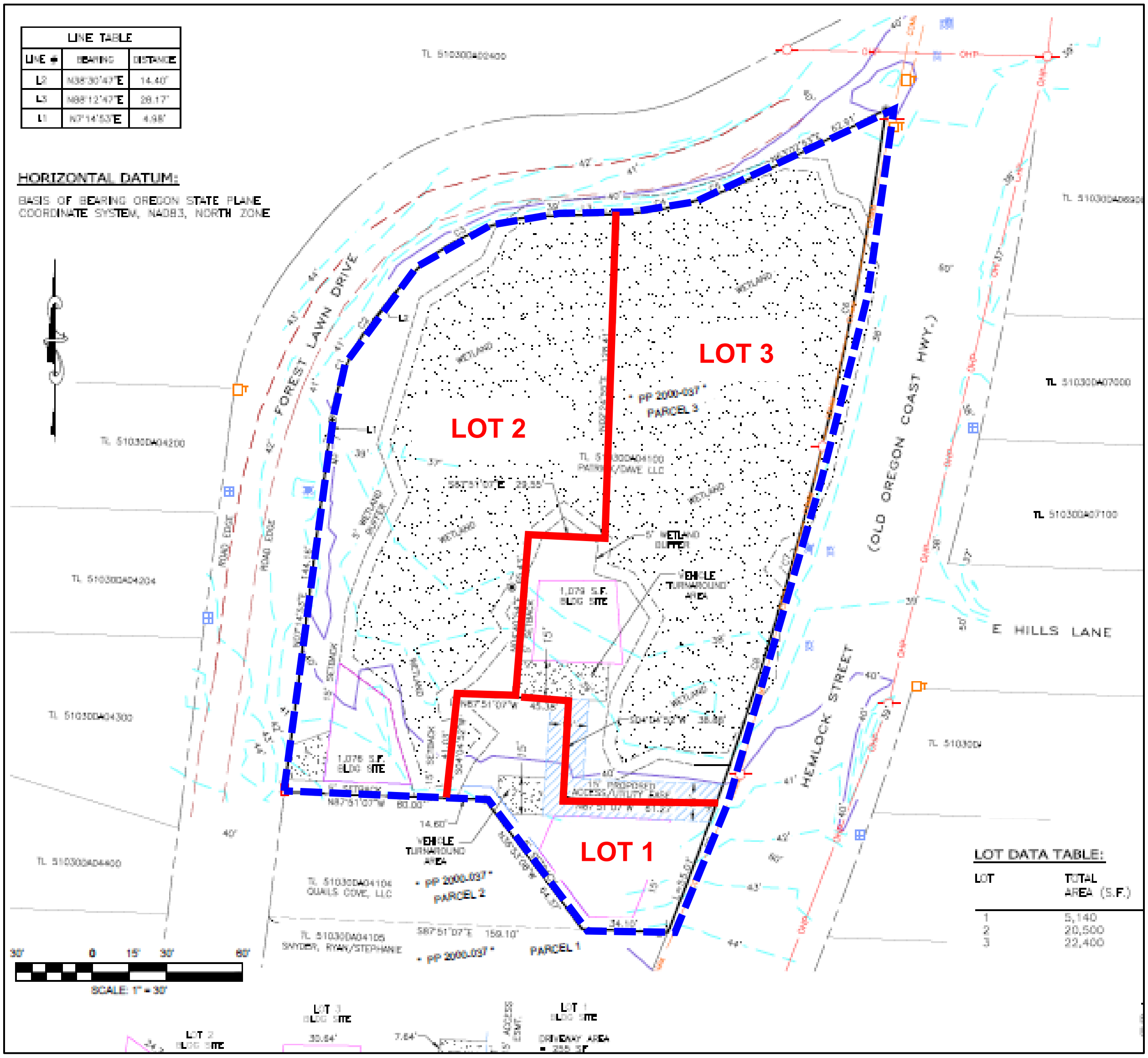

Figure 1: Partition plan referenced above showing the project vicinity. The subject property is outlined in blue and the proposed lot boundaries are outlined in red.

1.3 Purpose and Scope of Services

The purpose of our services was to explore the subsurface conditions at the site of the 3 residential lots to better define the soil, rock, and groundwater properties in order to provide geotechnical related recommendations related to the proposed construction. Our site investigation consisted of advancing two Standard Penetration Test (SPT) borings (B-1 and B-2) located on the subject property using a trailer mounted Big Beaver drill rig subcontracted from Dan J Fischer, Inc of Forest Grove, Oregon. SPT samples were taken at regular intervals and transported to our laboratory for testing. We supplemented our drilled borings with three hand auger borings (HA-1 through HA-3) and drive probe testing. Laboratory testing was accomplished in general accordance with ASTM procedures.

This report briefly outlines the testing procedures, presents available project information, describes the site, assumed subsurface conditions, and presents recommendations regarding the following:

- A discussion of subsurface conditions encountered including pertinent soil and groundwater conditions.
- Seismic design parameters in accordance with ASCE 7-16.
- Geotechnical related recommendations for deep foundation design.
- Structural fill recommendations, including an evaluation of whether the in-situ soils can be used as structural fill.
- Retaining wall design parameter recommendations, including coefficient of friction and earth pressures.
- Floor slab support recommendations.
- A Geologic Hazard Report (GHR) in accordance with Clatsop County requirements
- Other discussion on geotechnical issues that may impact the project.

It should be noted, we consider this report to be preliminary for the project area as a whole. Due to accessibility issues, we were only able to advance deep borings on the perimeter of the project area, and limited hand tool explorations on the southern portion of the property. Once the project is further along and the site is more accessible, we can perform additional drilled borings on the 3 lots (if requested). EEI should be informed when detailed construction drawings are made for the proposed residences so we can revise our report for each individual lot, if necessary.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Site Location and Description

The site for the proposed development is located at Clatsop County Tax Lot No. 51030DA04100 in Cannon Beach, Oregon. The site is bound to the north and west by Forest Lawn Road, to the south by residential properties and to the east by South Hemlock Street. See Figure 2 below for project vicinity.

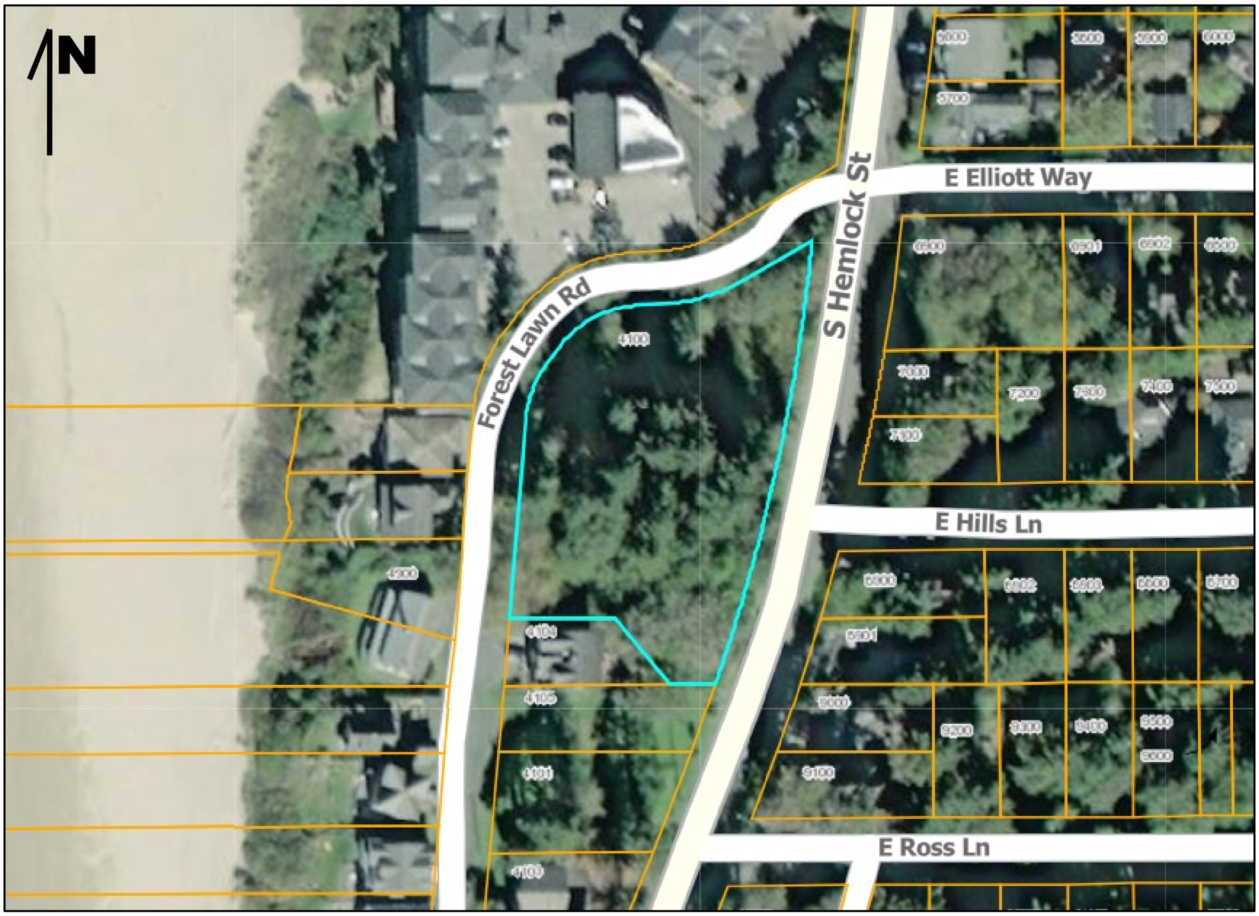

Figure 2: Project vicinity showing the subject property (outlined in blue).
Source: https://delta.co.clatsop.or.us/apps/ClatsopCounty/.

The subject property is currently vacant, vegetated with grass, brush and mature trees. It should be noted, the northern portion of the property is densely vegetated with brush and trees; as a result, we were unable to advance any explorations in those areas. We also observed vegetation indicative of a wetland or a marsh along the northern portion of the property. In terms of topography, the subject property is level. According to Google Earth, the elevation ranges from 39 feet above mean sea level (msl) to 46 feet msl. While on site, we did not observe any signs of soil movement (i.e. cracking in the soil, leaning trees, landscape head scarps etc.). See Photos 1 through 5 below for the current site conditions.

Photo 1: Current site conditions, taken from the southern property line facing north (looking at Lot 1).

Photo 2: Current site conditions, facing northwest (looking at Lot 2).

Photo 3: Current site conditions, facing northeast (looking at Lot 3).

Photo 4: Current site conditions taken from the western property line, facing east (looking at Lot 2).

Photo 5: Current site conditions taken from the northwestern property line, facing southeast (looking at Lot 2).

2.2 Subsurface Materials

The site was explored with two SPT borings (B-1 and B-2). For approximate exploration locations see the Exploration Location Plan in Appendix B. The SPT borings were advanced with a subcontracted trailer mounted drill rig subcontracted from Dan J. Fischer Excavating, Inc. of Forest Grove, Oregon. Boring B-1 was advanced to a depth of 33.5 feet below ground surface (bgs) and B-2 was advanced to a depth of 51.5 feet bgs. SPT samples were generally taken at regular intervals within the boring and transported to our laboratory for testing.

In addition, we supplemented our drilled borings with three hand auger explorations (HA-1 through HA-3) and drive probe testing. The three hand tool explorations were advanced in each of the three proposed ***partition*** lots. For approximate exploration locations see the Exploration Location Plan in Appendix B. The hand auger explorations were each advanced to a depth of 5 feet bgs and the drive probe testing was advanced to a depth of 8 feet bgs.

The drive probe test is based on a “relative density” exploration device used to determine the distribution and to estimate strength of the subsurface soil units. The resistance to penetration is measured in blows-per-½-foot of an 11-pound hammer which free falls roughly 39 inches driving a 3/4-inch outside diameter pipe with a 1-inch diameter endcap into the ground. This measure of resistance to penetration can be used to estimate relative density of soils. For a more detailed description of this geotechnical exploration method, please refer to the Slope Stability Reference Guide for National Forests in the United States, Volume I, USDA, EM-7170-13, August 1994, P 317-321. Results of the drive probe tests are reported in the hand auger logs in Appendix C.

Select soil samples were tested in the laboratory to determine material properties for our evaluation. Results of the explorations are reported in the Exploration Logs in Appendix C. Laboratory testing was accomplished in general accordance with ASTM procedures. The testing performed included moisture content tests (ASTM D 2216), fines content determinations (ASTM D1140) and Atterberg limit testing (ASTM D4318). The test results have been included on the Exploration Logs in Appendix C and the Report of Atterberg Limits Testing in Appendix E.

In general, we encountered a surficial layer of topsoil overlying compressible, organic soils which eventually transitioned to dense sandstone with depth. Each individual stratum encountered is discussed in further detail below.

TOPSOIL

In all of our explorations, we encountered topsoil as the surficial layer. The topsoil stratum was generally dark brown to black sandy silt with heavy organics (i.e. roots, rootlets and wood chips). The thickness of this stratum was 6-inches to 12-inches in our explorations.

COMPRESSIBLE, ORGANIC SOILS

In all of our explorations we encountered a thick layer of compressible soils underlying the topsoil described above. In B-2, the upper layer of compressible soils was generally a gray-brown sand with broken rock fragments, wood chips and rootlets. Laboratory moisture content testing on samples obtained within this stratum ranged from 21 to 32 percent. Fines content laboratory testing for a sample obtained within this stratum yielded a result of 8 percent passing the #200 sieve. Based on SPT sampling data, this stratum ranged from very loose to loose (N-value average of 5). This sand stratum extended to a depth of 5.5 feet bgs in B-2.

In all of our explorations (except for B-2), we encountered low plasticity silt underlying the topsoil described above. In B-2, this silt was underlying the upper sand stratum described above. This stratum was generally a blue-gray to gray-brown to dark brown silt with orange and gray mottling. We also encountered rootlets within this stratum. Laboratory moisture content testing on samples obtained within this stratum ranged from 53 to 72 percent. Fines content laboratory testing for samples obtained within this stratum ranged from 93 to 94 percent passing the #200 sieve. We also conducted Atterberg testing on a sample retrieved within this stratum from B-2 at 5 feet bgs. The testing indicated this stratum is a low plasticity silt (ML). Based on SPT sampling data, this stratum ranged from very soft to soft (N-value average of 2). This low plasticity silt stratum extended to the terminal depth of our hand tool explorations (i.e. 5 feet bgs), and to a depth of 10 feet bgs in of our drilled borings.

