Real-World Geotechnical Solutions
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Preliminary Geotechnical Engineering Report

Baker Creek North Subdivision

1755 NW Baker Creek Road
McMinnville, Oregon 97128

GeoPacific Engineering, Inc. Job No. 17-4694
October 2, 2017

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GeoPacific Engineering, Inc.

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Project No. 17-4694

Stafford Land Company
Mr. Morgan Will
485 South State Street
Lake Oswego, Oregon 97034
Phone: (503) 305-7647
Email: morgan@staffordlandcomany.com

SUBJECT: PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
BAKER CREEK NORTH SUBDIVISION
1755 NW BAKER CREEK ROAD
MCMINNVILLE, OREGON 97128

1.0 PROJECT INFORMATION

This report presents the results of a geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our investigation was to evaluate subsurface conditions at the site, and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-6185, dated August 16, 2017, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

Site Location:	1755 NW Baker Creek Road McMinnville, Oregon 97128 (see Figures 1 through 3)
Developer:	Stafford Land Company 485 South State Street Lake Oswego, Oregon 97034 Phone: (503) 305-7647
Jurisdictional Agency:	Yamhill County, Oregon
Geotechnical Engineer:	GeoPacific Engineering, Inc 14835 SW 72nd Avenue Portland, Oregon 97224 Tel (503) 598-8445 Fax (503) 941-9281

2.0 SITE AND PROJECT DESCRIPTION

As indicated on Figures 1 through 3, the subject site is located at 1755 NW Baker Creek Road, in McMinnville, Oregon. The approximate site latitude and longitude are 45.228042, -123.222922, and the legal description is a portion of Section 18, T4S, R4W, Willamette Meridian. The regulatory jurisdictional agency is Yamhill County, Oregon. The property consists of Yamhill County Parcel No. 100 and 105 totaling approximately 55.05-acres in size, and is irregular in shape.

The site is bordered by NW Baker Creek Road to the south, by a church and existing residential properties to the east, by undeveloped wetland area and Baker Creek to the north, and by existing agricultural properties to the west. An electrical substation is present at the south central portion of the property between the two tax parcels. Review of available historical aerial photography indicates that the property has primarily been utilized for farming and agricultural purposes, however a residence was once present on tax lot 105 adjacent to Baker Creek Road in the southern portion of the property. Vegetation at the site primarily consists of grasses, native plants, and some trees. The majority of the site has been regularly plowed and currently consists of open space. Topography within the area proposed for development at the site is relatively flat to gently sloping to the north with site elevations ranging from approximately 145 to 170 feet above mean sea level (amsl). However, the northern margin of the site includes a moderately to steeply sloping bluff which extends north to the wetland. The bluff contains areas sloping from approximately 15 to 65 percent with elevations ranging from approximately 132 to 155 feet amsl. The bluff area is designated as a *moderate* to *high* risk for landslide hazard by the Oregon Department of Geology and Mineral Industries (DOGAMI), though no landslides have been mapped or identified at the subject site.

Based upon communication with the client and review of preliminary project plans (see Figures 3 and 3a), GeoPacific understands that site development will consist of a phased subdivision which will create 241 new residential building lots for single-family homes, new public streets, parks, stormwater facilities, and associated underground utility installations. Approximately 4.40-acres of tax lot 100 will include multi-family development with a single-story pavilion building, a three-story senior living facility, and parking and drive aisles. Approximately 3.76-acres of tax lot 100 will also include a commercial development with four single-story buildings, and parking and drive aisles. The project will also include a playground, a pump station, and a nature park. It is our understanding that the homes will be constructed with typical spread foundations and crawl spaces. We anticipate that maximum structural loading on column footings and continuous strip footings of the homes will be on the order of 35 kips, and 4 to 7 kips respectively. At this time, no information has been provided to GeoPacific regarding the potential foundation types or structural loading of the commercial or multi-family buildings. At this time, a grading plan for the project has not been provided to GeoPacific for review, however the client has indicated that development will include significant engineered fill placement along the steep bluff area to the north which has been identified as a potential landslide hazard area. Based upon review of the proposed development layout (Figure 3), we understand that several residential homes and public streets will be constructed in the noted area.

3.0 REGIONAL GEOLOGIC SETTING

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins.

The *Generalized Geologic Map of the Willamette Lowland, Marshall W. Gannett and Rodney R. Caldwell, (U.S. Department of the Interior, U.S. Geological Survey, 1998)*, indicates that the site is underlain by Pleistocene-aged (approximately 2.6 million to 11,000 years ago) silt, sand, and gravel deposited primarily by late Pleistocene glacial outburst flooding commonly referred to as the Missoula Flood Events, but also including glaciofluvial sediments derived from wreathing of the Cascade Range located to the east (Qs).

The *Web Soil Survey (United States Department of Agriculture, Natural Resource Conservation Service (USDA NRCS 2017 Website)*, indicates that near-surface soils consist of the Willamette silt loam, and Woodburn silt loam soil series. Willamette series soils generally consist of very deep, well-drained soils that formed in silty glaciolacustrine deposits. Woodburn series soils generally consist of very deep, moderately well drained soils that formed in silty, stratified, glaciolacustrine deposits. The Web Soil Survey soil map for the subject site is presented as an attachment to this report.

4.0 REGIONAL SEISMIC SETTING

At least three major fault zones capable of generating damaging earthquakes are thought to exist in the vicinity of the subject site. These include the Portland Hills Fault Zone, the Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone.

4.1 Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3.5 and 5.0 miles. The combined three faults reportedly vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills, and is located approximately 32.75 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills, and is located approximately 30 miles northeast of the site. The East Bank Fault occurs along the eastern margin of the Willamette River, and is located approximately 34 miles northeast of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000).

According to the USGS Earthquake Hazards Program, the fault was originally mapped as a down-to-the-northeast normal fault, but has also been mapped as part of a regional-scale zone of right-lateral, oblique slip faults, and as a steep escarpment caused by asymmetrical folding above a south-west dipping, blind thrust fault. The Portland Hills fault offsets Miocene Columbia River Basalts, and Miocene to Pliocene sedimentary rocks of the Troutdale Formation. No fault scarps on surficial Quaternary deposits have been described along the fault trace, and the fault is mapped as buried by the Pleistocene aged Missoula flood deposits. No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

4.2 Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies about 12 miles northeast of the subject site. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment (Yeats et al., 1996; Werner et al., 1992). A geologic reconnaissance and photogeologic analysis study conducted for the Scoggins Dam site in the Tualatin Basin revealed no evidence of deformed geomorphic surfaces along the structural zone (Unruh et al., 1994). No seismicity has been recorded on the Gales Creek Fault or Newberg Fault (the fault closest to the subject site); however, these faults are considered to be potentially active because they may connect with the seismically active Mount Angel Fault and the rupture plane of the 1993 M5.6 Scotts Mills earthquake (Werner et al. 1992; Geomatrix Consultants, 1995).

According to the USGS Earthquake Hazards Program, the Mount Angel fault is mapped as a high-angle, reverse-oblique fault, which offsets Miocene rocks of the Columbia River Basalts, and Miocene and Pliocene sedimentary rocks. The fault appears to have controlled emplacement of the Frenchman Spring Member of the Wanapum Basalts, and thus must have a history that predates the Miocene age of these rocks. No unequivocal evidence of deformation of Quaternary deposits has been described, but a thick sequence of sediments deposited by the Missoula floods covers much of the southern part of the fault trace.

4.3 Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies approximately along the Oregon Coast at depths of between 20 and 40 kilometers below the surface.

5.0 FIELD EXPLORATION AND SUBSURFACE CONDITIONS

Our site-specific explorations for this report were conducted on September 6, 2017. A total of eighteen exploratory test pits (TP-1 through TP-18) were excavated at the site using a track-mounted excavator subcontracted by GeoPacific to a depth of approximately 13 feet bgs. Explorations were conducted under the full-time observation of GeoPacific personnel. During the explorations, GeoPacific observed and recorded pertinent soil information such as color, stratigraphy, strength, and soil moisture content. Soil samples obtained from the explorations were placed in relatively air-tight plastic bags. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence was recorded. Soils were classified in accordance with the Unified Soil Classification System (USCS). At the completion of each exploration, the test pits were backfilled loosely with onsite soil.

The approximate locations of the explorations are indicated on Figures 2 and 3. It should be noted that exploration locations were located in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate. Summary exploration logs are attached. The stratigraphic contacts shown on the individual subsurface logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times. Soil and groundwater conditions encountered in the explorations are summarized below.

5.1 Soil Descriptions

Fill Stockpiles: As shown on Figure 2, various piles of soil and debris fill were observed to be present in the approximate area noted on the figure. The piles appeared to be remnant soil stockpiles, various agricultural piles, and various remnant house debris piles. A home once was present in the southern portion of the noted area. An old gravel drive is still present in the noted area. The piles in the northern portion of the site were the largest observed, and were heavily vegetated with blackberries. It is anticipated that the piles will not be suitable for re-use as engineered fill at the site, though the determination for suitability for use as engineered fill should be determined in the field when conditions may be exposed.

Topsoil/Till Zone: The ground surface at the locations of test pits TP-1 through TP-18 was typical surfaced with grasses or blackberries, with organic SILT soils containing fine grass roots extending to maximum observed depths of 4 to 12 inches. In our experience, it is likely that large roots may be present extending to up to 2 feet where trees are present. Underlying the topsoil at the locations of our test pit explorations, an agricultural till zone was observed to be present, typically extending to depths of 18 inches bgs. Pocket penetrometer measurements recorded in the till zone of the ground surface indicated unconfined compressive strengths on the order of 3.5 tons/ft^2. The till zone has created disturbed soil conditions in the upper 18 inches of the majority of the site, which is likely to soften during periods of wet weather.

Elastic SILT: Underlying the topsoil and till zone at the locations of our test pits, subsurface soils were observed to consist of very stiff to hard, damp to moist, moderately plastic, light brown, Elastic SILT (MH). The soil type typically was observed to extend to depths ranging from approximately 6 to 8 feet bgs within our test pits, with the exceptions of test pits TP-2, and TP-9, which were excavated in the wetland. Pocket penetrometer measurements recorded in the upper four to five feet of native undisturbed soils typically indicated unconfined compressive strengths on the order of 3.5 to greater than 4.5 tons/ft^2.

Soils laboratory testing conducted on representative samples collected from test pit TP-1 indicated approximately 98 to 99 percent by weight passing the U.S. No. 200 sieve, and a moisture content ranging from 30 to 33 percent. Atterberg limit testing indicated a liquid limit ranging from 49 to 62, and a plasticity index ranging from 19 to 29. The soil type classified as Elastic SILT (MH) according to the USCS soil classification system, and as A-7-5(25), and A-7-5(36) according to AASHTO standards.

Possible Hydric Soils, Elastic SILT: Underlying the light brown Elastic SILT at the locations of test pits TP-2, and TP-9, which were excavated outside of the site development boundaries, at the base of the northern slope, within the wetland area, subsurface soils were observed to consist of very stiff, damp to moist, moderately plastic, dark gray, brown, orange, and bluish, Elastic SILT (MH). The soil type was observed to extend to the maximum depth of exploration within the noted test pits. The noted soil layers displayed distinct mottling and hydric soil texture. It appears that the soil layers are natural, historic wetland soils. Although the soils appeared to be hydric, the consistency was very stiff to hard, and no groundwater seepage was observed as the excavations were done near the end of the dry season when the water table is at its low point.