In our drilled borings, we encountered high plasticity silt underlying the low plasticity silt described above. This stratum was generally a blue-gray to gray to brown silt. We also encountered heavy organics (i.e. wood chips and rootlets) within this stratum. Laboratory moisture content testing on samples obtained within this stratum ranged from 50 to 388 percent. It should be noted the very high moisture readings are likely due to the presence of organics. Fines content laboratory testing for sample a sample obtained within this stratum yielded a result of 97 percent passing the #200 sieve. We also conducted Atterberg testing on a sample retrieved within this stratum from B-2 at 10 feet bgs. The testing indicated this stratum is a high plasticity silt (MH). Based on SPT sampling data, this stratum ranged from very soft to soft (N-value average of 2). This high plasticity silt stratum extended to a depth of 25 feet bgs in both of our explorations.

In our drilled borings, we encountered a layer of silty sand underlying the high plasticity silt described above. In B-2, we encountered silty sand and sandy silt underlying the high plasticity silt described above. This stratum was generally a brown to gray brown to blue gray silty sand/sandy silt with trace organics. Laboratory moisture content testing on samples obtained within this stratum ranged from 60 to 124 percent. It should be noted the very high moisture readings are likely due to the presence of organics. Fines content laboratory testing for samples obtained within this stratum ranged from 26 to 81 percent passing the #200 sieve. Based on SPT sampling data, the silty sand stratum ranged from very loose to medium dense and the sandy silt stratum was generally medium stiff (N-value average of 5). This stratum extended to a depth of 30 feet bgs in B-1 and 45 feet bgs in B-2.

DENSE SANDSTONE

In both of our boring explorations, we encountered a dense sandstone layer underlying the compressible, organic soils described above. This stratum was generally a gray to blue-gray sandstone with varying amounts of silt. Laboratory moisture content testing on samples obtained within this stratum ranged from 11 to 76 percent. Fines content laboratory testing for samples obtained within this stratum ranged from 9 to 39 percent passing the #200 sieve. Based on SPT sampling data, this stratum ranged from medium dense to very dense (N-value average of 42). This sandstone stratum extended to the terminal depths of our explorations (i.e. 33.5 feet bgs in B-1 and 51.5 feet bgs in B-2).

The classifications noted above were made in general accordance with the USCS as shown in Appendix D. The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The exploration logs included in the Appendix should be reviewed for specific information. These records include soil descriptions, stratifications, and locations of the samples. The stratifications shown on the logs represent the conditions only at the actual exploration location. Variations may occur and should be expected across the site. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these logs. The samples that were not altered by laboratory testing will be retained for 90 days from the date of this report and then will be discarded.

2.4 Groundwater Information

During our subsurface investigation, we encountered groundwater at depths ranging from 1 to 4 feet bgs.

In addition, we reviewed publicly available well logs from the Oregon Water Resources Department website (http://apps.wrd.state.or.us/apps/gw/well_log/) for historic information. We found two historical logs for a property located approximately 550 feet north of the subject property, advanced on June 1, 2015. The logs indicate that groundwater was encountered at a depth of 7 feet below ground surface. See Appendix F for a copy of these well log reports.

It should be noted that groundwater elevations can fluctuate seasonally and annually, especially during periods of extended wet or dry weather, or from changes in land use.

3.0 GEOLOGIC HAZARD ASSESSMENT

3.1 Soil Survey

The United States Department of Agriculture (USDA) Soil Survey provides geographical information of the soils in Clatsop County as well as summarizing various properties of the soils. The USDA maps the surface soils on site as Unit 61E (Templeton-Ecola silt loams on 30 to 60 percent slopes) and Unit 71C (Walluski medial silt loam on 7 to 15 percent slopes.[1]

The Templeton-Ecola silt loam covers the western majority of the project area (i.e. the entirety of Lot 2, and the western portions of Lots 1 and 3). The soil unit consists of well-drained soils formed on hillslopes and mountain slopes with a parent material of colluvium and residuum derived from sedimentary rock. A typical profile consists of slightly decomposed plant material overlying medial silt to silty clay loam which eventually transitions to weathered bedrock with depth. Although the USDA indicates this unit is mapped on 30 to 60 percent slopes we did not encounter any slopes up to 30 to 60 percent on the subject property.

The Walluski medial silt loam covers the eastern portion of the property (i.e. the eastern portions of Lots 1 and 3). The soil unit consists of moderately well-drained soils formed on stream terraces with a parent material of mixed alluvium and/or fluviomarine deposits derived from sedimentary rock. A typical profile consists of slightly decomposed plant material overlying medial silt loam overlying silty clay loam.

3.2 Geology

The site is located approximately 120 feet east of a coastal bluff overlooking Cannon Beach on the Oregon Coast. The bluff is approximately 20 feet tall with a slope of approximately 2.1H:1V. The region is underlain by a framework of Miocene aged (23 to 5 million years ago) volcanic rocks and Oligocene (33 to 23 million years ago) to Miocene aged marine sedimentary deposits that have been deposited over a basement rock of Eocene-aged (54 to 33 million years ago) volcanic arc deposits. Overlying this framework are Quaternary–aged (1.8 million years ago to present) marine terrace deposits, beach and dune deposits, and landslide deposits.

More specifically, Niem and Niem (1985)[2] maps the underlying geology on the subject property as middle to lower Miocene aged Cannon Beach member (informal) of the Astoria Formation from the Astoria Group. This formation is described as a "well-bedded sequence of laminated to

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[1] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/ accessed 5/24/2022.

[2] Niem, A.R., and Niem, W., 1985, Geologic map of the Astoria Basin, Clatsop and northernmost Tillamook Counties, northwest Oregon: Portland, Oregon, Oregon Department of Geology and Mineral Industries Oil and Gas Investigation Map OGI-14, Plate 1, scale 1:100,000.

massive micaceous mudstone, with subordinate, rhythmically thin-bedded feldspathic sandstone and mudstone in the lower part of the unit". See Figure 3 below.

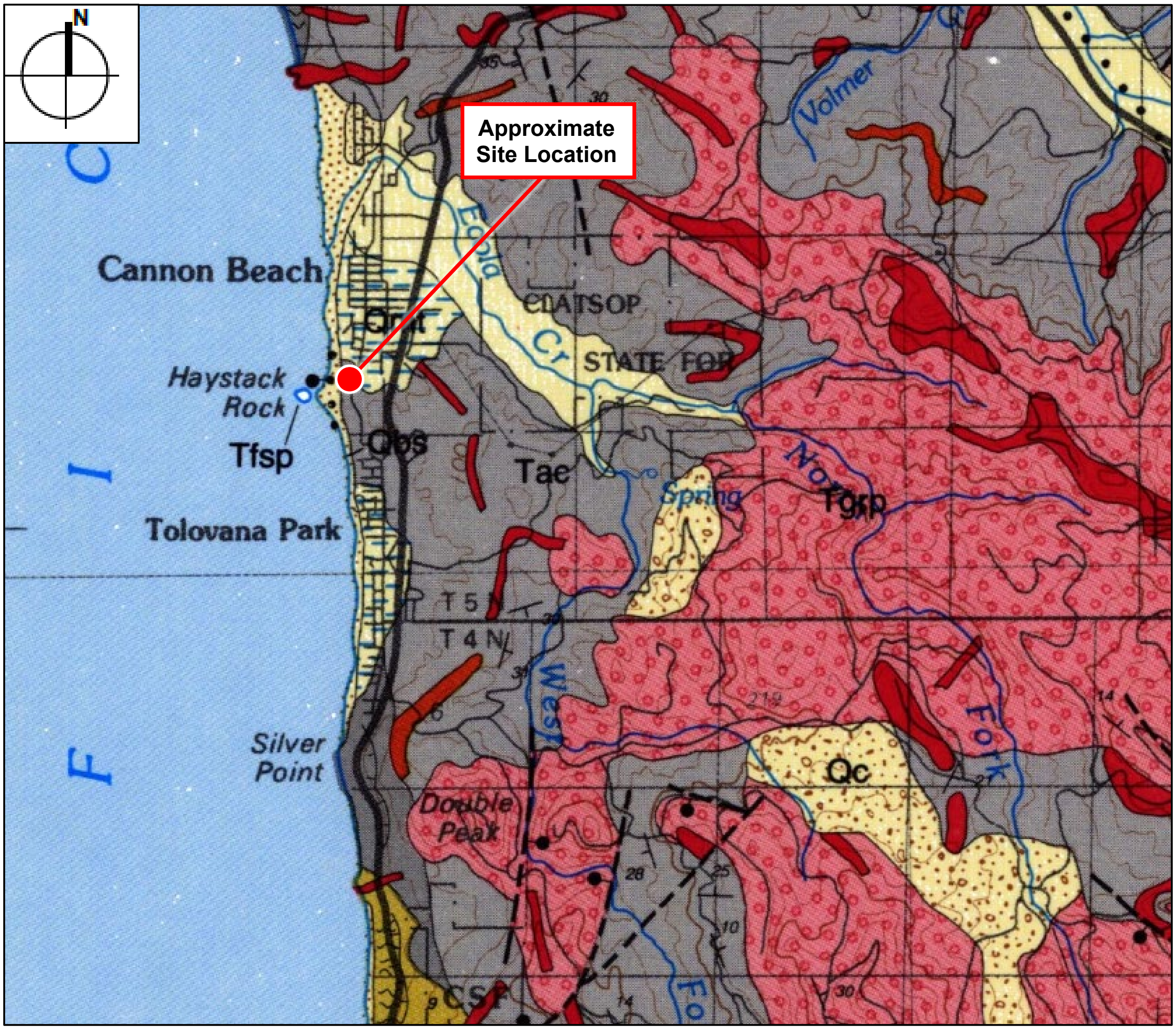

Figure 3: Geologic map of the subject property and its surrounding areas (base map source: Niem and Niem, 1985).

In addition, Schlicker and others (1972)[3] indicates that the subject property is mapped adjacent to an active landslide area. Active landslide areas are described as "areas where ground movement is continuous or periodic or areas in which historic movement has taken place. The area includes debris and rockfalls on the headlands, shallow slump failures along terraces fronting the ocean and bays, and areas of local slump in upland areas". The underlying bedrock unit in

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[3] Schlicker, H.G., Deacon, R.J., Beaulieu, J.D., and Olott, G.W., 1972. Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties, Oregon, Oregon Department of Geology and Mineral Industries, Bulletin 74, 1:62,500.

the active landslide area is mapped as Pleistocene aged marine terrace deposits (Qmt). See Figure 4 below.

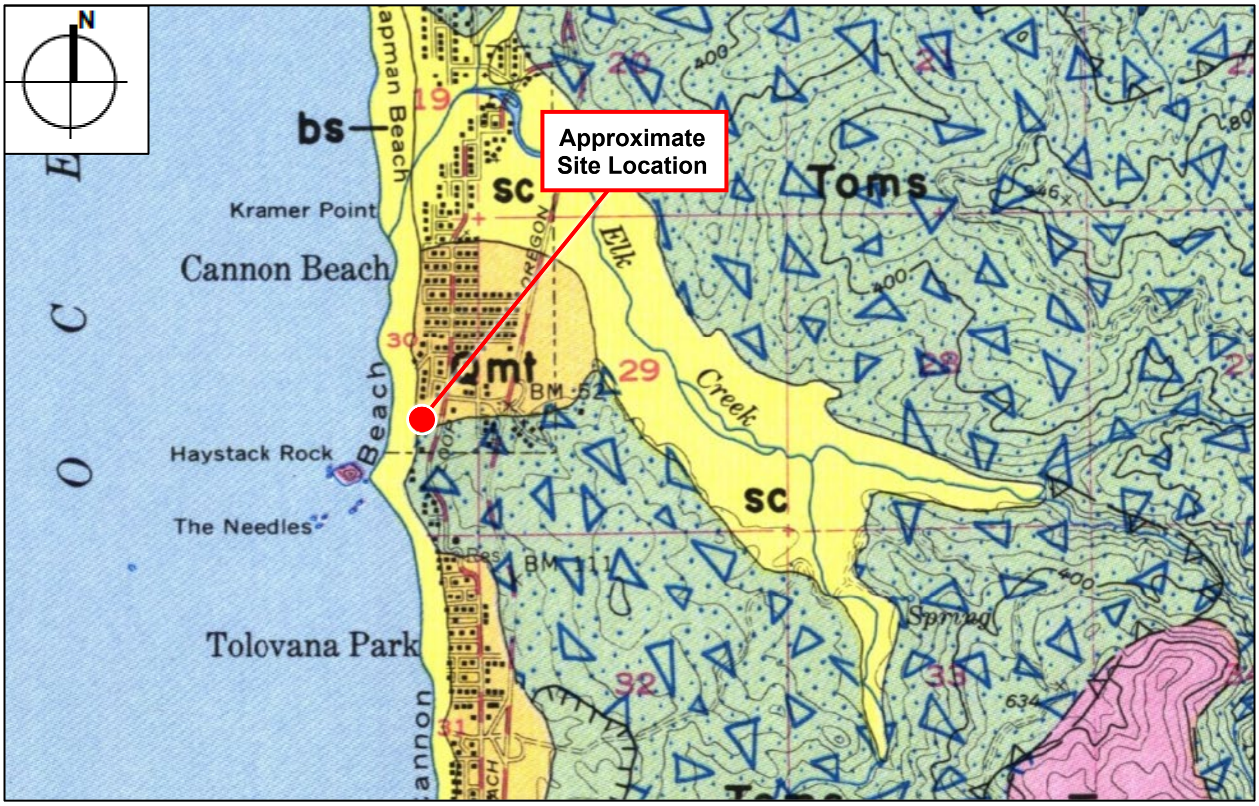

Figure 4: Geologic map of the area; the blue triangle pattern is symbolic of landslide topography (base map source: Schlicker and others, 1972).

We did not observe signs of recent or active landslides from our reconnaissance of the immediate area. Based on our observations of exposed and subsurface soils, as well as the geomorphic features of the site and nearby properties, it is our professional opinion that the site is likely at risk from shallow and deep global landsliding.

The upper, roughly 30 to 40 feet of soft soil is at risk of localized shallow landsliding or soil creep. Adding the weight of a home to this soil layer could increase that risk. As such, we recommend that any house foundations be supported on a deep foundation that extends through this soil layer.

The second landslide risk is from deep-seated block failure given the property may be sitting on a relatively deep portion of the landslide debris. Based on our explorations, it is our professional opinion that the sandstone encountered is the stable layer, therefore extending deep foundations through the upper, compressible soils and bearing them on the sandstone will mitigate the risk of deep global landsliding.

In summary, our recommended approach is to employ a deep foundation system that extends through the compressible, organic soils, and protects the house foundations from shallow, localized landsliding or slope creep that might occur in the future.

3.3 Seismicity

Oregon's position at the western margin of the North American Plate and its location relative to the Pacific and Juan de Fuca plates have had a major impact on the geologic development of the state. The interaction of the three plates has created a complex set of stress regimes that influence the tectonic activity of the state. The western part of Oregon is heavily impacted by the influence of the active subduction zone formed by the Juan de Fuca Oceanic Plate converging upon and subducting beneath the North American Continental Plate off the Oregon coastline.