SILT: Underlying the Elastic SILT at the locations of test pits TP-1, TP-3 through TP-8, and TP-10 through TP-18, subsurface soils were observed to consist of very stiff, moist, moderately plastic, brown, SILT (ML). The soil type typically was observed to extend to the maximum depth of exploration within the noted test pits. The soil type is typically referred to as the Willamette Formation.

Soils laboratory testing conducted on a representative sample collected from test pit TP-1 indicated approximately 99 percent by weight passing the U.S. No. 200 sieve, and a moisture content of 36.7 percent. Atterberg limit testing indicated a liquid limit of 43, and a plasticity index of 15 to 29. The soil type classified as SILT (ML) according to the USCS soil classification system, and as A-7-6(18) according to AASHTO standards.

5.2 Groundwater and Soil Moisture

On September 6, 2017, observed soil moisture conditions were generally damp to moist. Groundwater seepage was not encountered within the test pit explorations which extended to a maximum depth of 13 feet bgs. Based on our review of available well logs from the vicinity of the subject site (see *Site Research*-report appendix), we expect that groundwater may be encountered at depths ranging from approximately 30 to 40 feet bgs, depending on ground surface elevation. Based upon the proximity of the site to Baker Creek and the wetland to the north, we estimate that during the wet season the depth to groundwater corresponds to the elevation of the wetland, or an elevation of approximately 135 feet amsl in the northern portion of the site. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. Perched groundwater may be encountered in localized areas. Seeps and springs may exist in areas not explored, and may become evident during site grading.

If the seasonal fluctuation of the static groundwater table underlying the subject site require detailed understanding, piezometers may be installed and periodically monitored.

6.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Our understanding of the proposed development at the site is currently preliminary. Our site investigation indicates that the proposed construction appears to be geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. However, additional analysis will be required to address Oregon Department of Geology and Minerals (DOGAMI) geologic hazard mapping in the northern portion of the site where engineered fill, residential homes, and public streets are proposed near slopes extending to the wetland.

The primary geotechnical concern associated with development at the site is the potential for slope instability in the northern portion of the site where the client has indicated that significant engineered fills will be proposed. Based upon our review of preliminary project plans prepared by Westtech Engineering, Inc., entitled Baker Creek North Subdivision, Drawing H, Overall Utility Plan, dated July 2017, specific areas which appear to be located within the DOGAMI hazard zone include Lots 1-16, 162-172, 192-200, 203-206, 211, C Street, and the pump station (see Figure 3). GeoPacific should be consulted to review the grading plan when it becomes available, and to conduct a slope stability analysis of the northern portion of the site with the proposed grading. The soils observed in the test pits in the northern portion of the site appeared to display moderate plasticity, and moderate to high shear strength, which typically indicates relatively stable sloping conditions under normal loading. The degree of engineered fill proposed in the area will impact stability of the slopes and should be studied further. It appears likely that placement of engineered fill may be accomplished in the area with installation of keyways, subdrains, and benching. However, slope stability analysis of the area should be conducted which would at a minimum include creation of geologic cross-sections with the proposed development in the northern portion of the site near the wetland slopes, and quantitative slope stability calculations which take into consideration the propose surcharge loading of the engineered fill. A static factor of safety of 1.5, and a psuedostatic factor of safety of 1.1 against potential slope instability are considered to be the minimum factors of safety for placement of engineered fill and construction of homesites and roadways near a slope.

In addition, structural loading information for the commercial, and multi-family residential developments shown on Figure 3a have not been provided to GeoPacific at this time. After final site planning is completed, GeoPacific should be provided with structural plans and proposed foundation loading information so that recommendations can be provided for the proposed structures.

The recommendations presented below are currently applicable to portions of the site located outside of the potential landslide hazard zone, and include the following areas within the proposed subdivision without additional study (reference Westtech Engineering, Inc. Baker Creek North Subdivision, Drawing H, Overall Utility Plan, dated July 2017):

- Lots 17-161, 173-191, 201-202, 207-210, and 212-241;
- Proposed public streets except C Street

6.1 Site Preparation Recommendations

Areas of proposed construction and areas to receive fill should be cleared of any organic and inorganic debris, and loose stockpiled soils. Inorganic debris and organic materials from clearing should be removed from the site. Organic-rich soils and root zones should then be stripped from construction areas of the site or where engineered fill is to be placed. Depth of stripping of existing topsoil and debris fill is estimated to be approximately 4 to 12 inches across the majority of the site, however depth of organic soil layers may increase in areas where deep till zones are soft; and soil stockpiles, trees, and vegetation are present. The final depth of soil removal will be determined because of a site inspection after the stripping/excavation has been performed. Stripped topsoil should be removed from areas proposed for placement of engineered fill. Any remaining topsoil should be stockpiled only in designated areas and stripping operations should be observed and documented by the geotechnical engineer or his representative.

If encountered, undocumented fills and any subsurface structures (dry wells, basements, driveway and landscaping fill, old utility lines, septic leach fields, etc.) should be completely removed and the excavations backfilled with engineered fill.

We recommend that areas proposed for placement of engineered fill are scarified to a minimum depth of 12 inches and recompacted prior to placement of structural fill. Prior to placement of engineered fill, the underlying soils be over-excavated, ripped, aerated to optimum moisture content, and recompacted to project specifications for engineered fill as determined by the Standard Proctor (ASTM D698).

Areas proposed to be left at grade may require additional over-excavation of foundation areas in order to reach soils which will provide adequate bearing support for the proposed foundations. Site earthwork may be impacted by shallow groundwater. Stabilization of subgrade soils will require aeration and recompaction. If subgrade soils are found to be difficult to stabilize, over-excavation, placement of granular soils, or cement treatment of subgrade soils may be feasible options. GeoPacific should be onsite to observe preparation of subgrade soil conditions prior to placement of engineered fill.

6.2 Keyways, Benching, and Subdrains for Fill Slopes

Engineered fill placed on existing sloped areas inclining steeper than an approximately fifteen percent grade should be constructed on a keyway and benches in accordance with the typical designs shown in the attached Fill Slope Detail (Figure 5). Keyways should have a minimum depth of three feet, and a minimum width of ten feet. Additional removal of weakened or soft soils may be required depending on the conditions observed during construction. Benches and keyways should be roughly horizontal in the down slope direction, by may slope up to a 10 percent grade along a topographic contour. Keyways sloping more than a fifteen percent grade along a topographic contour should be benched or configured as approved by the geotechnical engineer or his designated representative.

If groundwater seepage is observed during excavation, keyways should include a subdrain consisting of a minimum 4-inch-diameter, ADS Heavy Duty Grade (or equivalent), perforated plastic pipe enveloped in a minimum of 4 cubic feet per lineal foot of 2”- ½”, open-graded gravel drain rock wrapped with geotextile filter fabric (Mirafi 140N or equivalent). A minimum 0.5 percent gradient should be maintained throughout all subdrain pipes and outlets. GeoPacific should inspect keyways, subdrains and benching prior to fill placement. Subdrains may be eliminated at the discretion of the geotechnical engineer.

6.3 Engineered Fill

All grading for the proposed construction should be performed as engineered grading in accordance with the applicable building code at the time of construction with the exceptions and additions noted herein. Site grading should be conducted in accordance with the requirements outlined in the 2015 International Building Code (IBC), Chapter 18 and Appendix J. Areas proposed for fill placement should be prepared as described in the *Site Preparation Recommendations* section. Surface soils should then be scarified and recompacted prior to placement of structural fill. Site preparation, soil stripping, and grading activities should be observed and documented by a geotechnical engineer or his representative. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill.

Onsite native soils consisting of Elastic SILT and SILT appear to be suitable for use as engineered fill. Soils containing greater than 5 percent organic content should not be used as structural fill. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 12 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 95 percent of the maximum dry density determined by ASTM D698 (Standard Proctor) or equivalent. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency.

Site earthwork may be impacted by shallow groundwater, soil moisture and wet weather conditions. Earthwork in wet weather would likely require extensive use of additional crushed aggregate, cement or lime treatment, or other special measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

6.4 Excavating Conditions and Utility Trench Backfill

We anticipate that onsite soils can generally be excavated using conventional heavy equipment. Bedrock was not encountered within our subsurface explorations which extended to a maximum depth of 13 feet bgs. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. These cut slope inclinations are applicable to excavations above the water table only.

Shallow, perched groundwater may be encountered during the wet weather season and should be anticipated in excavations and utility trenches. Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

Underground utility pipes should be installed in accordance with the procedures specified in ASTM D2321 and City of McMinnville/Yamhill County standards. We recommend that structural trench backfill be compacted to at least 95 percent of the maximum dry density obtained by the Standard Proctor (ASTM D698) or equivalent. Initial backfill lift thicknesses for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, at least one density test is taken for every 4 vertical feet of backfill on each 100-lineal-foot section of trench.

6.5 Erosion Control Considerations

During our field exploration program, we observed soil conditions that may be considered highly susceptible to erosion, primarily located in the sloping portions of the site. In our opinion, the primary concern regarding erosion potential will occur during construction in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw waddles, fiber rolls, and silt fences. If used, these erosion control devices should remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

6.6 Wet Weather Earthwork

Soils underlying the site are likely to be moisture sensitive and will be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will require expensive measures such as cement treatment or imported granular material to compact areas where fill may be proposed to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than 5 percent passing the No. 200 sieve. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Geotextile silt fences, straw waddles, and fiber rolls should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

6.7 Spread Foundations

Based upon communication with the client and review of preliminary project plans (see Figures 3 and 3a), GeoPacific understands that site development will consist of a phased subdivision which will create 241 new residential building lots for single-family homes, new public streets, parks, stormwater facilities, and associated underground utility installations. Approximately 4.40-acres of tax lot 100 will include multi-family development with a single-story pavilion building, a three-story senior living facility, and parking and drive aisles. Approximately 3.76-acres of tax lot 100 will also include a commercial development with four single-story buildings, and parking and drive aisles. The project will also include a playground, a pump station, and a nature park. It is our understanding that the homes will be constructed with typical spread foundations and crawl spaces. We anticipate that maximum structural loading on column footings and continuous strip footings of the homes will be on the order of 35 kips, and 4 to 7 kips respectively. At this time, no information has been provided to GeoPacific regarding the potential foundation types or structural loading of the commercial or multi-family buildings.

The recommendations presented below are currently applicable to portions of the site located outside of the potential landslide hazard zone, and include the following areas within the proposed subdivision without additional study (reference Westtech Engineering, Inc. Baker Creek North Subdivision, Drawing H, Overall Utility Plan, dated July 2017):

For the homes located outside of the potential landslide hazard zone (Lots 17-161, 173-191, 201-202, 207-210, and 212-241), the proposed structures may be supported on shallow foundations bearing on stiff, native soils and/or engineered fill, appropriately designed and constructed as recommended in this report. We understand that much of the site proposed for construction of residential homes will be left at existing grades, and that the majority of the proposed engineered fill will be located in the southwestern portion of the site. Areas where homes are to be constructed where no engineered fill will be placed should either be prepared as recommended for roadway areas; or the foundation envelopes of the proposed homes should be over-excavated to expose native soils on a lot by lot basis. (See *Site Preparation Recommendations* section).

Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 18 inches below exterior grade. If soft soil conditions are encountered at footing subgrade elevation, they should be removed and replaced with compacted crushed aggregate.

The anticipated allowable soil bearing pressure is 2,000 lbs/ft^2 for footings bearing on competent, native soil and/or engineered fill. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. For loads heavier than 35 kips, the geotechnical engineer should be consulted. If heavier loads than described above are proposed, it may be necessary to over-excavate point load areas and replace with additional compacted crushed aggregate. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.42, which includes no factor of safety. The maximum anticipated total and differential footing movements (generally from soil expansion and/or settlement) are 1 inch and ¾ inch over a span of 20 feet, respectively. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied. Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings.

Footing excavations should penetrate through topsoil and any disturbed soil to competent subgrade that is suitable for bearing support. All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require over-excavation of footings and backfill with compacted, crushed aggregate.

Our recommendations are for residential construction incorporating raised wood floors and conventional spread footing foundations. After site development, a Final Soil Engineer's Report should either confirm or modify the above recommendations.

6.8 Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation Recommendations* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock.

For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 150 kcf (87 pci) should be assumed for the medium stiff, fine-grained soils anticipated to be present at foundation subgrade elevation following adequate site preparation as described above. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of 8 inches of 1½”-0 crushed aggregate beneath the slab. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 95 percent of its maximum dry density as determined by ASTM D1557 (Modified Proctor) or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside GeoPacific’s area of expertise.

6.9 Footing and Roof Drains

Construction should include typical measures for controlling subsurface water beneath the structure, including positive crawlspace drainage to an adequate low-point drain exiting the foundation, visqueen covering the expose ground in the crawlspace, and crawlspace ventilation (foundation vents). The client should be informed and educated that some slow flowing water in the crawlspaces is considered normal and not necessarily detrimental to the home given these other design elements incorporated into its construction. Appropriate design professionals should be consulting regarding crawlspace ventilation, building material selection and mold prevention issues, which are outside GeoPacific’s area of expertise.

Down spouts and roof drains should collect roof water in a system separate from the footing drains to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point and storm system well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

If the proposed structure will have a raised floor, and no concrete slab-on-grade floors are used, perimeter footing drains may be eliminated at the discretion of the geotechnical engineer based on soil conditions encountered at the site and experience with standard local construction practices.

Where it is desired to reduce the potential for moist crawl spaces, footing drains may be installed. If concrete slab-on-grade floors are used, perimeter footing drains should be installed as recommended below.

Where necessary, perimeter footing drains should consist of 3 or 4-inch diameter, perforated plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Figure 4 presents a typical perimeter footing drain detail. In our opinion, footing drains may outlet at the curb, or on the back sides of lots where sufficient fall is not available to allow drainage to meet the street.

6.10 Permanent Below-Grade Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater.

If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained wall, an at-rest equivalent fluid pressure of 55 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 6.5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 300 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and GeoPacific should be contacted for additional recommendations.

A coefficient of friction of 0.42 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build-up. This can be accomplished by placing a 12 to 18-inch wide zone of sand and gravel containing less than 5 percent passing the No. 200 sieve against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a suitable discharge point to remove water in this zone of sand and gravel. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging.

Wall drains are recommended to prevent detrimental effects of surface water runoff on foundations – not to dewater groundwater. Drains should not be expected to eliminate all potential sources of water entering a basement or beneath a slab-on-grade. An adequate grade to a low point outlet drain in the crawlspace is required by code. Underslab drains are sometimes added beneath the slab when placed over soils of low permeability and shallow, perched groundwater.

Water collected from the wall drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the wall drains in order to reduce the potential for clogging. The drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building.

GeoPacific should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Structures should be located a horizontal distance of at least 1.5H away from the back of the retaining wall, where H is the total height of the wall. GeoPacific should be contacted for additional foundation recommendations where structures are located closer than 1.5H to the top of any wall.

7.0 SEISMIC DESIGN

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2017 Statewide GeoHazards Viewer indicates that the site is in an area where *very strong* ground shaking is anticipated during an earthquake. Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2015 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2014). We recommend Site Class D be used for design per the OSSC, Table 1613.5.2 and as defined in ASCE 7, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) 2017 Seismic Design Maps Summary Report are summarized in Table 1, and are based upon existing soil conditions.

Table 1 - Recommended Earthquake Ground Motion Parameters (USGS 2017)

Parameter	Value
Location (Lat, Long), degrees	45.228, -123.221
Probabilistic Ground Motion Values, 2% Probability of Exceedance in 50 yrs	
Peak Ground Acceleration PGA_M	0.482 g
Short Period, S_s	1.014 g
1.0 Sec Period, S_1	0.481 g
Soil Factors for Site Class D:	
F_a	1.094
F_v	1.519
$SD_s = 2/3 \times F_a \times S_s$	0.740 g
$SD_1 = 2/3 \times F_v \times S_1$	0.487 g
Seismic Design Category	D

7.1 Soil Liquefaction

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2017 Statewide GeoHazards Viewer indicates that the site is in an area considered to be at *moderate* risk for soil liquefaction during an earthquake. Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to ground shaking caused by strong earthquakes. Soil liquefaction is generally limited to loose, sands and granular soils located below the water table, and fine-grained soils with a plasticity index less than 15. The upper 13 feet of the site was observed to be underlain by very stiff to hard, fine-grained soils with moderate plasticity. Groundwater was not encountered within our subsurface explorations. Based on our review of available well logs from the vicinity of the subject site (see *Site Research*-report appendix), we expect that groundwater may be encountered at depths ranging from approximately 30 to 40 feet bgs, depending on ground surface elevation. Based upon the results of our study, it is our opinion that the risk of soil liquefaction in the upper 13 feet of the ground surface during a seismic event at the subject site should be considered to be low.

If deemed necessary, quantitative liquefaction assessment, beyond the scope of this study, may be conducted at the subject site to determine whether or not liquefiable soil layers are present underneath the subject site beyond the depths explored. Cone penetrometer testing (CPT) would be conducted at a selected location within the site boundaries to explore deeper subsurface soil layers, and the data would be used to estimate anticipated dynamic settlement at the subject site during a seismic ground shaking event.

8.0 UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. The checklist attached to this report outlines recommended geotechnical observations and testing for the project. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.

BENJAMIN L COOK
2265
Exp 12/31/17

14743PE
JAN. 23, 1990
JAMES D. IMBRIE
EXPIRES: 06/30/2019

Benjamin L. Cook, R.G.
Senior Geologist

James D. Imbrie, G.E., C.E.G.
Principal Geotechnical Engineer

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CHECKLIST OF RECOMMENDED GEOTECHNICAL TESTING AND OBSERVATION

Item No.	Procedure	Timing	By Whom	Done
1	Preconstruction meeting	Prior to beginning site work	Contractor, Developer, Civil and Geotechnical Engineers	
2	Fill removal from site or sorting and stockpiling	Prior to mass stripping	Soil Technician/ Geotechnical Engineer	
3	Stripping, aeration, and root-picking operations	During stripping	Soil Technician	
4	Compaction testing of engineered fill (95% of Standard Proctor)	During filling, tested every 2 vertical feet	Soil Technician	
5	Retaining Wall Keyway and Subbase	During Excavation	Soil Technician/ Geotechnical Engineer	
6	Retaining Wall Backfill and Geogrid Placement	During Construction	Soil Technician/ Geotechnical Engineer	
7	Compaction testing of trench backfill (95% of Standard Proctor)	During backfilling, tested every 4 vertical feet for every 200 linear feet	Soil Technician	
8	Street Subgrade Inspection (95% of Standard Proctor)	Prior to placing base course	Soil Technician	
9	Base course compaction (95% of Modified Proctor)	Prior to paving, tested every 200 linear feet	Soil Technician	
10	Asphalt Compaction (92% Rice Value)	During paving, tested every 100 linear feet	Soil Technician	
11	Final Geotechnical Engineer’s Report	Completion of project	Geotechnical Engineer	

FIGURES

GeoPacific Engineering, Inc.
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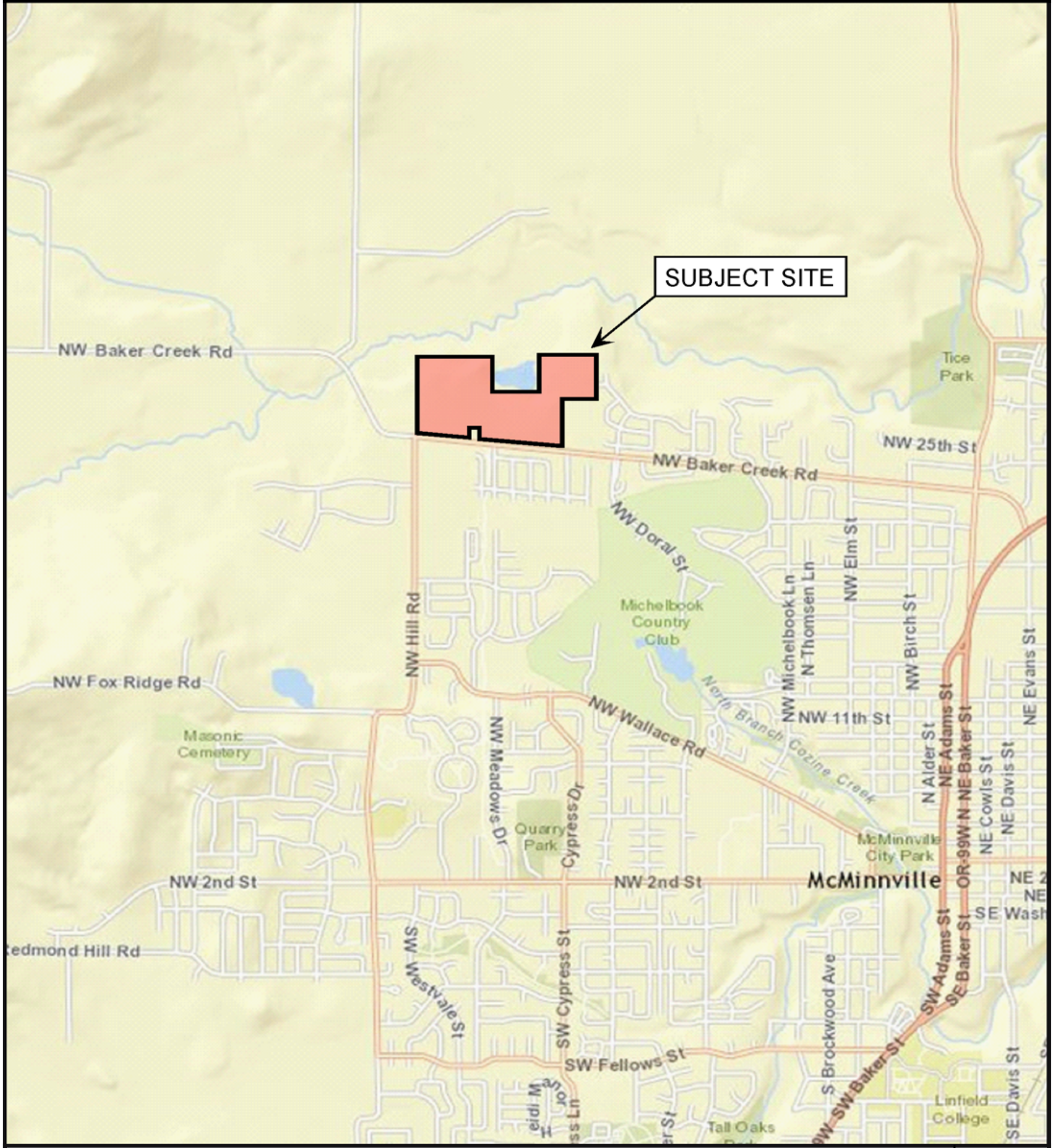
SITE VICINITY MAP