The Cascadia Subduction Zone, located approximately 100 kilometers off of the Oregon and Washington coasts, is a potential source of earthquakes large enough to cause significant ground shaking at the subject site. Research over the last several years has shown that this offshore fault zone has repeatedly produced large earthquakes, on average, every 300 to 700 years. It is generally understood that the last great Cascadia Subduction Zone earthquake occurred about 300 years ago, in 1700 AD. Although researchers do not necessarily agree on the likely magnitude, it is widely believed that an earthquake moment magnitude (M_w) of 8.5 to 9.5 is possible. The duration of strong ground shaking is estimated to be greater than 1 minute, with minor shaking lasting on the order of several minutes.

Additionally, earthquakes resulting from movement in upper plate local faults are considered a possibility. Crustal earthquakes are relatively shallow, occurring within 10 to 20 kilometers of the surface. Oregon has experienced at least two significant crustal earthquakes in the past decade—the Scotts Mills (Mt. Angel) earthquake (M_w 5.6) on March 25, 1993 and the Klamath Falls earthquake (M_w 5.9) on September 20, 1993. Based on limited data available in Oregon, it would be reasonable to assume a M_w 6.0 to 6.5 crustal earthquake may occur in Oregon every 500 years (recurrence rate of 10 percent in 50 years). There are no mapped crustal faults in the immediate vicinity of the property, but there is a marine crustal fault approximately 3 miles west of the property[4].

3.3.1 Seismic Design Parameters

In accordance with ASCE 7-16, we recommend a Site Class E (soft soil with an average standard penetration resistance less than 15 blows per foot) when considering the average of the upper 100 feet of bearing material beneath the proposed foundations. This recommendation is based on the SPT N-values in our boring B-1 and our local knowledge of the area geology.

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[4] USGS U.S. Quaternary Faults Interactive Map, https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf.

Inputting our recommended Site Class as well as the site latitude and longitude into the Structural Engineers Association of California (SEAOC) – OSHPD Seismic Design Maps website (http://seismicmaps.org) which is based on the United States Geological Survey, we obtained the seismic design parameters shown in Table 1 below. Note that the values for F_a and F_v in Table 1 were obtained from ASCE's Supplement 3 dated November 5, 2021 and issued for ASCE 7-16 to correct some seismic design issues in the original publication.

Table 1: Seismic Design Parameter Recommendations (ASCE 7-16, including Supplement 3 dated November 5, 2021)

PARAMETER	RECOMMENDATION
Site Class	E
S_s	1.317g
S_1	0.691g
F_a	1.200
F_v	2.000
S_{MS} (= S_s x F_a)	1.580g
S_{M1} (= S_1 x F_v)	1.382g
S_{DS} (=2/3 x S_s x F_a)	1.054g
S_{D1} (=2/3 x S_1 x F_V)	0.921g
Design PGA (= S_{DS} / 2.5)	0.422g
MCE_G PGA	0.664g
F_{PGA}	1.100
PGA_M (= MCE_G PGA * F_{PGA})	0.731g

Note: Site latitude = 45.8866, longitude = -123.963

The return interval for the ground motions reported in the table above is 2 percent probability of exceedance in 50 years.

Per Section 11.4.8 of ASCE 7-16 a site-specific ground motion hazard analysis shall be performed in accordance with Section 21.2 for the following conditions:

1. Structures on Site Class D sites with S_1 greater than or equal to 0.2g.

   Exception: ASCE 7-16 does not require a site-specific ground motion hazard analysis when the value of S_{M1} is elected to be increased by 50% for all applications of S_{M1} by the Structural Engineer. If S_{M1} is increased by 50% to avoid having to perform the seismic response analysis, then the resulting value of S_{D1} shall be equal to 2/3 * [1.5* S_{M1}])

2. Structures on Site Class E sites with values of S_s greater than or equal to 1.0, or values of S_1 greater than or equal to 0.2.

   Exception: ASCE 7-16 does not require a site-specific ground motion hazard analysis when:

1. The Structural Engineer uses the equivalent lateral force design procedure and the value of Cs is determined by Eq. 12.8-2 for all values of T, or
2. Where (i) the value of S_{ai} is determined by Eq. 15.7-7 for all values of T_i, and (ii) the value of the parameter S_{D1} is replaced with 1.5*S_{D1} in Eq. 15.7-10 and 15.7-11.

We classified this site as Site Class E. Because the S_s value is greater than 1.0 as shown in Table 1 above, a ground motion hazard analysis is required unless the Structural Engineer elects to increase the S_{M1} value by 50 percent (which results in increasing the S_{D1} value by 50 percent). **If the Structural Engineer elects not to utilize the 50 percent increase on S_{M1} and S_{D1}, then EEI should be retained to perform a site-specific ground motion hazard analysis in accordance with Section 21.2 of ASCE 7-16.**

3.3.2 Liquefaction

Based on our investigation, we consider the soils encountered in our exploration to be liquefiable. Liquefaction occurs when a saturated sand or silt soil starts to behave like a liquid. Liquefaction occurs because of the increased pore pressure and reduced effective stress between solid particles generated by the presence of liquid. It is often caused by severe ground shaking, especially that associated with earthquakes. For the purpose of our hazard evaluation, we consider only the saturated soils within the upper 50 feet of the ground surface to be potentially liquefiable. The liquefaction potential was evaluated based on the SPT N_{60}-values.

Assuming 2 to 3 percent vertical strain, we estimate that total dynamic settlement caused by an earthquake could be on the order of 9 to 13 inches. This assumes the potentially liquefiable layer is 36 feet thick (i.e. reference boring B-2 where it is potentially liquefiable from 4 to 40 feet). We estimate differential dynamic settlement due to liquefaction could be on the order of 50 to 75 percent of the total dynamic settlement; meaning anywhere from approximately 4.5- to 10-inches of differential dynamic settlement due to liquefaction could occur across the building footprints.

3.4 Geologic Hazards

The Oregon Department of Geology and Mineral Resources (DOGAMI) maps various geologic hazards, such as 100-year flooding, earthquake ground shaking, costal erosion, and landslides.[5] This service, generally referred to as Oregon's HazVu, shows the geologic hazards associated with development of this region of the site to include the following:

- Severe Cascadia earthquake expected shaking
- Very strong crustal earthquake expected shaking
- Low liquefaction (soft soil) hazard area
- Moderate landslide hazard area (i.e. landsliding possible)

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[5] Oregon HazVu: Statewide Geohazards Viewer, available online at: http://www.oregongeology.org/sub/hazvu/ accessed 5/31/2022.

- In close proximity to mapped landslide deposits
- In close proximity to mapped coastal erosion hazard area

Figures 5 through 10 below show mapping of the geologic hazards as presented by Oregon's HazVu.

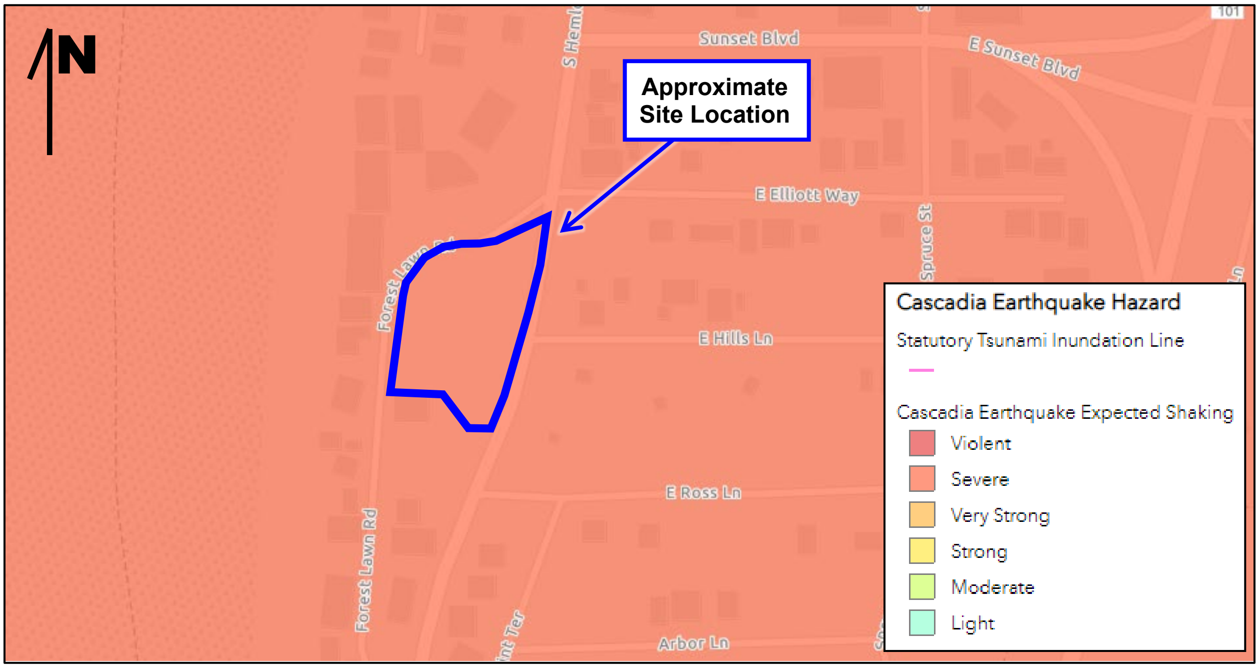

Figure 5: HazVu map showing the Cascadia earthquake expected shaking hazard zones.

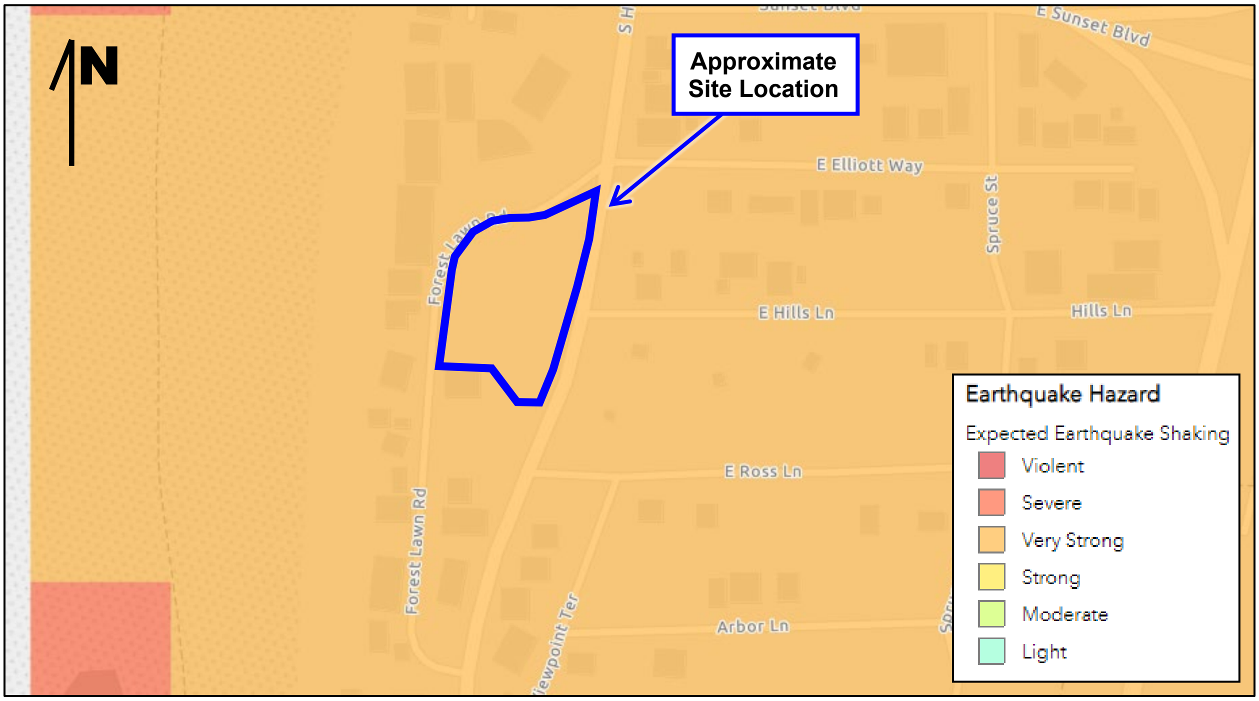

Figure 6: HazVu map showing the crustal earthquake expected shaking hazard zones.

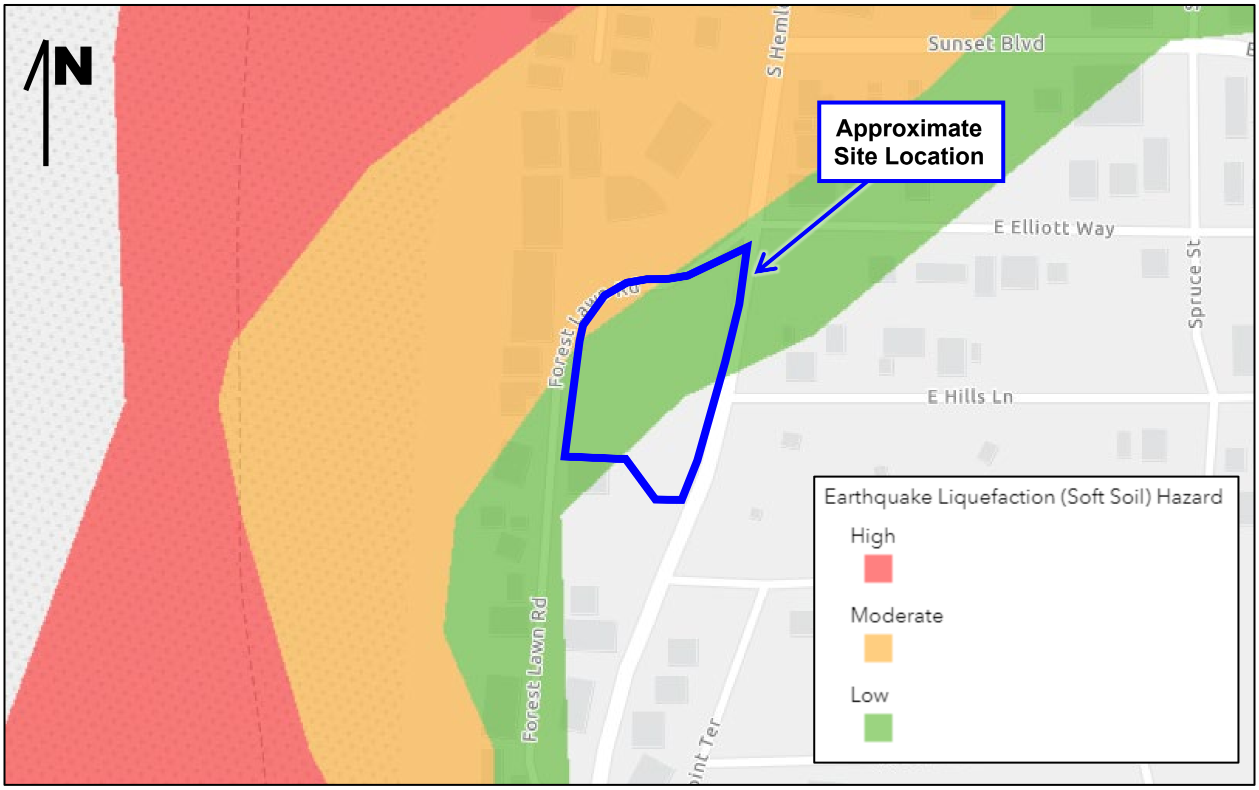

Figure 7: HazVu map showing the liquefaction (soft soil) hazard area.