Base Map: DOGAMI HAZVU, 2017
Date: 9/22/2017
Drawn by: BLC

North

Project: Baker Creek North Subdivision
1755 NW Baker Creek Road
McMinnville, Oregon 97128

Project No. 17-4694

FIGURE 1

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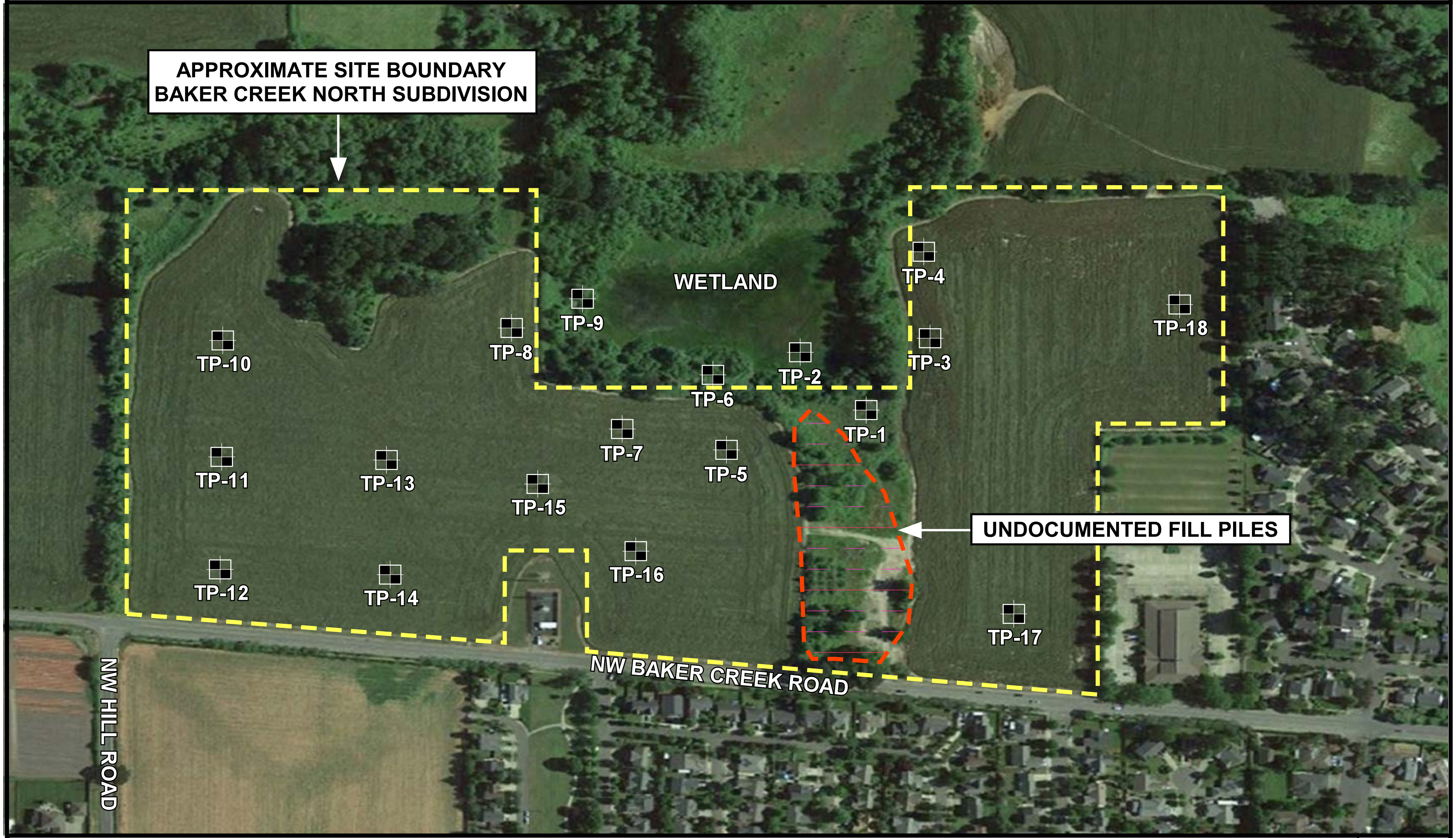
SITE AERIAL MAP AND EXPLORATION LOCATIONS



Legend: Base Map - Google Earth Pro 6/22/2017

⊞ Test Pit Designation and Approximate Location

APPROXIMATE SCALE
(FEET)
175 0 175 350

Drawn by: BLC
Date: 9/22/2017

North

Project: Baker Creek North Subdivision
1755 NW Baker Creek Road
McMinnville, Oregon 97218

Project No. 17-4694

FIGURE 2

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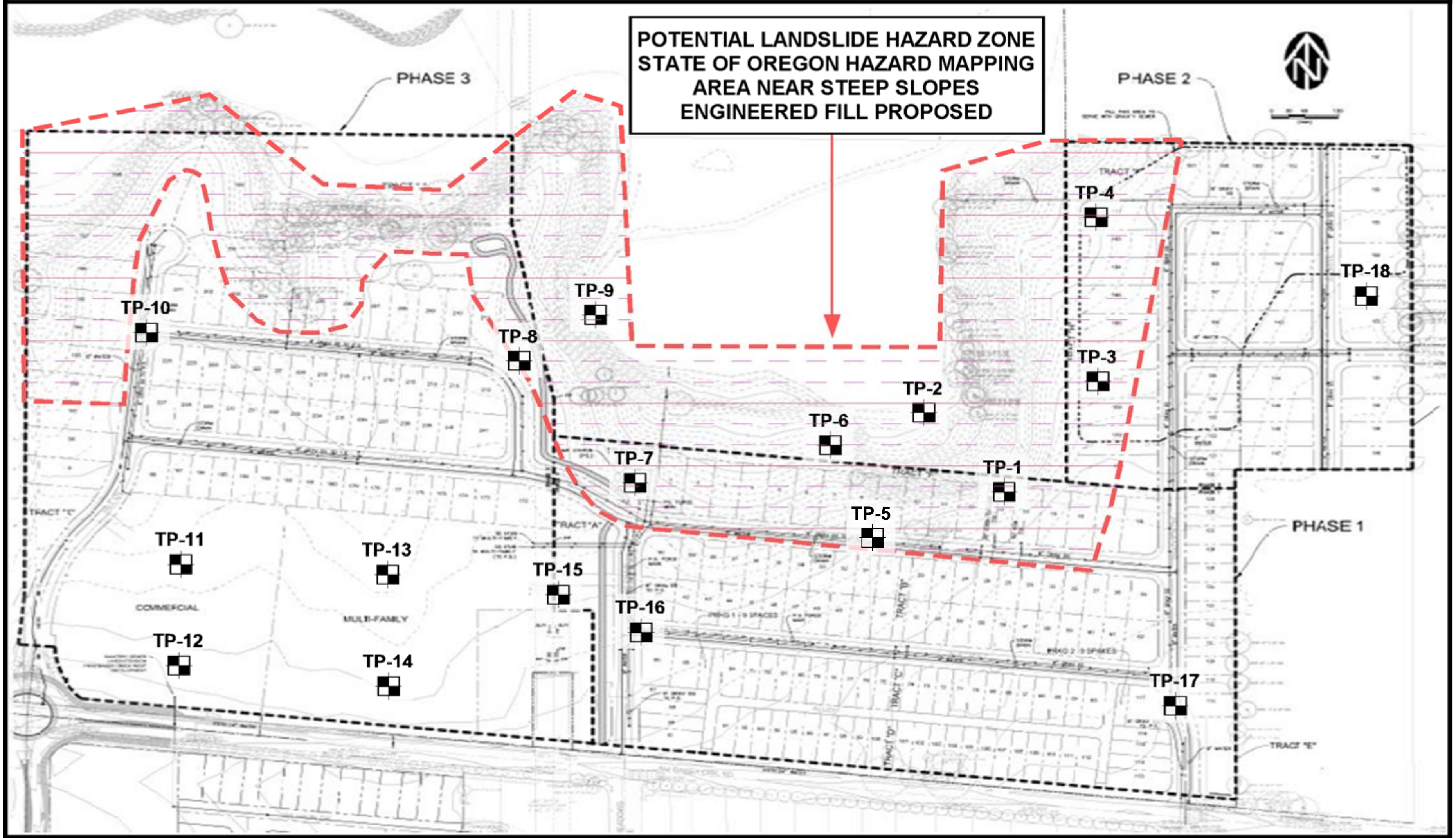
SITE PLAN MAP AND EXPLORATION LOCATIONS



Legend: Base Map - Westtech Engineering, Inc., Baker Creek North, Overall Utility Plan, Drawing H

▚ Test Pit Designation and Approximate Location

Drawn by: BLC
Date: 9/22/2017

↑ North

Project: Baker Creek North Subdivision
1755 NW Baker Creek Road
McMinnville, Oregon 97218

Project No. 17-4694

FIGURE 3

GeoPacific Engineering, Inc.

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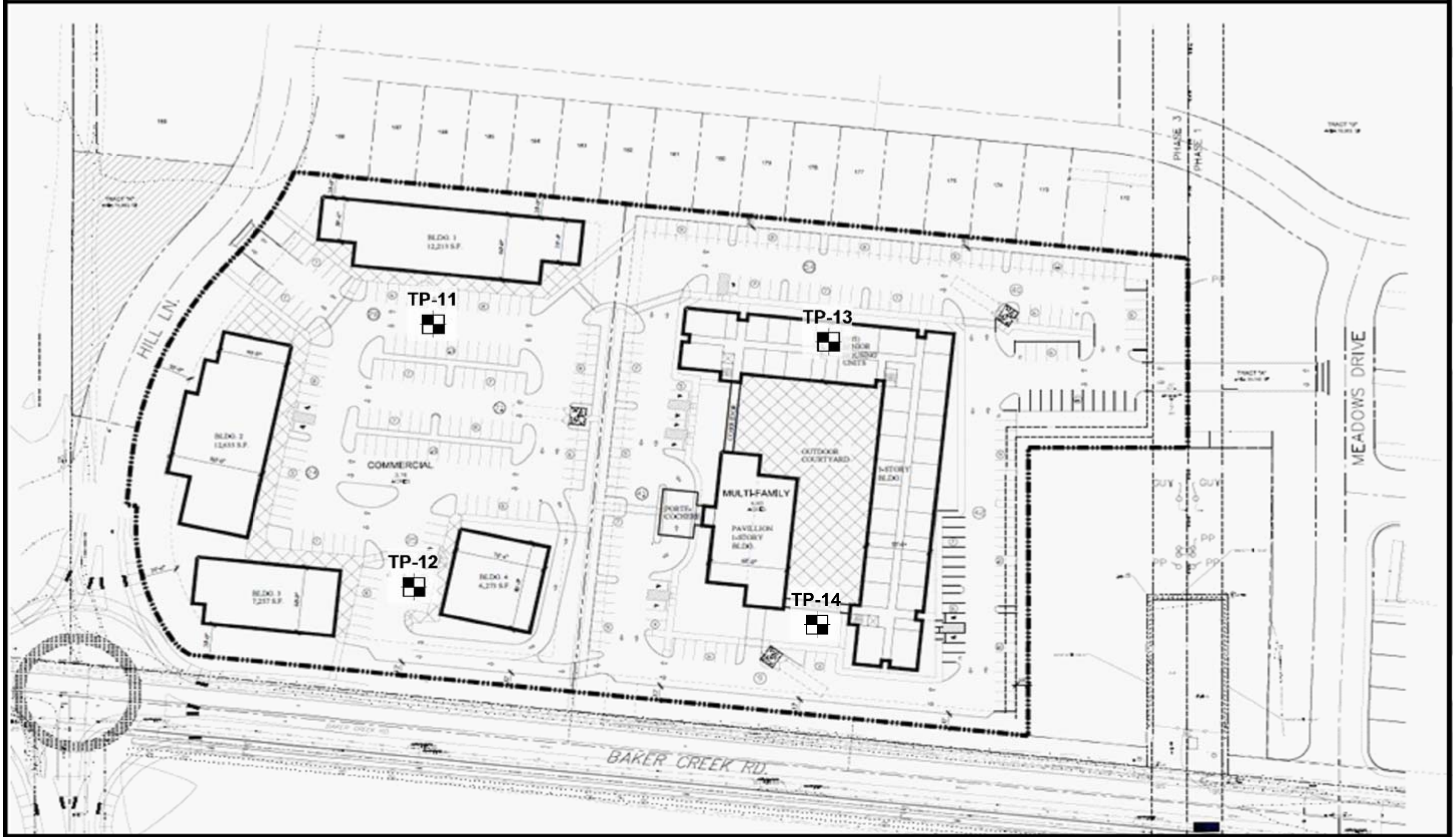
SITE PLAN MAP AND EXPLORATION LOCATIONS



Legend: Base Map - Westtech Engineering, Inc., Baker Creek North, Site Concept Plan A, Sheet A1.1A

▚ Test Pit Designation and Approximate Location

Drawn by: BLC
Date: 9/22/2017

North

Project: Baker Creek North Subdivision
1755 NW Baker Creek Road
McMinnville, Oregon 97218

Project No. 17-4694

FIGURE 3A

GeoPacific Engineering, Inc.
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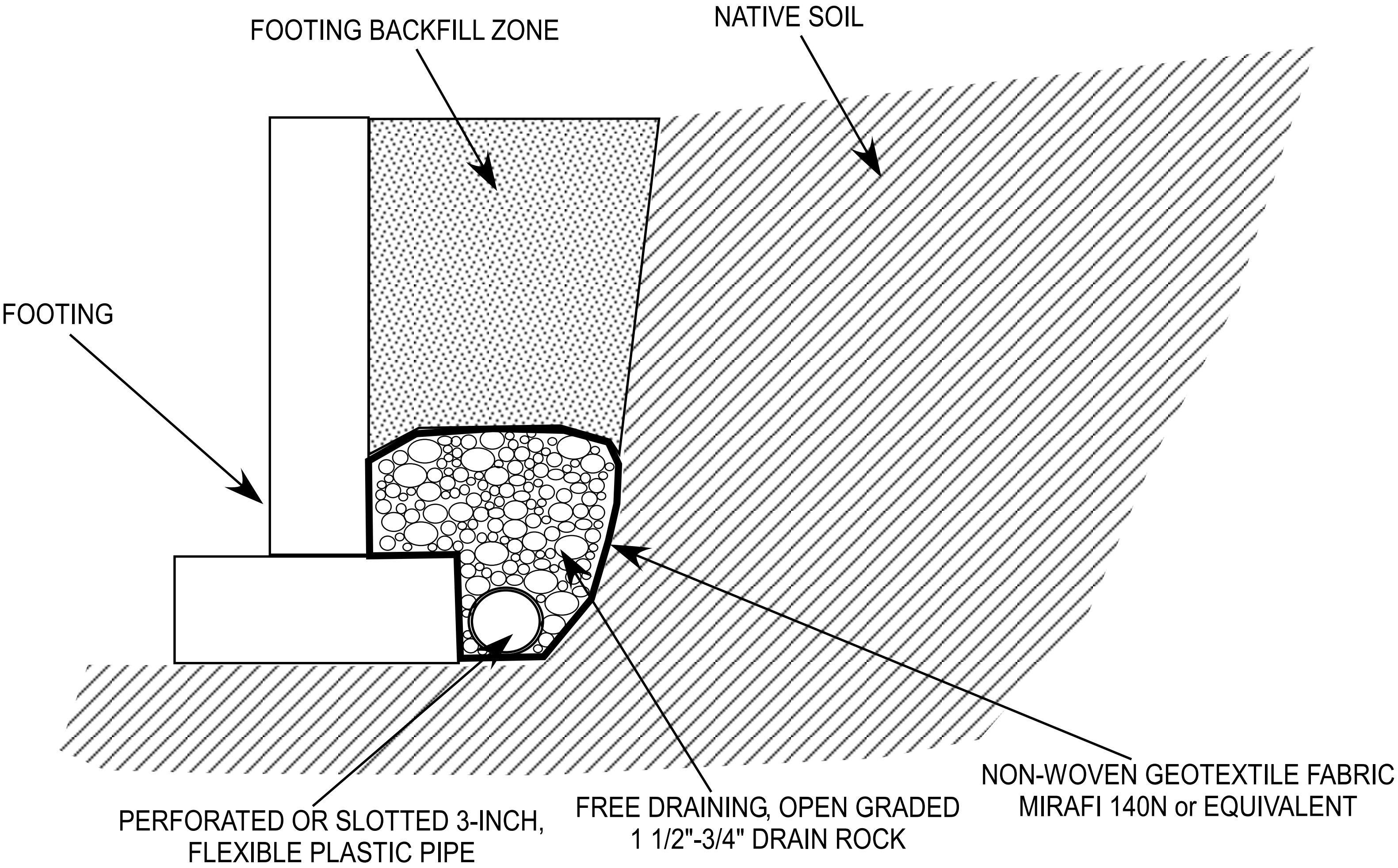
TYPICAL PERIMETER FOOTING DRAIN DETAIL



Notes:
1) Drain rock should contain no more than 5 percent fines passing the U.S. No. 200 Sieve.
2) Trench bottom and drain pipe should be sloped to drain to approved discharge location.

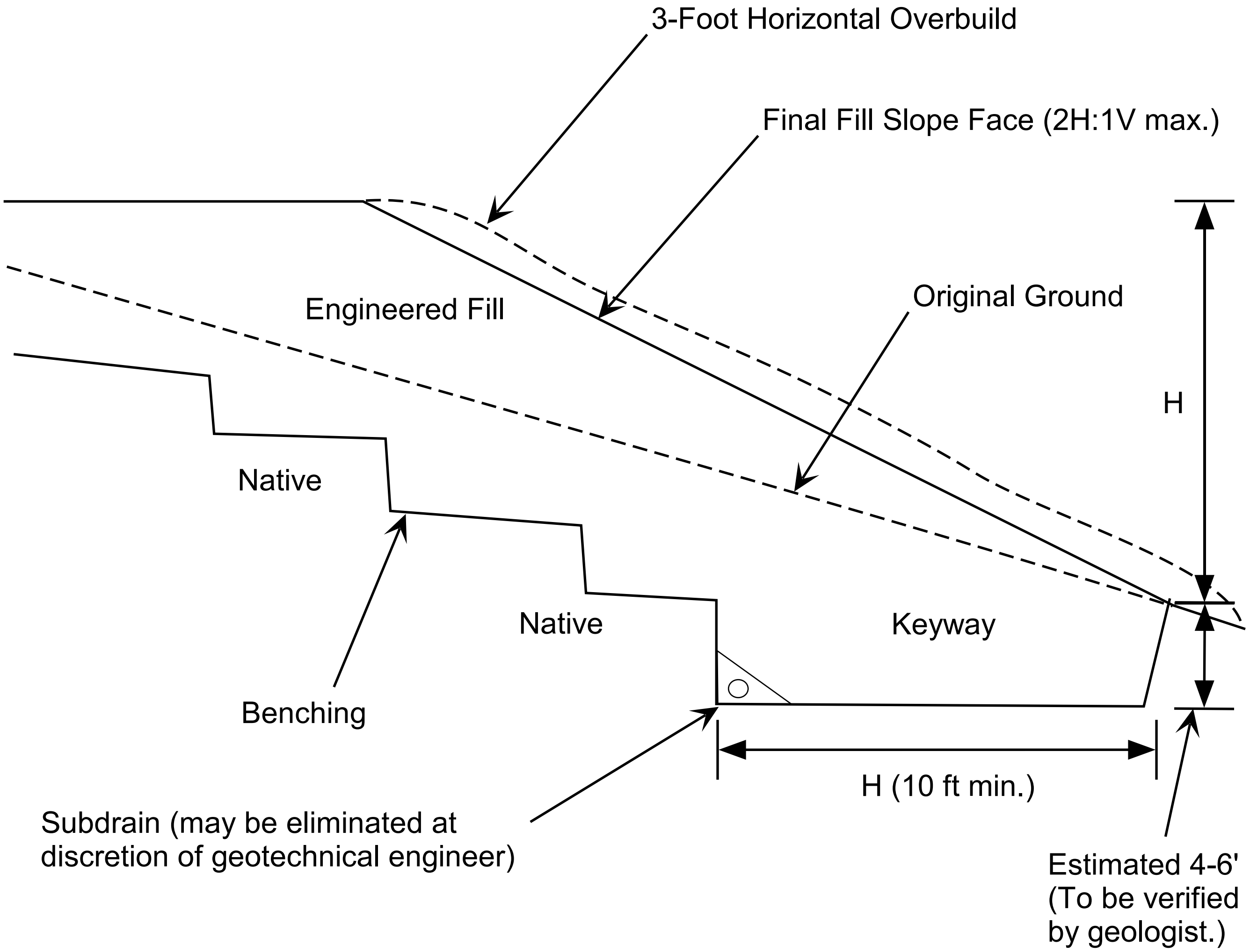
Date: 9/22/2017
Drawn by: BLC

Project: Baker Creek North Subdivision
1755 NW Baker Creek Road, McMinnville, Oregon

Project No. 17-4694

FIGURE 4

TYPICAL KEYWAY, BENCHING & FILL SLOPE DETAIL



Recommended subdrain is minimum 3-inch-diameter ADS Heavy Duty grade (or equivalent), perforated plastic pipe enveloped in a minimum of 3 cubic feet per lineal foot of 2" to 1/2" open-graded gravel drain rock wrapped with geotextile filter fabric (Mirafi 140N or equivalent).