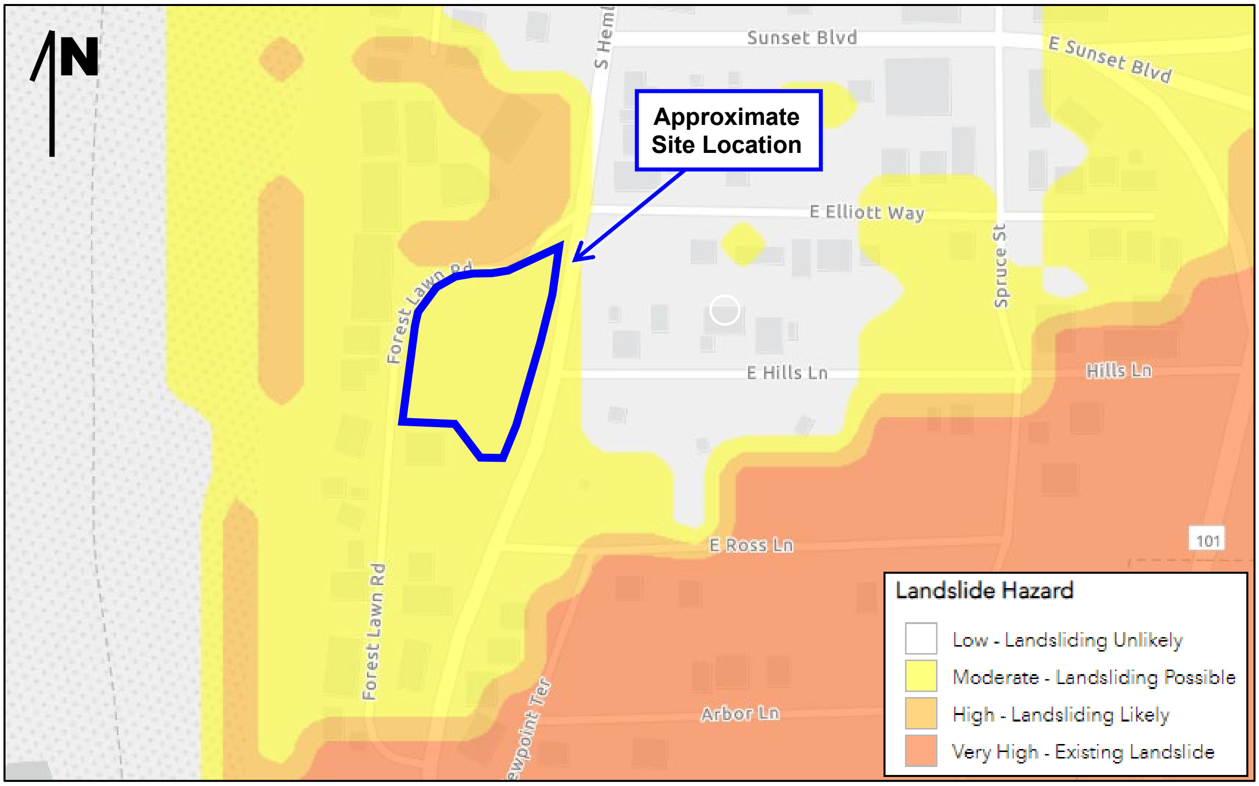

Figure 8: HazVu map showing the landslide hazard zones.

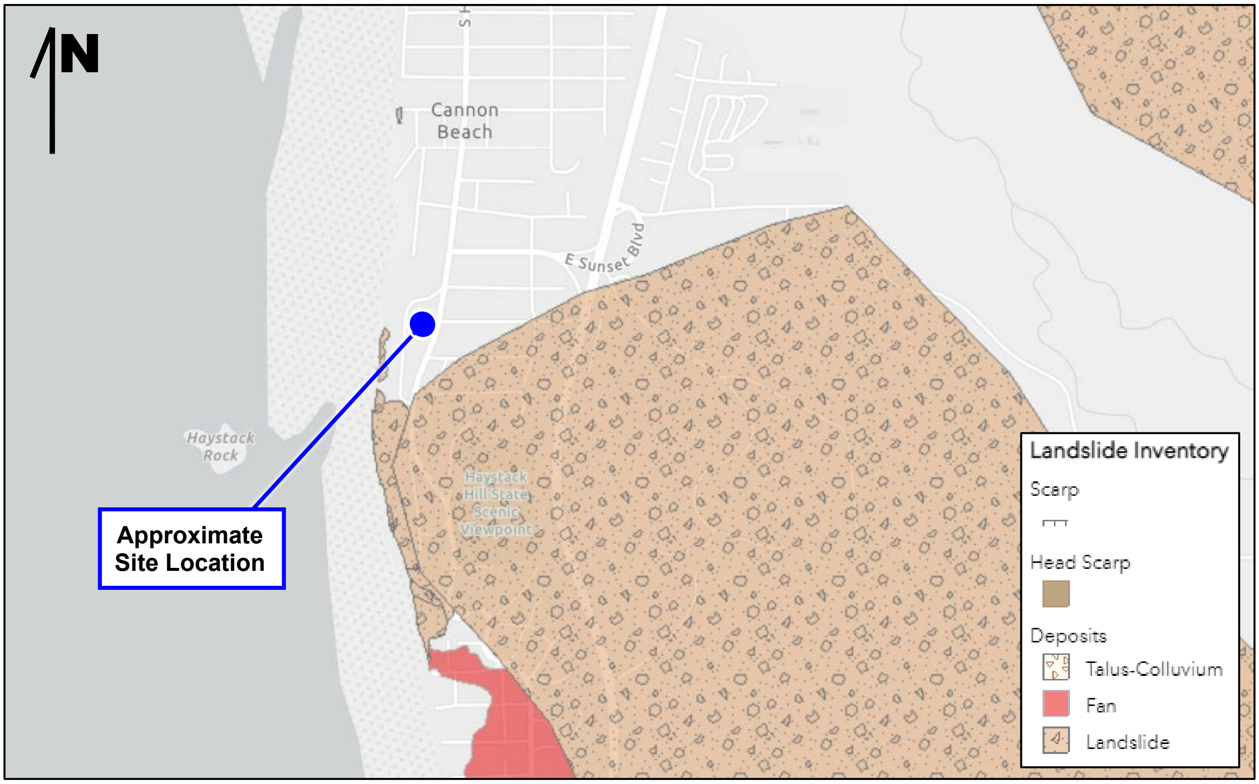

Figure 9: HazVu map showing the mapped landslide deposits.

Figure 10: HazVu map showing the mapped coastal erosion hazard.

In addition, we reviewed the Northwest Association of Networked Ocean Observing Systems (NANOOS) Visualization System (NVS) for information on tsunami hazard in proximity to the subject property.[6] The NVS maps the subject property within a local earthquake and tsunami region. See Figure 11 below.

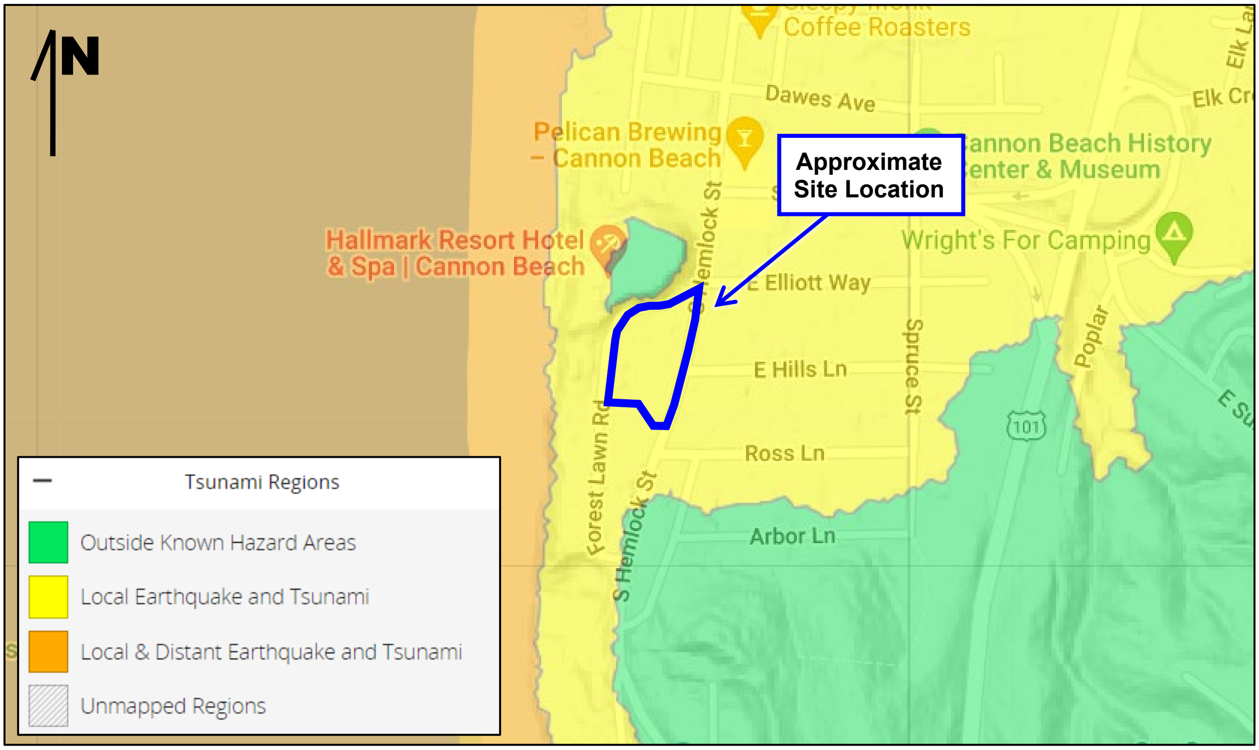

Figure 11: NVS map showing the mapped tsunami hazard region.

Based on our site reconnaissance, subsurface explorations, and office research, we consider the site to have the following geologic hazards:

- Earthquake shaking from regional seismic activity.
- Landslide hazard.
- Potential settlement/movement associated with compressible, near surface soils and liquefaction potential.
- Coastal erosion.
- Tsunami hazard from a local CSZ earthquake.

As stated above, the subject property is surrounded by ancient landslides, and is mapped within a moderate landslide hazard area (i.e. landsliding possible). Although the subject property is not mapped within an ancient landslide, the compressible, variable soils we encountered to depths of 30 to 40 feet are consistent with landslide material we have observed in the area. It is very normal/typical for the shallow, compressible soils to slide after wet winter weather or a seismic

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[6] Northwest Association of Networked Ocean Observing Systems (NANOOS) Visualization System (NVS), available online at http://nvs.nanoos.org/TsunamiEvac accessed 5/31/2022.

event. We do not believe this property is at any greater risk from this hazard than the other numerous existing developed lots in the neighborhood. That being said, we recommend that at a minimum, any house foundations be designed to protect life-safety (i.e. the house is allowed to be damaged by landsliding but the structure stays intact long enough for the occupants to evacuate).

As shown in Figure 10 above, the western property line is mapped within a low risk of coastal erosion hazard. Although we do not believe that the subject property is at immediate risk from coastal erosion, it could recede back towards the home gradually over time. We envision that it would occur in several sequences that would allow for addressing the issue before it ever reached the house. In addition, any structures would be protected from erosion if supported on a foundation that bears directly on the more stable sandstone stratum (i.e. piles).

As shown in Figure 11 above, the property is at risk of being inundated by a tsunami. We are not providing any geotechnical recommendations for mitigating that risk from tsunami level events. Developing on the lot means that the property owner needs to accept the risk of damage to the residences in the event of a tsunami.

In summary, it is our professional opinion that the proposed residential development on this property is feasible, subject to the geotechnical engineering recommendations and acceptance of geologic hazards risk presented in this report. Primary considerations should be made to not placing any new fill to raise site grades, and maintaining adequate site surface and subsurface drainage. Vegetation should also be maintained to prevent excessive erosion, and should only be removed where needed to complete the proposed construction. Additionally, the house foundations should extend to the native sandstone and be engineered with the idea of resisting the effects of earthquake shaking. These recommendations are discussed in more detail in Section 4 below. Ultimately, owning a home in this area means there is an acceptance of risk that the property is located among very large ancient landslide deposits and within a landslide hazard area that could reactivate at some time in the future, possibly en masse due to a Cascadia Subduction Zone earthquake event.

4.0 EVALUATION AND FOUNDATION RECOMMENDATIONS

4.1 Geotechnical Discussion

Based on our site reconnaissance, it is our professional opinion that the primary factors impacting the proposed development include the following:

1. **Presence of weak, compressible, organic soils** – As discussed above, we encountered compressible, organic soils to a depth of approximately 30 to 40 feet bgs. The compressible soils encountered had an N-value average of 2 (i.e. generally loose). It is our professional opinion that these compressible soils are not sufficient for shallow foundation support. As such, we recommend all foundations penetrate through these variable soils to bear on the medium dense to very dense sandstone first encountered in our borings at a depth of 30 to 40 feet bgs. See Section 4.5 below for detailed deep foundation recommendations (i.e. pin piles or helical piers).

2. **Presence of potentially liquefiable soils** – As stated above, there are potentially liquefiable soils located at the project site. Based on our analysis, approximately 9- to 13-inches of total dynamic settlement due to liquefaction could occur with potential differential settlements up to approximately 4.5- to 10-inches across the proposed buildings' footprints. This much settlement precludes the use of shallow foundations. As stated above, we are recommending deep foundations for the proposed development that will mitigate risk of settlement in a design level earthquake event.

3. **Presence of organics** – As stated above, we encountered heavy organics (i.e. wood chips and rootlets) in all of our explorations. The presence of organics extended to depths of 25 to 30 feet bgs. It is our professional opinion that this material is not sufficient to provide shallow foundation support without risking excess total and differential settlements. As such, we are providing deep foundation recommendations that penetrate through these organic soils to bear on the medium dense to very dense sandstone stratum encountered at a depth of approximately 30 to 40 feet bgs. In addition, the organic soils are unsuitable for use as structural fill.