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EXPLORATION LOGS

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TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-1**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 6 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 18 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity
3	>4.5		100 to 1,000 g	98.6	33.4		AASHTO Classification = A-7-5(36), Liquid Limit = 62, Plasticity Index = 29
4	>4.5						Increased soil moisture = moist.
5							
6			100 to 1,000 g	99.6	30.8		AASHTO Classification = A-7-5(25), Liquid Limit = 49, Plasticity Index = 19
7							
8							SILT (ML), brown, very stiff, moist to very moist, moderate plasticity.
9			100 to 1,000 g	99.2	36.7		AASHTO Classification = A-7-6(18), Liquid Limit = 43, Plasticity Index = 15
10							
11							
12							
13							Test pit terminated at 13 feet bgs. No groundwater seepage observed during excavation.
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket	▯	💧	▨	▽
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 160 Feet

GeoPacific Engineering, Inc.
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Portland, Oregon 97224
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TEST PIT LOG

Project: Baker Creek North Subdivision McMinnville, Oregon	Project No. 17-4694	Test Pit No. **TP-2**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
							TOPSOIL. Wetland area. Organic SILT(OL-ML), brown, dry, fine roots extending to 12 inches bgs.
1	3.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
2	>4.5						
3	>4.5		100 to 1,000 g				Elastic SILT (MH), dark gray, damp to moist, very stiff, moderate plasticity hydric soil, containing fine roots.
4	>4.5						
5							
6			100 to 1,000 g				
7							Elastic SILT (MH), dark gray/brown/orange/gray layering and mottling, moist to very moist, stiff, moderate plasticity, hydric soil, containing fine roots.
8							
9			100 to 1,000 g				
10							Test pit terminated at 10 feet bgs. No groundwater seepage observed during excavation.
11							
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket	▯	💧	▨	▽
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 130 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 12 inches bgs.
1	3.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
2	>4.5						
3	>4.5						
4	>4.5						Increased soil moisture = moist.
5							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
6							
7							
8							
9							
10							Test pit terminated at 10 feet bgs. No groundwater seepage observed during excavation.
11							
12							
13							
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g Bag Sample
- 5 Gal. Bucket Bucket Sample
- ▯ Shelby Tube Sample
- 💧 Seepage
- ▨ Water Bearing Zone
- ▽ Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 165 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision McMinnville, Oregon	Project No. 17-4694	Test Pit No. **TP-4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 12 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 18 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9							
10							Test pit terminated at 9.5 feet bgs. No groundwater seepage observed during excavation.
11							
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket			▨	
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 161 Feet

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-5**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 12 inches bgs.
1	3.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
2	>4.5						
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9							
10							
11							Test pit terminated at 11 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g — Bag Sample
- 5 Gal. Bucket — Bucket Sample
- Shelby Tube Sample
- Seepage
- ▨ Water Bearing Zone
- Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 158 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision McMinnville, Oregon	Project No. 17-4694	Test Pit No. **TP-6**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
1	3.5						TOPSOIL. Surfaced with blackberries. Organic SILT(OL-ML), brown, dry, blackberry roots extending to 24 inches bgs.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5		100 to 1,000 g				
4	>4.5						
5							
6			100 to 1,000 g				Increased soil moisture = moist.
7							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
8							
9			100 to 1,000 g				
10							Test pit terminated at 10 feet bgs. No groundwater seepage observed during excavation.
11							
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket			▨	
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 147 Feet

GeoPacific Engineering, Inc.
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Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-7**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 6 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 18 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							
6							
7							Increased soil moisture = moist.
8							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
9							
10							
11							
12							
13							Test pit terminated at 13 feet bgs. No groundwater seepage observed during excavation.
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g — Bag Sample
- 5 Gal. Bucket — Bucket Sample
- Shelby Tube Sample
- Seepage
- ▨ Water Bearing Zone
- Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 157 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision McMinnville, Oregon	Project No. 17-4694	Test Pit No. **TP-8**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 6 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 18 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							
							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9							
10							
11							
12							Test pit terminated at 11.5 feet bgs. No groundwater seepage observed during excavation.
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket			▨	
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 161 Feet

GeoPacific Engineering, Inc.
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Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-9**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Wetland area. Organic SILT(OL-ML), brown, dry, fine roots extending to 18 inches bgs.
1	3.5						
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity
3	>4.5		100 to 1,000 g				
4	>4.5						Elastic SILT (MH), dark gray, damp to moist, very stiff, moderate plasticity hydric soil, containing fine roots.
5							
6			100 to 1,000 g				
7							Elastic SILT (MH), dark gray/yellowish/brown/orange/gray layering and mottling, moist to very moist, stiff, moderate plasticity, hydric soil, containing fine roots.
8							
9			100 to 1,000 g				
10							Test pit terminated at 10 feet bgs. No groundwater seepage observed during excavation.
11							
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket	▯	💧	▨	▽
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 132 Feet

GeoPacific Engineering, Inc.

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TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-10**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 6 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 18 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							
7							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
8							
9							
10							
11							Test pit terminated at 10.5 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket	▯	💧	▨	▽
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 159 Feet

GeoPacific Engineering, Inc.
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Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-11**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 16 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5		100 to 1,000 g				
4	>4.5						
5							Increased soil moisture = moist.
6			100 to 1,000 g				SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9			100 to 1,000 g				
10							
11							Test pit terminated at 11 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g — Bag Sample
- 5 Gal. Bucket — Bucket Sample
- Shelby Tube Sample
- Seepage
- ▨ Water Bearing Zone
- Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation: 163 Feet

GeoPacific Engineering, Inc.

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TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-12**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 16 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5		100 to 1,000 g				
4	>4.5						
5							Increased soil moisture = moist.
6			100 to 1,000 g				SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9			100 to 1,000 g				
10							
11							Test pit terminated at 11 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket			▨	
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:164 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision McMinnville, Oregon	Project No. 17-4694	Test Pit No. **TP-13**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
							Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 16 inches.
1	3.5						
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5		100 to 1,000 g				
4	>4.5						
5							Increased soil moisture = moist.
6			100 to 1,000 g				
							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9			100 to 1,000 g				
10							
11							Test pit terminated at 11 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket			▨	
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:163 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-14**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	**Material Description**
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 16 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							
7							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
8							
9							Test pit terminated at 9 feet bgs. No groundwater seepage observed during excavation.
10							
11							
12							
13							
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g Bag Sample
- 5 Gal. Bucket Bucket Sample
- ▯ Shelby Tube Sample
- 💧 Seepage
- ▨ Water Bearing Zone
- ▽ Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:165 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-15**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 14 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9							Test pit terminated at 9 feet bgs. No groundwater seepage observed during excavation.
10							
11							
12							
13							
14							
15							
16							
17							

LEGEND

100 to 1,000 g	5 Gal. Bucket	▯	💧	▨	▽
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:165 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-16**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 14 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						Increased soil moisture = moist.
5							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
6							
7							
8							
9							
10							Test pit terminated at 10 feet bgs. No groundwater seepage observed during excavation.
11							
12							
13							
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g Bag Sample
- 5 Gal. Bucket Bucket Sample
- ▯ Shelby Tube Sample
- 💧 Seepage
- ▨ Water Bearing Zone
- ▽ Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:166 Feet

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TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-17**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Torvane Shear (tons/ft^2)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 14 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9							
10							
11							Test pit terminated at 11 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

LEGEND

- 100 to 1,000 g — Bag Sample
- 5 Gal. Bucket — Bucket Sample
- ▯ Shelby Tube Sample
- 💧 Seepage
- ▨ Water Bearing Zone
- ▽ Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:170 Feet

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: Baker Creek North Subdivision
McMinnville, Oregon

Project No. 17-4694

Test Pit No. **TP-18**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Torvane Shear (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
							TOPSOIL. Surfaced with grass. Organic SILT(OL-ML), brown, dry, fine roots extending to 4 inches bgs.
1	3.5						Elastic SILT (MH), light brown, dry to damp, very stiff, moderate plasticity, till zone, with disturbed texture and appearance to approximately 14 inches.
2	>4.5						Elastic SILT (MH), light brown, damp to moist, very stiff, moderate plasticity.
3	>4.5						
4	>4.5						
5							Increased soil moisture = moist.
6							SILT (ML), brown with concentric orange mottles, very stiff, moist to very moist, moderate plasticity.
7							
8							
9							
10							
11							Test pit terminated at 11 feet bgs. No groundwater seepage observed during excavation.
12							
13							
14							
15							
16							
17							

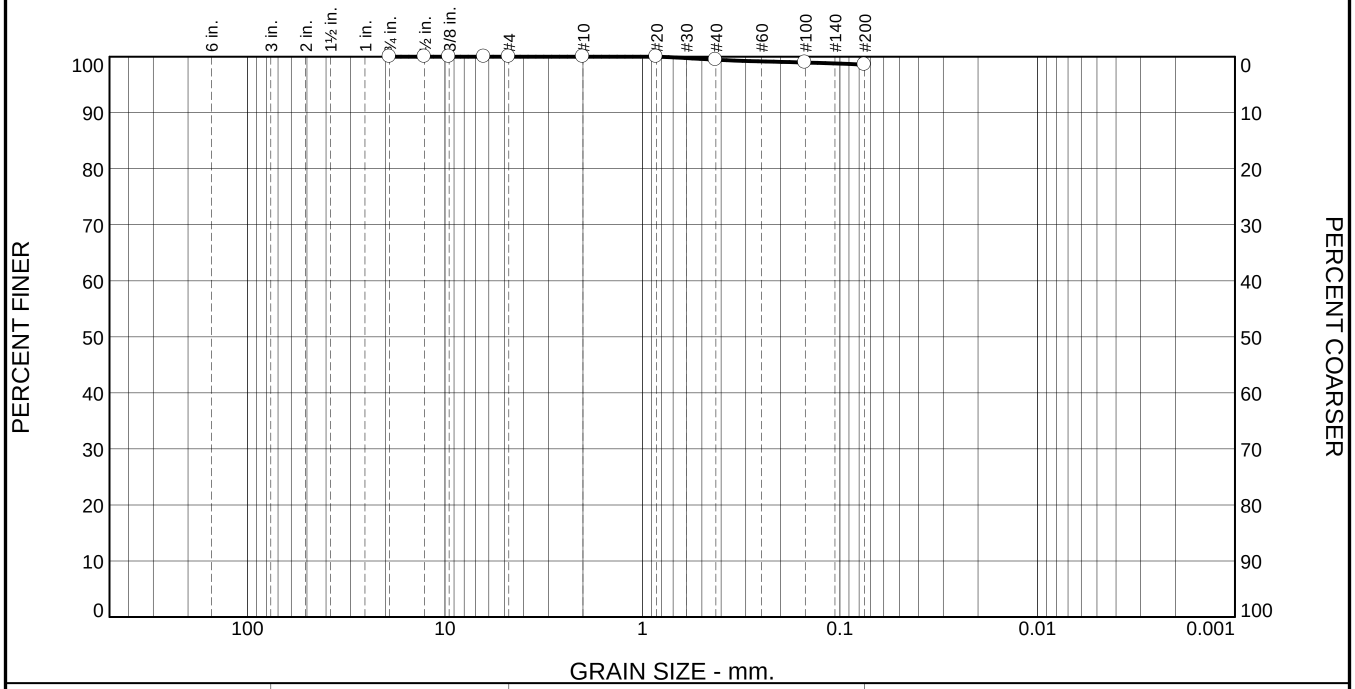
LEGEND

- 100 to 1,000 g — Bag Sample
- 5 Gal. Bucket — Bucket Sample
- Shelby Tube Sample
- Seepage
- ▨ Water Bearing Zone
- Water Level at Abandonment

Date Excavated: 9/6/2017
Logged By: B. Cook
Surface Elevation:170 Feet

LABORATORY TEST RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	0.9	98.6	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.5		
#100	99.0		
#200	98.6		

* (no specification provided)

Material Description

Elastic Silt

Atterberg Limits (ASTM D 4318)

PL= 32.8 **LL=** 62.0 **PI=** 29.2

Classification

USCS (D 2487)= MH **AASHTO (M 145)=** A-7-5(36)

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 33.4%

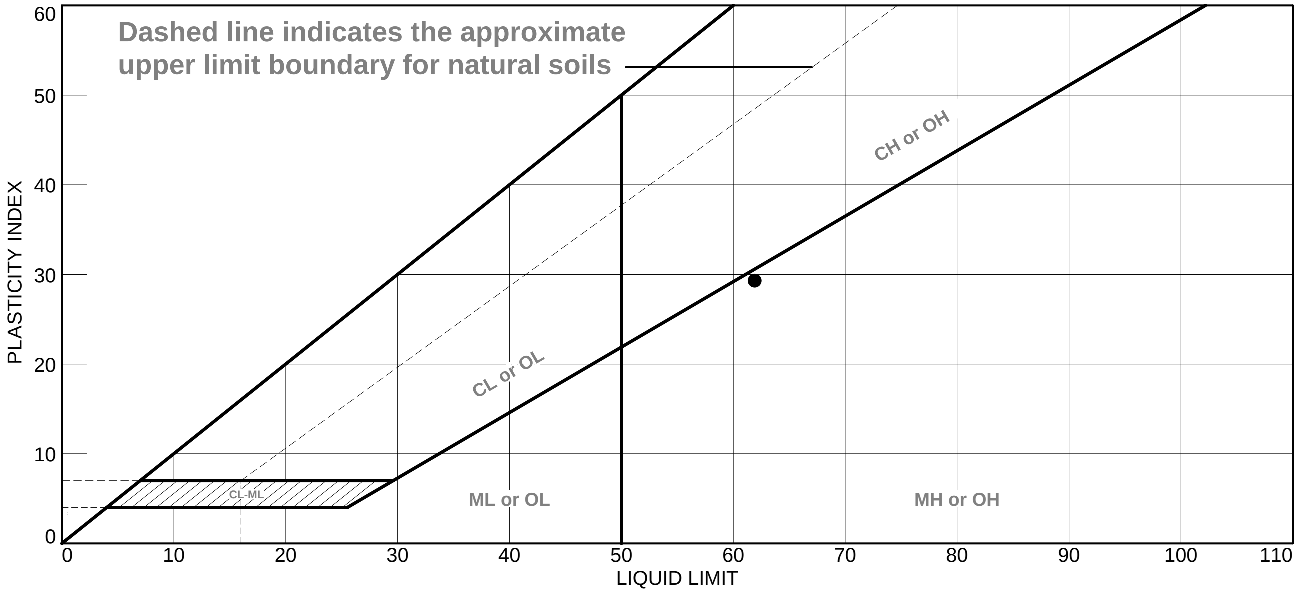
Date Received: **Date Tested:** 9/13/2017
Tested By: SJC
Checked By:
Title:

Location: TP-1 Sample 1.1
Sample Number: S17-269 **Depth:** 3'
Date Sampled: 9/6/2017 BLC

GEOPACIFIC ENGINEERING, INC.

Client: Stafford Land Company, Inc.
Project: Baker Creek North Subdivision
Project No: 17-4694 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



Dashed line indicates the approximate upper limit boundary for natural soils

	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt	62.0	32.8	29.2	99.5	98.6	MH

Project No. 17-4694 **Client:** Stafford Land Company, Inc.

Project: Baker Creek North Subdivision

Location: TP-1 Sample 1.1
Sample Number: S17-269 **Depth:** 3'

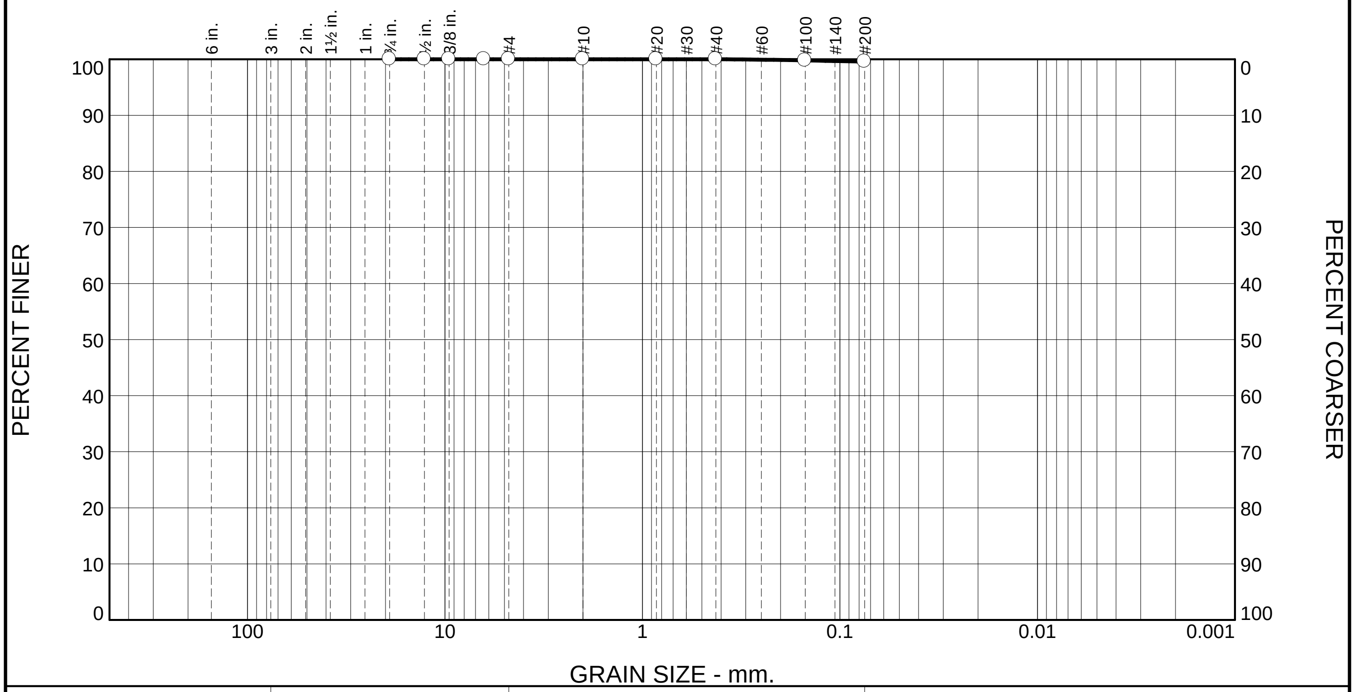
Remarks:

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	0.4	99.6	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	100.0		
#100	99.8		
#200	99.6		

* (no specification provided)

Material Description

Elastic Silt

Atterberg Limits (ASTM D 4318)

PL= 30.2 **LL=** 49.5 **PI=** 19.3

Classification

USCS (D 2487)= MH **AASHTO (M 145)=** A-7-5(25)

Coefficients

D_{90}=	D_{85}=	D_{60}=
D_{50}=	D_{30}=	D_{15}=
D_{10}=	C_u=	C_c=

Remarks

Moisture 30.8%

Date Received: **Date Tested:** 9/13/2017

Tested By: SJC

Checked By:

Title:

Location: TP-1 Sample 1.2

Sample Number: S17-270 **Depth:** 6'

Date Sampled: 9/6/2017 BLC

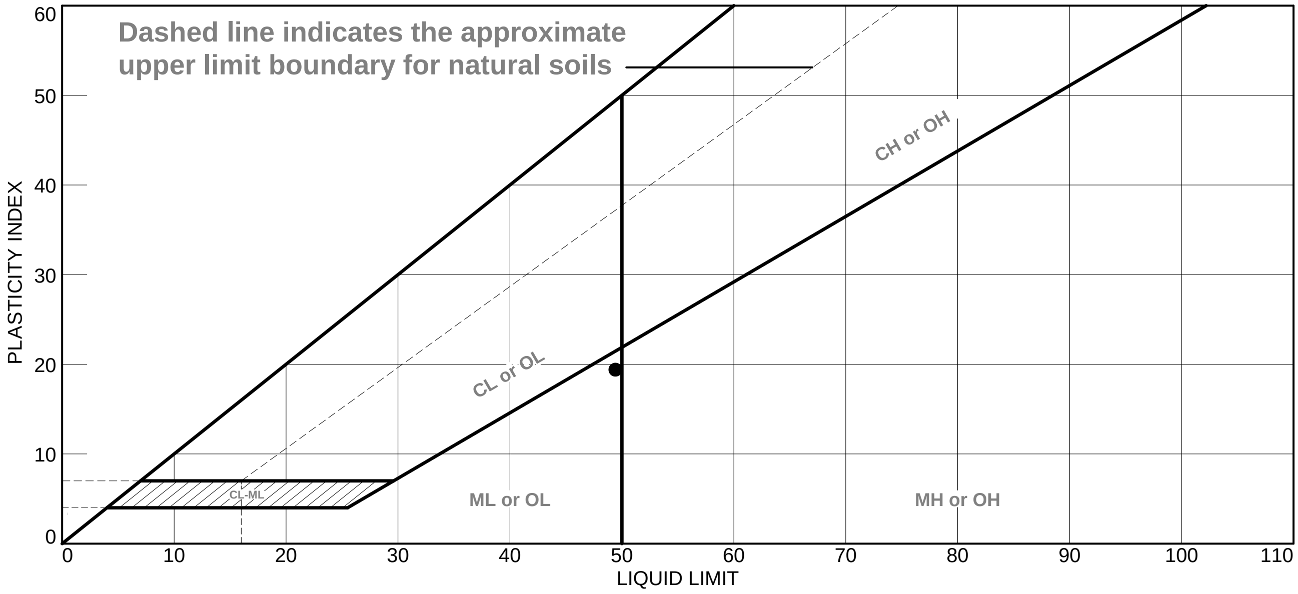
GEOPACIFIC ENGINEERING, INC.

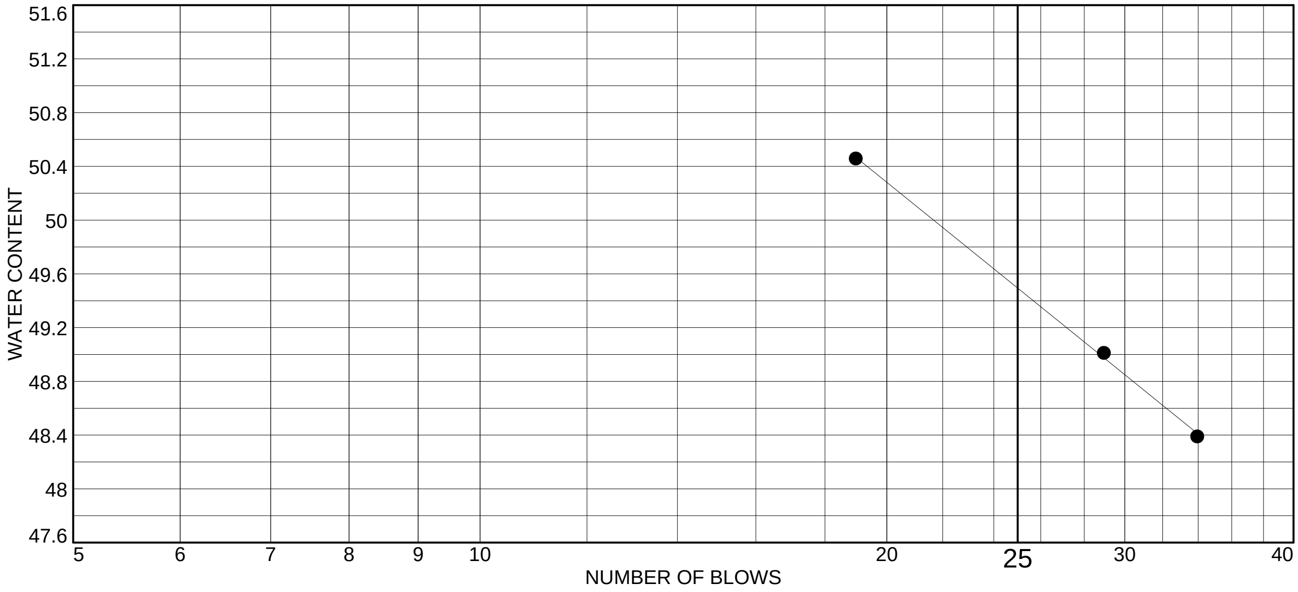
Client: Stafford Land Company, Inc.