4. **Shallow groundwater** – As previously mentioned, we encountered groundwater at depths ranging from 1 to 6 feet bgs across the subject property at the time of our subsurface investigation. The contractor should anticipate the need to dewater for any excavations deeper than about 1-foot. The need to dewater can be lessened if the construction occurs in the dry summer and early fall months. Detailed dewatering design is typically left up to the contractor's means and methods, and is not part of our current scope of services.

5. **Limited explorations** – As stated above, the project is in its preliminary stages. As a result, the property has not been cleared for accessibility and we were therefore only able

to advance drilled borings on the outer portion of the proposed development (i.e. along the property line). It should be noted we did advance hand tool explorations in the southern portion of the property (i.e. where it is not as densely vegetated), however based on the limited nature of hand tool explorations, we were unable to determine the depth to sandstone in these areas. Once the project is further along and the site is more accessible, we would be available to perform additional drilled borings on the 3 lots. This is not a requirement; it is just a suggestion if there is a desire by the project team to better define the depth the piles will need to go to reach the dense sandstone stratum.

6. **Lack of detailed design drawings** – Given this project is in its preliminary stages, we have not been provided with a detailed design drawing set for the proposed construction. One the drawings are complete, we should be forwarded a copy to review for compliance with our geotechnical engineering recommendations.

In summary, this site appears to be developable provided our geotechnical engineering recommendations are followed and the geologic hazard risks are acceptable.

4.2 Site Preparation

Minimal site preparation will be required to install the piles. Any utilities present beneath the proposed construction will need to be located and rerouted as necessary and any abandoned pipes or utility conduits should be removed to inhibit the potential for subsurface erosion. Utility trench excavations should be backfilled with properly compacted structural fill as discussed in Section 4.3 below.

4.3 Structural Fill

Any structural fill placed should be granular, free of organic or other deleterious materials, have a maximum particle size less than 3 inches, be relatively well graded, and have a liquid limit less than 45 and plasticity index less than 25. In our professional opinion, on-site soils are **not** appropriate for use as fill due to the presence of organics. As such, we recommend importing granular, well graded, crushed rock structural fill. Typically, we recommend fill be moisture conditioned to within 3 percentage points below and 2 percentage points above optimum moisture as determined by ASTM D1557 (Modified Proctor). If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying.

Fill should be placed in a relatively uniform horizontal lift on the prepared subgrade. Each loose lift should be about 1 foot. The type of compaction equipment used will ultimately determine the maximum lift thickness. Structural fill should be compacted to at least 92 percent of the Modified Proctor maximum dry density as determined by ASTM D1557.

Each lift of compacted engineered fill should be tested by a representative of the Geotechnical Engineer prior to placement of subsequent lifts. The fill should extend horizontally outward beyond the exterior perimeter of the building and pavements at least 5 and 3 feet, respectively, prior to sloping.

4.4 Foundation Recommendations

4.4.1 Pin Pile Recommendations

Once the site has been prepared, we recommend the proposed building be supported by 6-inch diameter, schedule 80 steel pipe piles driven to practical refusal using a hydraulic 2,000-pound hammer or equivalent. We also recommend the pin piles all be connected by an integrated, gridded system of rigid grade beams. Refusal for a 6-inch diameter pipe pile using a hammer of this size should be defined as less than 1-inch of penetration in 10 seconds or more. When practical, this refusal criteria should be met for the last 60 seconds of pile driving.

Assuming the piles are driven to refusal using these criteria, the allowable axial capacity for a pile installed vertically would be 30 kips in compression. This allowable axial capacity assumes a factor of safety of 2.0. We recommend a maximum lateral load resistance of 1.0 kip for each vertical pile as long as they are spaced a distance of at least 6D (measured from center to center) where D represents the diameter of the pile. If additional lateral load resistance is needed, we can provide battered pile recommendations.

Based on the known subsurface conditions we anticipate that properly constructed pin pile foundations driven to refusal will experience static settlements less than 1-inch and 1/2-inch of total and differential settlement, respectively. We estimate that the average pile driving refusal depth will be encountered at approximately 40 to 50 feet bgs.

4.4.2 Helical Pier Recommendations

We are also providing helical pier recommendations for the subject site to minimize noise disturbance (i.e. from driving the pin piles). It should be noted that helical piers can hit shallow refusal due to subsurface obstructions (i.e. rocks and/or debris). We encountered heavy organics and trace gravel in our explorations. As such, the contractor should anticipate the need to put in additional effort to get through the debris.

We recommend galvanized round shaft helical piers with a 12-inch diameter single helix. The helical piers should be installed so that the helix is embedded into the medium dense to very dense sandstone encountered at depths of 30 to 40 feet bgs in both of our explorations. In order to achieve the design loads outlined below, the helix needs to be embedded at least 1 foot. For preliminary budgeting purposes, we recommend the helical piers be planned for lengths of 35 to 45 feet.

We have assumed a 2-7/8 inch diameter round shaft helical piers will be used. The 2-7/8-inch diameter helical piers are typically manufactured to have a maximum axial compressive load capacity of 80 kips. Applying a FOS of 2, the piers can be designed for an allowable load capacity of 40 kips. If greater load capacity is needed, a larger shaft diameter can be selected. If requested, we can provide load capacities for larger shaft diameters. In order to use a FOS of 2, at least one helical pier should be load tested in compression for the project. If no load test is performed, then a FOS of 3 should be used..

Any helical piles installed vertically (i.e. not battered) may be designed for an allowable lateral load of up to 1 kip. If additional lateral loads are required the piles should be battered to achieve the necessary loads.

To utilize the fully recommended capacity, the helical piers should be laterally spaced no closer than 3 pier diameters, measured center to center (i.e. 3 feet for a piers with a 12-inch lead helical).

EEI should be scheduled to be on site when each helical pier is installed to inspect the installation and verify our recommendations are met. We also should be scheduled to be on site to inspect and approve the pile load test.

4.5 Floor Slab Recommendations

For the purposes of this report, we have assumed that maximum floor slab loads will not exceed 150 psf. Based on the existing soil conditions, the design of the floor slab can be based on a subgrade modulus (k) of 100 pci. This subgrade modulus value represents an anticipated value which would be obtained in a standard in-situ plate test with a 1-foot square plate. Use of this subgrade modulus for design or other on-grade structural elements should include appropriate modification based on dimensions as necessary.

In order to fully mitigate the risk of settlement, the concrete floor slab would need to be tied into the grade beams and supported on the deep foundation elements recommended above (i.e. designed as a structural floor slab). However, if a conventional, less expensive floor slab-on-grade is preferred, to at least partially mitigate the risk of potential settlement, the floor slab should be supported on at least 12-inches of properly compacted crushed rock gravel structural fill overlying the existing soils. This approach means that there is some acceptance of risk that there could be settlement cracking in floor slabs on grade. The structural fill recommendations are outlined in Section 4.3 above. The floor slabs should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Prior to placing the structural fill, the exposed subgrade surface should be prepared as discussed in Section 4.2. In addition, we recommend a proof-roll utilizing a fully loaded, dual axle dump truck or water truck in order to identify any unstable areas that should be removed prior to structural fill placement. The proofroll should be observed by a representative of the Geotechnical Engineer. If the subgrade cannot be accessed with a dump truck, then the subgrade will need to be visually evaluated by a representative of the Geotechnical Engineer by soil probing. If fill is required, the structural fill should be placed on the prepared subgrade after it has been approved by the Geotechnical Engineer.

The 12-inch thick crushed rock structural fill should provide a capillary break to limit migration of moisture through the slab. If additional protection against moisture vapor is desired, a moisture vapor retarding membrane may also be incorporated into the design. Factors such as cost, special considerations for construction, and the floor coverings suggest that decisions on the use of vapor retarding membranes be made by the project design team, the contractor and the owner.

4.6 Retaining Wall Recommendations

As stated above, the project is currently in its preliminary stages. As such, we have not been made aware of any proposed retaining walls. Once more detailed plans are known about retaining walls (if any), we should be provided the drawings so that we can update our recommendations as necessary. For the purposes of this report, we have assumed that no walls will be greater than 10 feet tall.

Retaining wall footings should be designed in general accordance with the recommendations contained in Section 4.4 above (i.e. pin piles or helical piers). For insignificant landscape retaining walls not greater than 4 feet tall, where excessive wall movement due to ground movement is acceptable and not a risk to life-safety, they may be supported on conventional shallow foundations designed for an allowable soil bearing capacity of up to 1,500 pounds per square foot.

Lateral earth pressures on walls, which are not restrained at the top, may be calculated on the basis of an “active” equivalent fluid pressure of 35 pcf for level backfill, and 60 pcf for sloping backfill with a maximum 2H:1V slope. Lateral earth pressures on walls that are restrained from yielding at the top (i.e. stem walls) may be calculated on the basis of an “at-rest” equivalent fluid pressure of 55 pcf for level backfill, and 90 pcf for sloping backfill with a maximum 2H:1V slope. The stated equivalent fluid pressures do not include surcharge loads, such as foundation, vehicle, equipment, etc., adjacent to walls, hydrostatic pressure buildup, or earthquake loading. Surcharge loads on walls should be calculated based on the attached calculations/formulas shown in Appendix H.

We recommend that retaining walls be designed for an earth pressure determined using the Mononobe-Okabe method to mitigate future seismic forces. Our calculations were based on one-half of the Design Peak Ground Acceleration (PGA) value of 0.422g, which was obtained from Table 1 above. We have assumed that the retained soil/rock will have a minimum friction angle of 29 degrees and a total unit weight of about 115 pounds per cubic foot. For seismic loading on retaining walls with level backfill, new research indicates that the seismic load is to be applied at 1/3 H of the wall instead of 2/3 H, where H is the height of the wall[7]. We recommend that a Mononobe-Okabe earthquake thrust per linear foot of 13.7 psf * H^2 be applied at 1/3 H, where H is the height of the wall measured in feet. Note that the recommended earthquake thrust value is appropriate for slopes behind the retaining wall of up to 10 degrees.

Any minor amount of backfill for retaining walls should be select granular material, such as sand or crushed rock with a maximum particle size between ¾ and 1 ½ inches, having less than 5 percent material passing the No. 200 sieve. As stated above, the onsite soils do not meet the requirement for structural fill, and it will be necessary to import material to the project for structure backfill. Silty soils can be used for the last 18 to 24 inches of backfill, thus acting as a seal to the granular backfill.

All backfill behind retaining walls should be moisture conditioned to within ± 2 percent of optimum moisture content, and compacted to a minimum of 90 percent of the material's maximum dry density as determined in accordance with ASTM D1557. Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches. Care in the placement and compaction of fill behind retaining walls must be taken in order to ensure that undue lateral loads are not placed on the walls.

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[7] Lew, M., et al (2010). “Seismic Earth Pressures on Depp Building Basements,” SEAOC 2010 Convention Proceedings, Indian Wells, CA.

5.0 CONSTRUCTION CONSIDERATIONS

EEI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project. EEI cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundations if not engaged to also provide construction observation for this project.

5.1 Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are expected to be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. While not required, it will be advantageous to perform earthwork and foundation construction activities during dry weather.

5.2 Drainage and Groundwater Considerations

Water should not be allowed to collect in the foundation excavations or on prepared subgrades for the floor slab during construction. Positive site drainage should be maintained throughout construction activities. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff.

The site grading plan should be developed to provide rapid drainage of surface water away from the building areas and to inhibit infiltration of surface water around the perimeter of the building and beneath the floor slab. The grades should be sloped away from the building area. Stormwater should be piped (tightlined) to an existing city storm sewer or to a drainage ditch.

5.3 Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document and subsequent updates were issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. EEI does not assume responsibility for construction site safety or the contractor's compliance with local, state, and federal safety or other regulations.

6.0 REPORT LIMITATIONS

As is standard practice in the geotechnical industry, the conclusions contained in our report are considered preliminary because they are based on assumptions made about the soil, rock, and groundwater conditions exposed at the site during our subsurface investigation. A more complete extent of the actual subsurface conditions can only be identified when they are exposed during construction. Therefore, EEI should be retained as your consultant during construction to observe the actual conditions and to provide our final conclusions. If a different geotechnical consultant is retained to perform geotechnical inspection during construction, then they should be relied upon to provide final design conclusions and recommendations, and should assume the role of geotechnical engineer of record, as is the typical procedure required by the governing jurisdiction.

The geotechnical recommendations presented in this report are based on the available project information, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform EEI in writing so that we may amend the recommendations presented in this report, if appropriate, and if desired by the client. EEI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Once construction plans are finalized and a grading plan has been prepared, EEI should be retained to review those plans, and modify our existing recommendations related to the proposed construction, if determined to be necessary.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of Patrick/Dave, LLC for the specific application to the proposed Forest Lawn ***3-Lot Partition*** located on County Tax Lot No. 51030DA04100 in Cannon Beach, Clatsop County, Oregon. EEI does not authorize the use of the advice herein nor the reliance upon the report by third parties without prior written authorization by EEI.

APPENDICES

APPENDIX A – SITE LOCATION PLAN

Base Map Source: https://livingatlas.arcgis.com/topoexplorer/

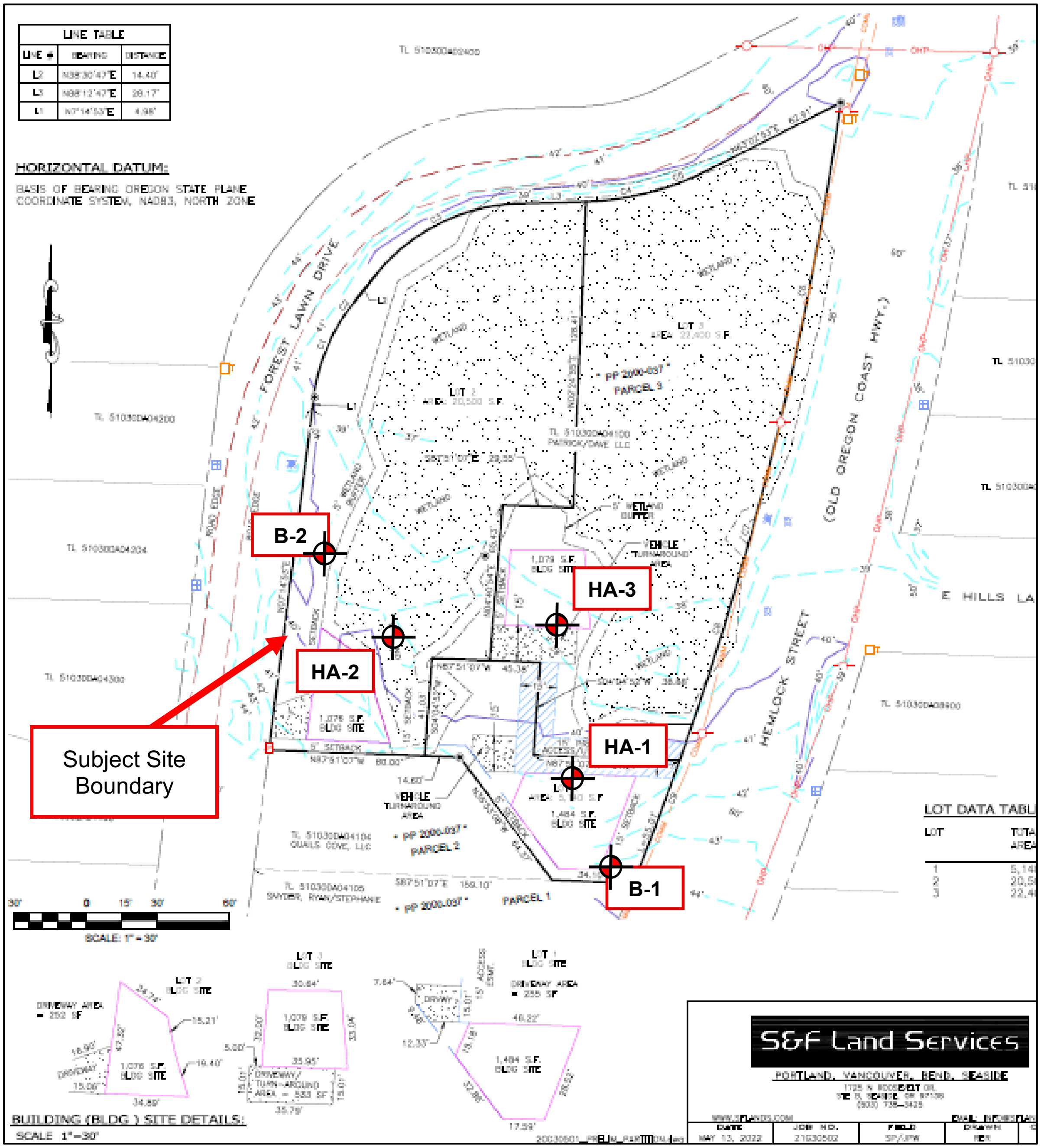
Earth Engineers, Inc.

Proposed Forest Lawn *3-Lot Partition*
Tax Lot #51030DA04100
Intersection of Forest Lawn Road and South Hemlock Street
Cannon Beach, Clatsop County, Oregon

Report No.
22-103-1-*R1*

June 3, 2022
(revised June 10, 2022)

APPENDIX B – EXPLORATION LOCATION PLAN



⌖ = Approximate Boring Location

Base image source: Partition plan titled "Preliminary Forest Lawn Partition Plat" prepared by S&F Land Services, dated May 13, 2022.

Earth Engineers, Inc.

Proposed Forest Lawn *3-Lot Partition*
Tax Lot #51030DA04100
Intersection of Forest Lawn Road and South Hemlock Street
Cannon Beach, Clatsop County, Oregon

Report No.
22-103-1-*R1*

June 3, 2022
(revised June 10, 2022)

Earth
Engineers,
Inc.

Appendix C: Boring B-1

Sheet 1 of 2

Client: Red Crow, LLC
Project: Proposed Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Jacqui Boyer

Report Number: 22-103-1
Drilling Contractor: Dan J Fischer Excavating, Inc.
Drilling Method: Solid Stem Auger
Drilling Equipment: Big Beaver w/ SPT Cathead Hammer
Approximate Ground Surface Elevation (ft msl): 46
Date of Exploration: 5/4/2022

Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30

Water Level	Geologic Description of Soil and Rock Strata	Sample Number	Blows per 6 Inches	N-value (0 50 100)	Moisture Content (%)	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Pocket Pen (tsf)	Remarks
	Topsoil - dark brown sandy silt with organics, moist Silt (ML) - gray-brown to dark brown silt with orange and gray mottling, rootlets, moist to wet, soft	SPT-1	1 0 2	2	64					
		SPT-2	2 1 1	2	68					
▼		SPT-3	2 1 1	2	65				0.5	
	chunks of dry, orange soil encountered	SPT-4	1 2 2	4	53				0.75	
	Silt (MH) - blue-gray to dark brown, high plasticity silt, moist to wet, very soft to soft	SPT-5	2 0 1	1	211				0	
	heavy organics (wood chips and rootlets) encountered in split spoon	SPT-6	1 1 1	2	89				0.75	
	heavy organics encountered in split spoon	SPT-7	1 1 1	2	388				1	
	heavy organics encountered in split spoon	SPT-8	1 1 2	3	191				0.75	
	Sand (SM) - gray to blue-gray silty sand, moist to wet, very loose	SPT-9	2 2 2	4	76					

Notes : Boring terminated at a depth of approximately 33.5 feet below ground surface (bgs) due to practical drilling refusal. Groundwater encountered at a depth of 6 feet bgs at the time of our exploration. Boring backfilled with bentonite chips on 5/4/22. N-values reported are based on the use of a cathead hammer (i.e. no correction factor). Approximate elevation from Google Earth.

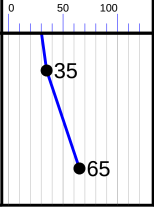
Earth Engineers, Inc.

Appendix C: Boring B-1

Sheet 2 of 2

Client: Red Crow, LLC
Project: Proposed Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Jacqui Boyer

Report Number: 22-103-1
Drilling Contractor: Dan J Fischer Excavating, Inc.
Drilling Method: Solid Stem Auger
Drilling Equipment: Big Beaver w/ SPT Cathead Hammer
Approximate Ground Surface Elevation (ft msl): 46
Date of Exploration: 5/4/2022

		Lithology		Sampling Data								
Depth (ft)	Water Level	Lithologic Symbol	Geologic Description of Soil and Rock Strata	Sample Number	Blows per 6 Inches	N-value 0 50 100	Moisture Content (%)	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Pocket Pen (tsf)	Remarks
30		⁘	Sandstone - blue-gray sandstone with few to little silt, moist, dense to very dense	SPT-10	9 14 21	35	26					drilling difficulty increased
32		⁘		SPT-11	26 31 34	65	11					drilling refusal
34												
36												
38												
40												
42												
44												
46												
48												
50												
52												
54												
56												
58												
60												

Notes : Boring terminated at a depth of approximately 33.5 feet below ground surface (bgs) due to practical drilling refusal. Groundwater encountered at a depth of 6 feet bgs at the time of our exploration. Boring backfilled with bentonite chips on 5/4/22. N-values reported are based on the use of a cathead hammer (i.e. no correction factor). Approximate elevation from Google Earth.

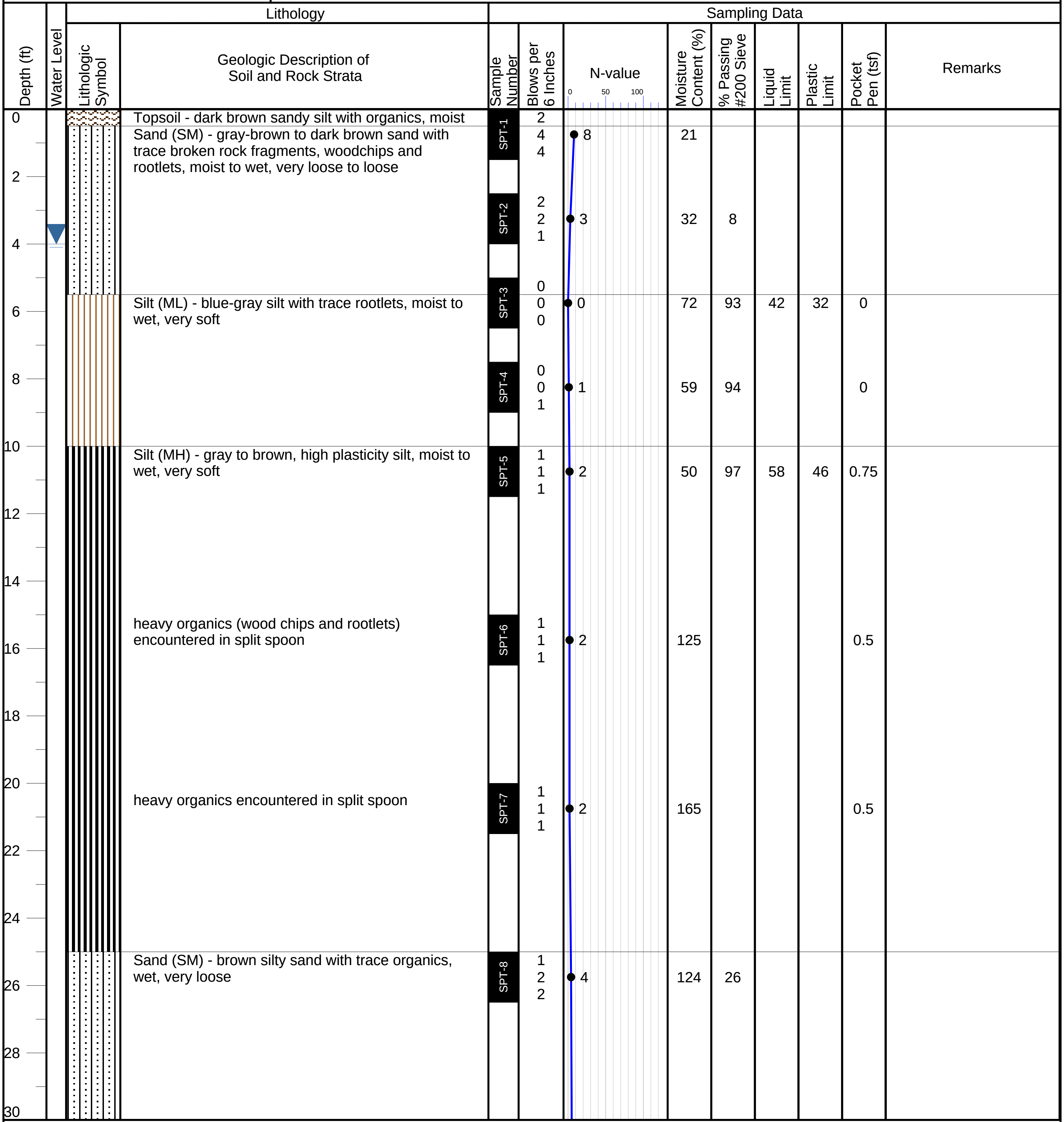
Earth Engineers, Inc.

Appendix C: Boring B-2

Sheet 1 of 2

Client: Red Crow, LLC
Project: Proposed Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Jacqui Boyer

Report Number: 22-103-1
Drilling Contractor: Dan J Fischer Excavating, Inc.
Drilling Method: Solid Stem Auger
Drilling Equipment: Big Beaver w/ SPT Cathead Hammer
Approximate Ground Surface Elevation (ft msl): 42
Date of Exploration: 5/4/2022



Geologic Description of Soil and Rock Strata	Sample Number	Blows per 6 Inches	N-value	Moisture Content (%)	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Pocket Pen (tsf)	Remarks
Topsoil - dark brown sandy silt with organics, moist									
Sand (SM) - gray-brown to dark brown sand with trace broken rock fragments, woodchips and rootlets, moist to wet, very loose to loose	SPT-1	2 4 4	8	21					
	SPT-2	2 2 1	3	32	8				
Silt (ML) - blue-gray silt with trace rootlets, moist to wet, very soft	SPT-3	0 0 0	0	72	93	42	32	0	
	SPT-4	0 0 1	1	59	94			0	
Silt (MH) - gray to brown, high plasticity silt, moist to wet, very soft	SPT-5	1 1 1	2	50	97	58	46	0.75	
heavy organics (wood chips and rootlets) encountered in split spoon	SPT-6	1 1 1	2	125				0.5	
heavy organics encountered in split spoon	SPT-7	1 1 1	2	165				0.5	
Sand (SM) - brown silty sand with trace organics, wet, very loose	SPT-8	1 2 2	4	124	26				

Notes : Boring terminated at a depth of approximately 51.5 feet below ground surface (bgs). Groundwater encountered at a depth of 4 feet bgs at the time of our exploration. Boring backfilled with bentonite chips on 5/4/22. N-values reported are based on the use of a cathead hammer (i.e. no correction factor). Approximate elevation from Google Earth.

Earth Engineers, Inc.

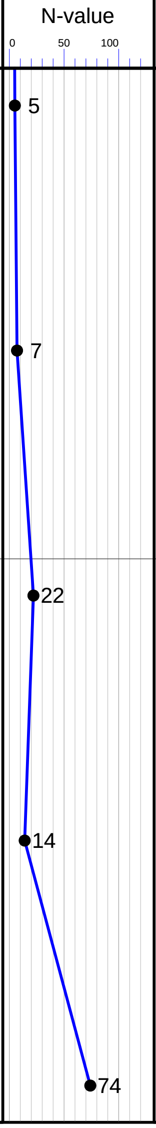
Appendix C: Boring B-2

Sheet 2 of 2

Client: Red Crow, LLC
Project: Proposed Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Jacqui Boyer

Report Number: 22-103-1
Drilling Contractor: Dan J Fischer Excavating, Inc.
Drilling Method: Solid Stem Auger
Drilling Equipment: Big Beaver w/ SPT Cathead Hammer
Approximate Ground Surface Elevation (ft msl): 42
Date of Exploration: 5/4/2022

Depth (ft)	Water Level	Lithology: Geologic Description of Soil and Rock Strata	Sampling Data: Sample Number	Blows per 6 Inches	N-value	Moisture Content (%)	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Pocket Pen (tsf)	Remarks
30		Silt (ML) - gray-brown sandy silt, moist to wet, medium stiff	SPT-9	2 2 3	5	60	81				
			SPT-10	3 3 4	7	83	68				
40		Sandstone - gray to blue-gray sandstone with few to some silt and trace gravel, moist to wet, medium dense to very dense	SPT-11	10 13 9	22	76	39				drilling difficulty increased
		broken rock encountered at base of split spoon	SPT-12	5 5 9	14	76	9				
			SPT-13	6 24 50	74	30	15				



Depth (ft): 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60

Notes : Boring terminated at a depth of approximately 51.5 feet below ground surface (bgs). Groundwater encountered at a depth of 4 feet bgs at the time of our exploration. Boring backfilled with bentonite chips on 5/4/22. N-values reported are based on the use of a cathead hammer (i.e. no correction factor). Approximate elevation from Google Earth.

Earth Engineers, Inc.

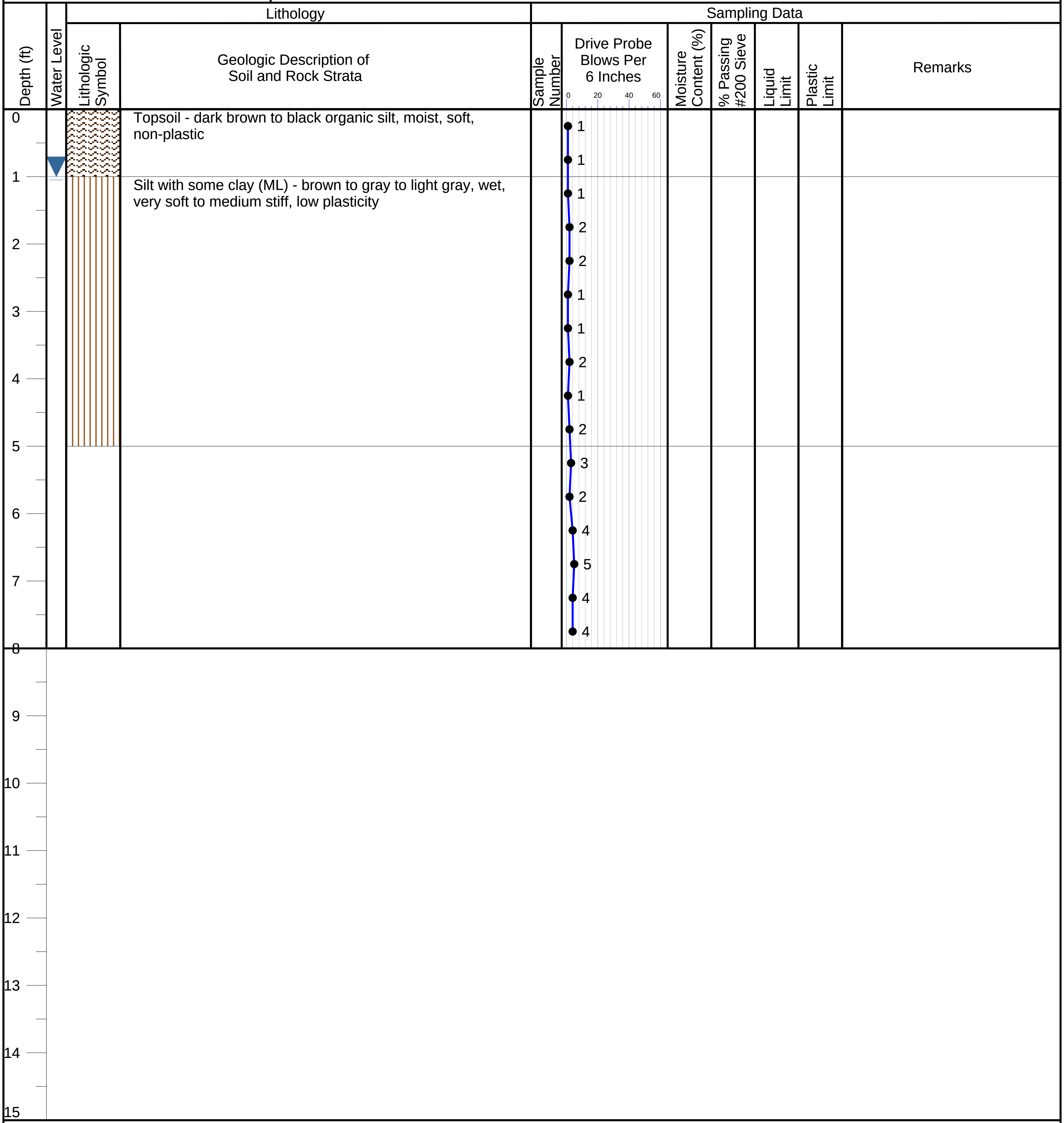
Appendix C: Hand Auger HA-1

Sheet 1 of 1

Client: Red Crow, LLC
Project: Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Matt Enos

Report Number: 22-103
Drilling Contractor: EEI
Drilling Method: N/A
Drilling Equipment: Hand Auger and Drive Probe
Approximate Ground Surface Elevation (ft msl): 41
Date of Exploration: 5/4/2022

Depth (ft)	Geologic Description of Soil and Rock Strata
0	Topsoil - dark brown to black organic silt, moist, soft, non-plastic
1	Silt with some clay (ML) - brown to gray to light gray, wet, very soft to medium stiff, low plasticity
5	



Notes : Hand auger terminated at 5 feet bgs and drive probe terminated at 8 feet bgs. Groundwater encountered at a depth of 1-foot bgs at the time of our exploration. Boring loosely backfilled with excavated soils on 5/4/2022. Approximate elevation based on Google Earth.

Earth Engineers, Inc.

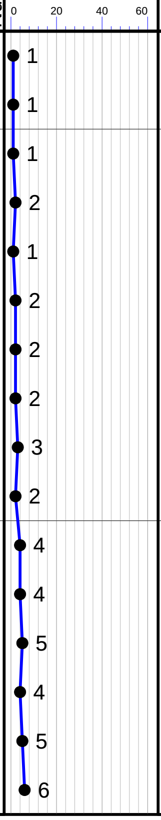
Appendix C: Hand Auger HA-2

Sheet 1 of 1

Client: Red Crow, LLC
Project: Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Matt Enos

Report Number: 22-103
Drilling Contractor: EEI
Drilling Method: N/A
Drilling Equipment: Hand Auger and Drive Probe
Approximate Ground Surface Elevation (ft msl): 40
Date of Exploration: 5/4/2022

Depth (ft)	Water Level	Lithologic Symbol	Geologic Description of Soil and Rock Strata	Sample Number	Drive Probe Blows Per 6 Inches	Moisture Content (%)	% Passing #200 Sieve	Liquid Limit	Plastic Limit	Remarks
0		▨	Topsoil - dark brown to black organic silt, moist, soft, non-plastic							
1	▼	▥	Silt with some clay (ML) - brown to gray to light gray, wet, very soft to medium stiff, low plasticity							
5										
8										



Notes : Hand auger terminated at 5 feet bgs and drive probe terminated at 8 feet bgs. Groundwater encountered at a depth of 1-foot bgs at the time of our exploration. Boring loosely backfilled with excavated soils on 5/4/2022. Approximate elevation based on Google Earth.

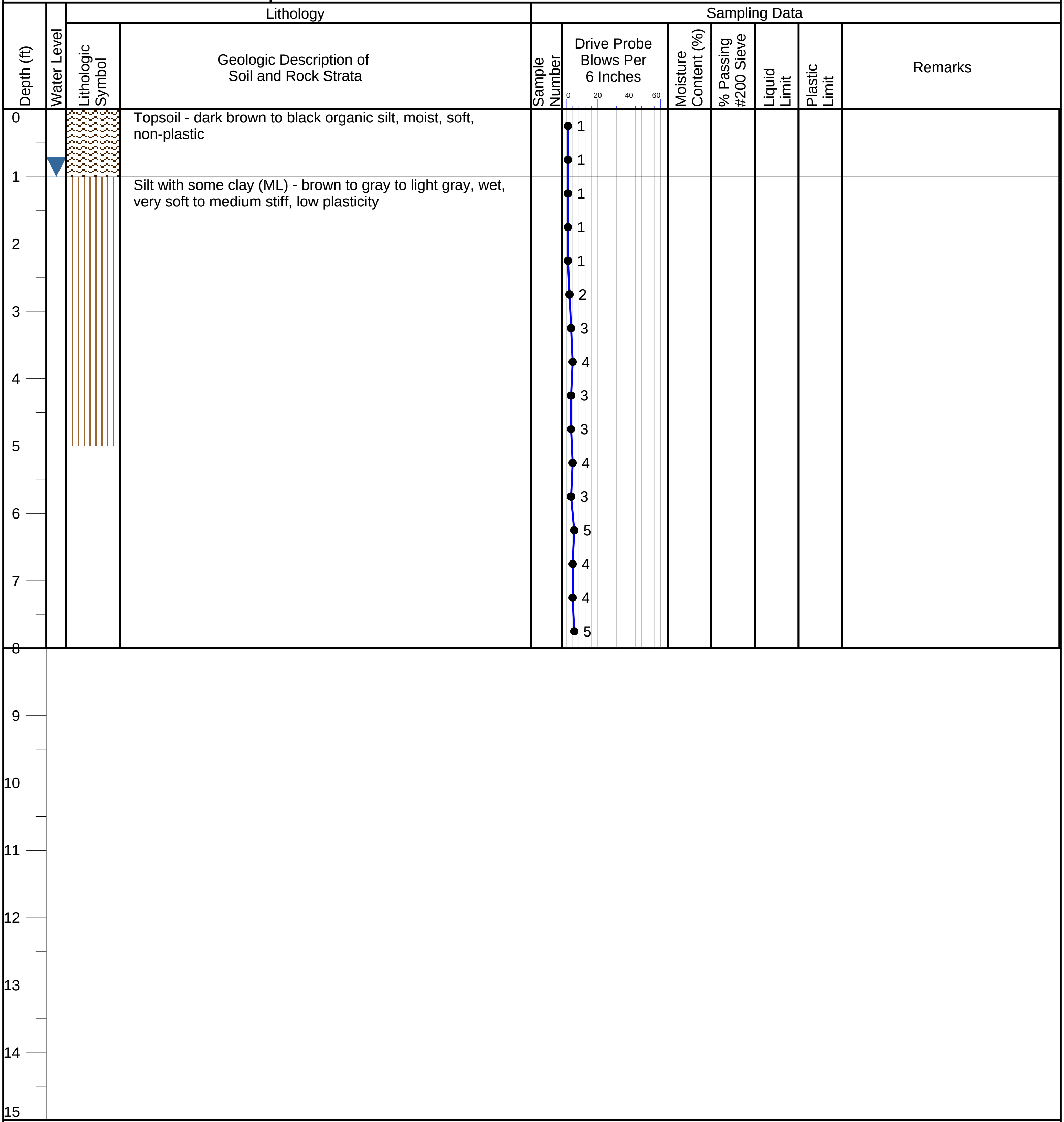
Earth Engineers, Inc.

Appendix C: Hand Auger HA-3

Sheet 1 of 1

Client: Red Crow, LLC
Project: Forest Lawn Partition
Site Address: Tax Lot No. 51030AA04402
Forest Lawn Road, Clatsop County, Cannon Beach, OR
Location of Exploration: See Appendix B
Logged By: Matt Enos

Report Number: 22-103
Drilling Contractor: EEI
Drilling Method: N/A
Drilling Equipment: Hand Auger and Drive Probe
Approximate Ground Surface Elevation (ft msl): 39
Date of Exploration: 5/4/2022



Topsoil - dark brown to black organic silt, moist, soft, non-plastic

Silt with some clay (ML) - brown to gray to light gray, wet, very soft to medium stiff, low plasticity

Notes : Hand auger terminated at 5 feet bgs and drive probe terminated at 8 feet bgs. Groundwater encountered at a depth of 1-foot bgs at the time of our exploration. Boring loosely backfilled with excavated soils on 5/4/2022. Approximate elevation based on Google Earth.

APPENDIX D: SOIL CLASSIFICATION LEGEND

APPARENT CONSISTENCY OF COHESIVE SOILS (PECK, HANSON & THORNBURN 1974, AASHTO 1988)

Descriptor	SPT N_{60} (blows/foot)*	Pocket Penetrometer, Qp (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 2	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	2 – 4	0.25 – 0.50	0.12 – 0.25	Easily penetrated several inches by thumb
Medium Stiff	5 – 8	0.50 – 1.0	0.25 – 0.50	Penetrated several inches by thumb w/moderate effort
Stiff	9 – 15	1.0 – 2.0	0.50 – 1.0	Readily indented by thumbnail
Very Stiff	16 – 30	2.0 – 4.0	1.0 – 2.0	Indented by thumb but penetrated only with great effort
Hard	> 30	> 4.0	> 2.0	Indented by thumbnail with difficulty

* Using SPT N_{60} is considered a crude approximation for cohesive soils.

APPARENT DENSITY OF COHESIONLESS SOILS (AASHTO 1988)

Descriptor	SPT N_{60} Value (blows/foot)
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	> 50

MOISTURE
(ASTM D2488-06)

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch, well below optimum moisture content (per ASTM D698 or D1557)
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table, well above optimum moisture content (per ASTM D698 or D1557)

PERCENT OR PROPORTION OF SOILS
(ASTM D2488-06)

Descriptor	Criteria
Trace	Particles are present but estimated < 5%
Few	5 – 10%
Little	15 – 25%
Some	30 – 45%
Mostly	50 – 100%

Percentages are estimated to nearest 5% in the field. Use “about” unless percentages are based on laboratory testing.

SOIL PARTICLE SIZE
(ASTM D2488-06)

Descriptor	Size
Boulder	> 12 inches
Cobble	3 to 12 inches
Gravel - Coarse Fine	¾ inch to 3 inches No. 4 sieve to ¾ inch
Sand - Coarse Medium Fine	No. 10 to No. 4 sieve (4.75mm) No. 40 to No. 10 sieve (2mm) No. 200 to No. 40 sieve (.425mm)
Silt and Clay (“fines”)	Passing No. 200 sieve (0.075mm)

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2488)

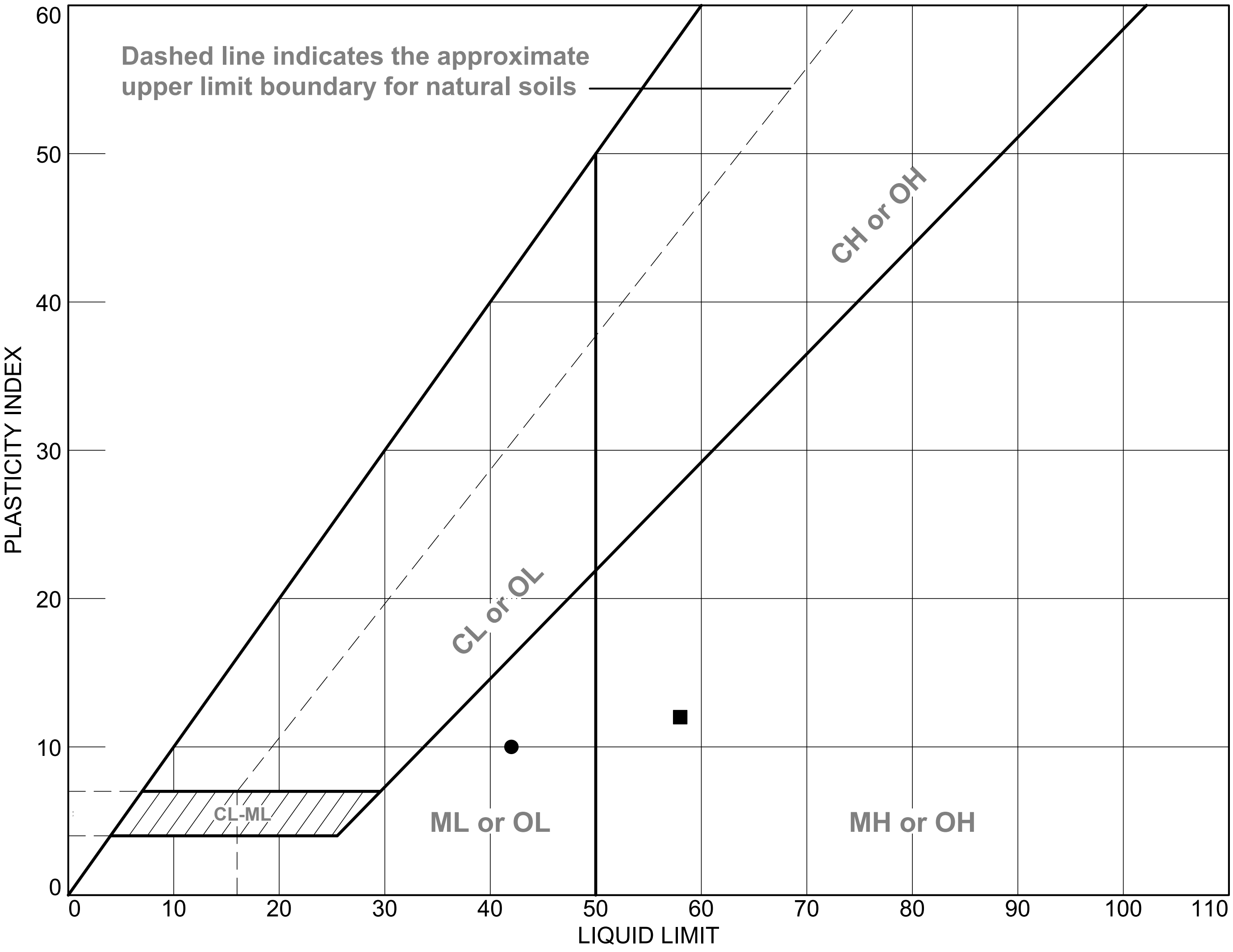
Major Division			Group Symbol	Description
Coarse Grained Soils (more than 50% retained on #200 sieve)	**Gravel** (50% or more retained on No. 4 sieve)	Clean Gravel	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravel with fines	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	Sand (> 50% passing No. 4 sieve)	Clean sand	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly-graded sands and gravelly sands, little or no fines
		Sand with fines	SM	Silty sands and sand-silt mixtures
			SC	Clayey sands and sand-clay mixtures
Fine Grained Soils (50% or more passing #200 sieve)	**Silt and Clay** (liquid limit < 50)		ML	Inorganic silts, rock flour and clayey silts
			CL	Inorganic clays of low-medium plasticity, gravelly, sandy & lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silt and Clay (liquid limit > 50)		MH	Inorganic silts and clayey silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Earth Engineers, Inc.

GRAPHIC SYMBOL LEGEND

GRAB	☒	Grab sample
SPT	■	Standard Penetration Test (2” OD), ASTM D1586
ST	▒	Shelby Tube, ASTM D1587 (pushed)
DM	▯	Dames and Moore ring sampler (3.25” OD and 140-pound hammer)
CORE	▥	Rock coring

APPENDIX E - LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring 2	1	5	72.0	32	42	10	ML
■	Boring 2	2	10	49.9	46	58	12	MH

Earth Engineers, Inc.

Client: Red Crow LLC
Project: Forest Lawn Partition

Project No.: 22-103 **Figure No.**

Tested By: J. Hill

APPENDIX F

NEARBY HISTORIC WELL LOGS

CLAT 54498

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

6/8/2015

(1) OWNER/PROJECT

Hole Number CPT-1

PROJECT NAME/NBR: MARSAM 060115

First Name Last Name

Company PELICAN BREWING

Address PO BOX 189

City PACIFIC CITY State OR Zip 97135

(2) TYPE OF WORK

☒ New ☐ Deepening ☒ Abandonment

☐ Alteration (repair/recondition)

(3) CONSTRUCTION

☐ Rotary Air ☐ Hand Auger ☒ Hollow stem auger

☐ Rotary Mud ☐ Cable ☒ Push Probe

☐ Other

(4) TYPE OF HOLE:

● Uncased Temporary ○ Cased Permanent

○ Uncased Permanent ○ Slope Stablity

○ Other

Other:

(5) USE OF HOLE

GEOTECHNICAL

RECEIVED BY OWRD
JUL 27 2015
SALEM, OR

(6) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Hole 20.00 ft.

BORE HOLE			SEAL				
Dia	From	To	Material	From	To	Amt	sacks/ lbs
8	0	2	Concrete	0	1	1	S
2	2	20	Bentonite Chips	1	2	1	S
			Bentonite Grout	2	20	1	S

Backfill placed from ft. to ft. Material

Filter pack from ft. to ft. Material Size

(7) CASING/SCREEN

Casing	Screen	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

(8) WELL TESTS

○ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration(hr)

Temperature °F Lab analysis ☐ Yes By

Supervising Geologist/Engineer

Water quality concerns? ☐ Yes (describe below) TDS amount

From	To	Description	Amount	Units

(9) LOCATION OF HOLE (legal description)

County CLATSOP Twp 5.00 N N/S Range 10.00 W E/W WM

Sec 30 we 1/4 of the se 1/4 Tax Lot 300

Tax Map Number Lot

Lat ° ' " or DMS or DD

Long ° ' " or DMS or DD

● Street address of hole ○ Nearest address

1371 S. HEMLOCK ST. CANNON BEACH, OREGON 97110

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well			☐	

Flowing Artesian? ☐

WATER BEARING ZONES

Depth water was first found 7.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
					☐	
					☐	
					☐	
					☐	
					☐	

(11) SUBSURFACE LOG

Ground Elevation

Material	From	To
ASPHALT / BASE ROCK	0	1
SILT W/ GRAVELS	1	2
CLAY	2	15
SILTY SAND TO SANDY SILT	15	20

Date Started 6/1/2015 Completed 6/1/2015

(12) ABANDONMENT LOG:

Material	From	To	Amt	sacks/ lbs
Concrete	0	1	1	S
Bentonite Chips	1	2	1	S
Bentonite Grout	2	20	1	S

Date Started 6/1/2015 Completed 6/1/2015

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

I accept responsibility for the construction, deepening, alteration, or abandonment work performed during the construction dates reported above. All work performed during this time is in compliance with Oregon geotechnical hole construction standards. This report is true to the best of my knowledge and belief.

License/Registration Number 10400 Date 6/8/2015

First Name ALLEN Last Name MEEUWSEN

Affiliation SUBSURFACE TECHNOLOGIES

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version:

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

CLAT 54498

6/8/2015

Map of Hole

CLAT 54497

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-0035)

6/8/2015

(1) OWNER/PROJECT

Hole Number B-1

PROJECT NAME/NBR: MARSAM060115

First Name ____ Last Name ____

Company PELICAN BREWING

Address PO BOX 189

City PACIFIC CITY State OR Zip 97135

(2) TYPE OF WORK

☒ New ☐ Deepening ☒ Abandonment

☐ Alteration (repair/recondition)

(3) CONSTRUCTION

☐ Rotary Air ☐ Hand Auger ☐ Hollow stem auger

☒ Rotary Mud ☐ Cable ☐ Push Probe

☐ Other ____

(4) TYPE OF HOLE:

● Uncased Temporary ○ Cased Permanent

○ Uncased Permanent ○ Slope Stablity

○ Other

Other: ____

(5) USE OF HOLE

GEOTECHNICAL

(6) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Hole 40.00 ft.

BORE HOLE			SEAL				
Dia	From	To	Material	From	To	Amt	sacks/ lbs
5	0	40	Concrete	0	1	1	S
			Bentonite Chips	1	10	2	S
			Bentonite Grout	10	40	1	S

Backfill placed from ____ ft. to ____ ft. Material ____

Filter pack from ____ ft. to ____ ft. Material ____ Size ____

(7) CASING/SCREEN

Casing	Screen	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

(8) WELL TESTS

○ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration(hr)

Temperature ____ °F Lab analysis ☐ Yes By ____

Supervising Geologist/Engineer ____

Water quality concerns? ☐ Yes (describe below) TDS amount ____

From	To	Description	Amount	Units

(9) LOCATION OF HOLE (legal description)

County CLATSOP Twp 5.00 N N/S Range 10.00 W E/W WM

Sec 30 ~~SE~~ ne 1/4 of the ~~NE~~ se 1/4 Tax Lot 300

Tax Map Number ____ Lot ____

Lat ____ ° ____ ' ____ " or ____ DMS or DD

Long ____ ° ____ ' ____ " or ____ DMS or DD

● Street address of hole ○ Nearest address

1371 S. HEMLOCK ST. CANNON BEACH, OREGON 97110

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well			☐	

Flowing Artesian? ☐

WATER BEARING ZONES

Depth water was first found 7.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
					☐	
					☐	
					☐	
					☐	
					☐	

(11) SUBSURFACE LOG

Ground Elevation ____

Material	From	To
ASPHALT / BASE ROCK	0	2
SANDY SILT	2	29
FINE SAND	29	40

Date Started 6/1/2015 Completed 6/1/2015

(12) ABANDONMENT LOG:

Material	From	To	Amt	sacks/ lbs
Concrete	0	1	1	S
Bentonite Chips	0	10	2	S
Bentonite Grout	10	40	1	S

Date Started 6/1/2015 Completed 6/1/2015

Professional Certification (to be signed by an Oregon licensed water or monitoring well constructor, Oregon registered geologist or professional engineer).

I accept responsibility for the construction, deepening, alteration, or abandonment work performed during the construction dates reported above. All work performed during this time is in compliance with Oregon geotechnical hole construction standards. This report is true to the best of my knowledge and belief.

License/Registration Number 10400 Date 6/8/2015

First Name ALLEN Last Name MEEUWSEN

Affiliation SUBSURFACE TECHNOLOGIES

RECEIVED BY OWRD
JUL 27 2015
SALEM, OR

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version:

GEOTECHNICAL HOLE REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

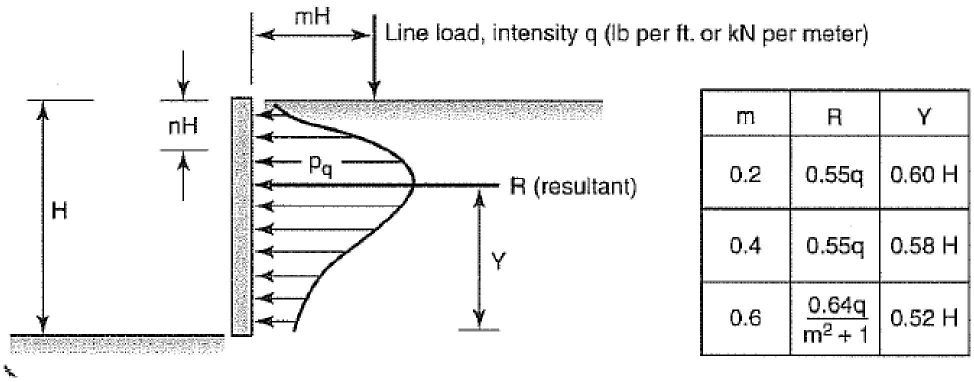
CLAT 54497

6/8/2015

Map of Hole

APPENDIX G: SURCHARGE-INDUCED LATERAL EARTH PRESSURES FOR WALL DESIGN

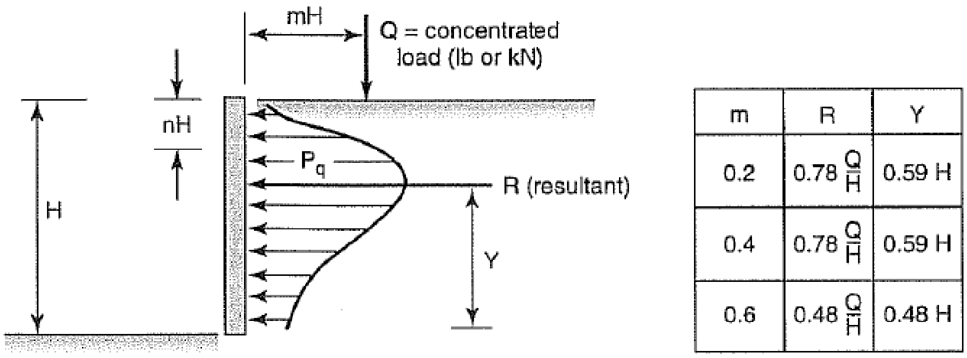
LINE LOAD (applicable for retaining walls not exceeding 20 feet in height):



m	R	Y
0.2	0.55q	0.60 H
0.4	0.55q	0.58 H
0.6	$\frac{0.64q}{m^2+1}$	0.52 H

Figure 16-28 Pressure distribution against vertical wall resulting from line load of intensity *q*.

CONCENTRATED POINT LOAD (applicable for retaining walls not exceeding 20 feet in height):



m	R	Y
0.2	$0.78\frac{Q}{H}$	0.59 H
0.4	$0.78\frac{Q}{H}$	0.59 H
0.6	$0.48\frac{Q}{H}$	0.48 H

Figure 16-27 Pressure distribution against vertical wall resulting from point load, *Q*.

AREAL LOAD:

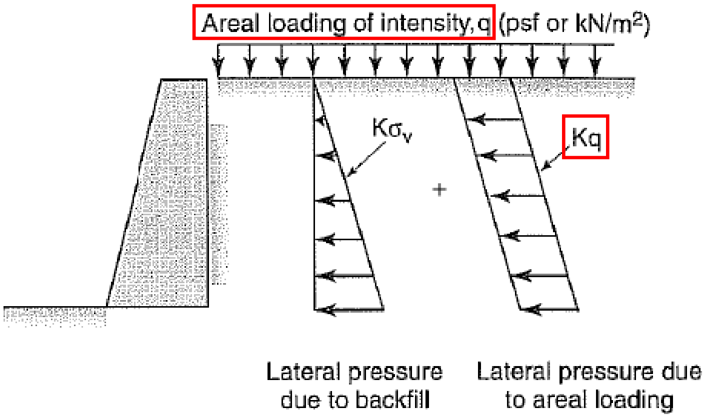
Figure 16-26 Influence of areal loading on wall pressures.

use K=0.4 for active condition (i.e. top of wall allowed to deflect laterally)

use K=0.9 for at-rest condition (i.e. top of wall not allowed to deflect laterally)

Resultant, R = K * q * H

Where H = wall height (feet)



Source of Figures: McCarthy, D.F., 1998, "Essentials of Soil Mechanics and foundations, Basic Geotechnics, Fifth Edition."

Earth
Engineers,
Inc.

Proposed Forest Lawn *3-Lot Partition*
Tax Lot #51030DA04100
Intersection of Forest Lawn Road and
South Hemlock Street
Cannon Beach, Clatsop County, Oregon

Report No.
22-103-1-*R1*

June 3, 2022
(revised June 10, 2022)