Project: Baker Creek North Subdivision

Project No: 17-4694 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt	49.5	30.2	19.3	100.0	99.6	MH

Project No. 17-4694 **Client:** Stafford Land Company, Inc.

Project: Baker Creek North Subdivision

Location: TP-1 Sample 1.2
Sample Number: S17-270 **Depth:** 6'

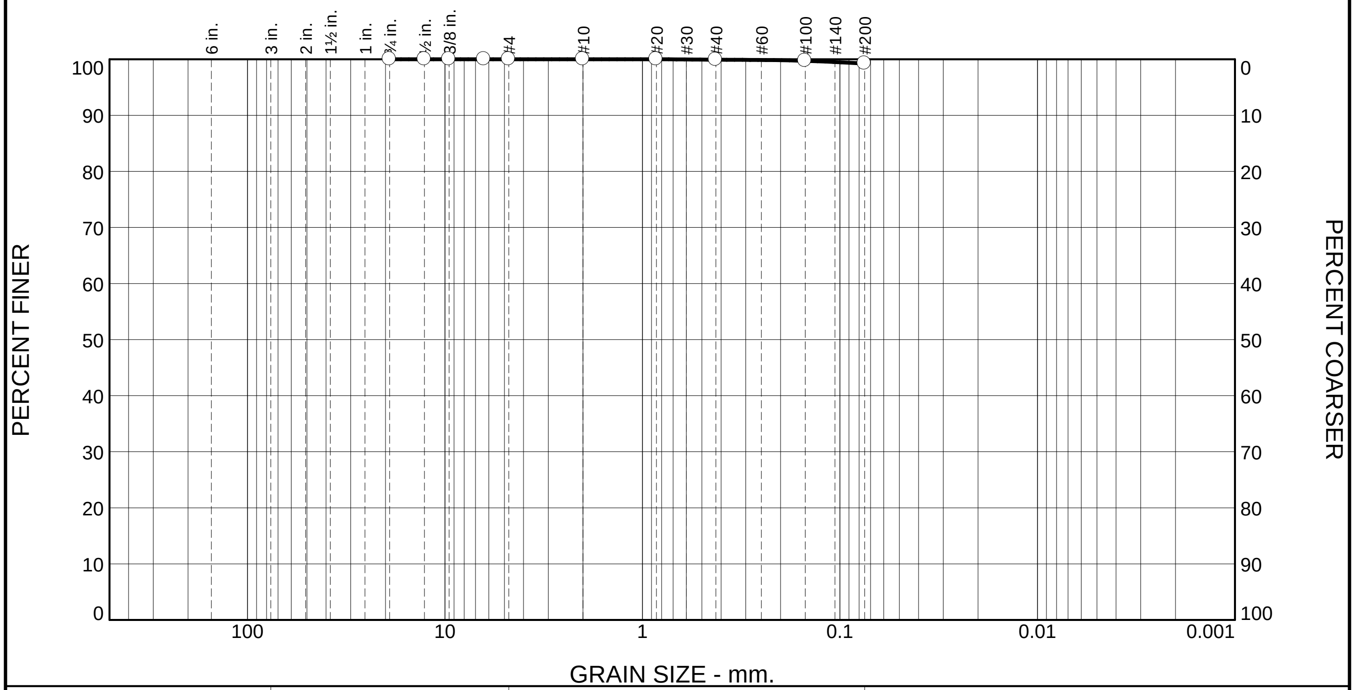
Remarks:

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	0.7	99.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.9		
#100	99.7		
#200	99.2		

* (no specification provided)

Material Description

Silt

Atterberg Limits (ASTM D 4318)

PL= 28.0 **LL=** 43.1 **PI=** 15.1

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-7-6(18)

Coefficients

D_{90}=	D_{85}=	D_{60}=
D_{50}=	D_{30}=	D_{15}=
D_{10}=	C_u=	C_c=

Remarks

Moisture 36.7%

Date Received: **Date Tested:** 9/13/2017

Tested By: SJC

Checked By:

Title:

Location: TP-1 Sample 1.3
Sample Number: S17-271

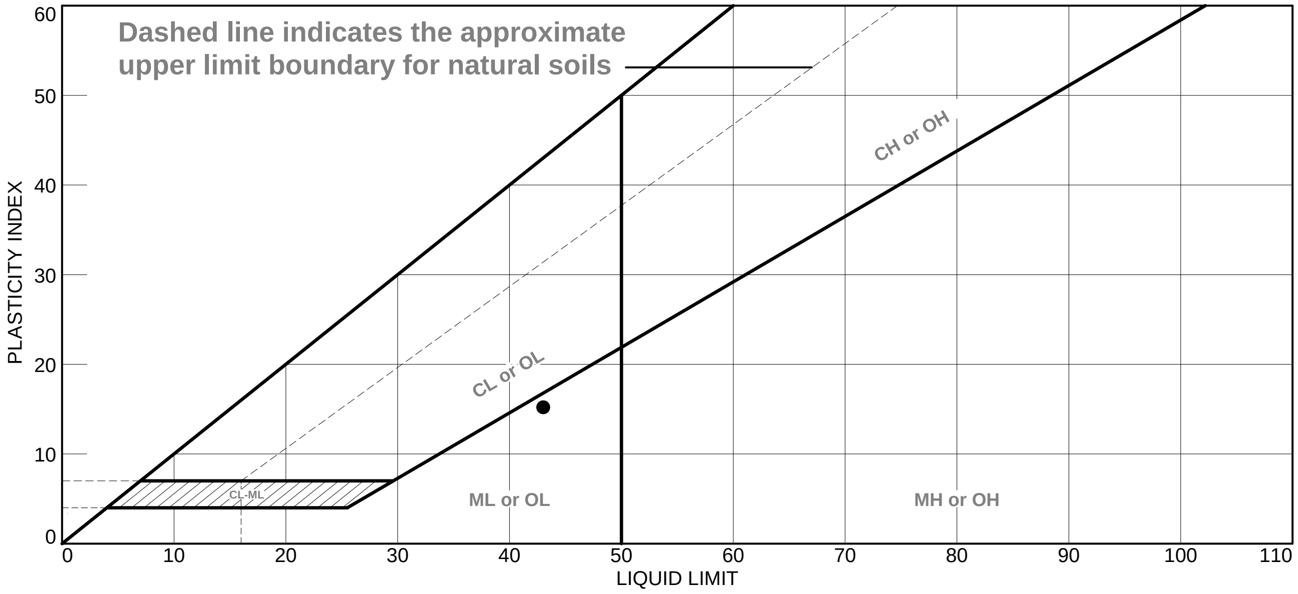
Date Sampled: 9/6/2017 BLC

GEOPACIFIC ENGINEERING, INC.

Client: Stafford Land Company, Inc.
Project: Baker Creek North Subdivision

Project No: 17-4694 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt	43.1	28.0	15.1	99.9	99.2	ML

Project No. 17-4694 **Client:** Stafford Land Company, Inc.

Project: Baker Creek North Subdivision

Location: TP-1 Sample 1.3
Sample Number: S17-271

Remarks:

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC

SOIL DESCRIPTION AND CLASSIFICATION GUIDELINES

Particle-Size Classification

COMPONENT	ASTM/USCS		AASHTO	
	size range	sieve size range	size range	sieve size range
Cobbles	> 75 mm	greater than 3 inches	> 75 mm	greater than 3 inches
Gravel	75 mm – 4.75 mm	3 inches to No. 4 sieve	75 mm – 2.00 mm	3 inches to No. 10 sieve
Coarse	75 mm – 19.0 mm	3 inches to 3/4-inch sieve	-	-
Fine	19.0 mm – 4.75 mm	3/4-inch to No. 4 sieve	-	-
Sand	4.75 mm – 0.075 mm	No. 4 to No. 200 sieve	2.00 mm – 0.075 mm	No. 10 to No. 200 sieve
Coarse	4.75 mm – 2.00 mm	No. 4 to No. 10 sieve	2.00 mm – 0.425 mm	No. 10 to No. 40 sieve
Medium	2.00 mm – 0.425 mm	No. 10 to No. 40 sieve	-	-
Fine	0.425 mm – 0.075 mm	No. 40 to No. 200 sieve	0.425 mm – 0.075 mm	No. 40 to No. 200 sieve
Fines (Silt and Clay)	< 0.075 mm	Passing No. 200 sieve	< 0.075 mm	Passing No. 200 sieve

Consistency for Cohesive Soil

CONSISTENCY	SPT N-VALUE (BLOWS PER FOOT)	POCKET PENETROMETER (UNCONFINED COMPRESSIVE STRENGTH, tsf)
Very Soft	2	less than 0.25
Soft	2 to 4	0.25 to 0.50
Medium Stiff	4 to 8	0.50 to 1.0
Stiff	8 to 15	1.0 to 2.0
Very Stiff	15 to 30	2.0 to 4.0
Hard	30 to 60	greater than 4.0
Very Hard	greater than 60	-

Relative Density for Granular Soil

RELATIVE DENSITY	SPT N-VALUE (BLOWS PER FOOT)
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	more than 50

Moisture Designations

TERM	FIELD IDENTIFICATION
Dry	No moisture. Dusty or dry.
Damp	Some moisture. Cohesive soils are usually below plastic limit and are moldable.
Moist	Grains appear darkened, but no visible water is present. Cohesive soils will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grains. Sand and silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is much wetter than optimum moisture content and is above plastic limit.

AASHTO SOIL CLASSIFICATION SYSTEM

TABLE 1. Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing .075 mm)			Silt-Clay Materials (More than 35 Percent Passing 0.075)			
Group Classification	A-1	A-3	A-2	A-4	A-5	A-6	A-7
Sieve analysis, percent passing:							
2.00 mm (No. 10)	-	-	-				
0.425 mm (No. 40)	50 max	51 min	-	-	-	-	-
0.075 mm (No. 200)	25 max	10 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)							
Liquid limit				40 max	41 min	40 max	41 min
Plasticity index	6 max	N.P.		10 max	10 max	11 min	11 min
General rating as subgrade	Excellent to good			Fair to poor			

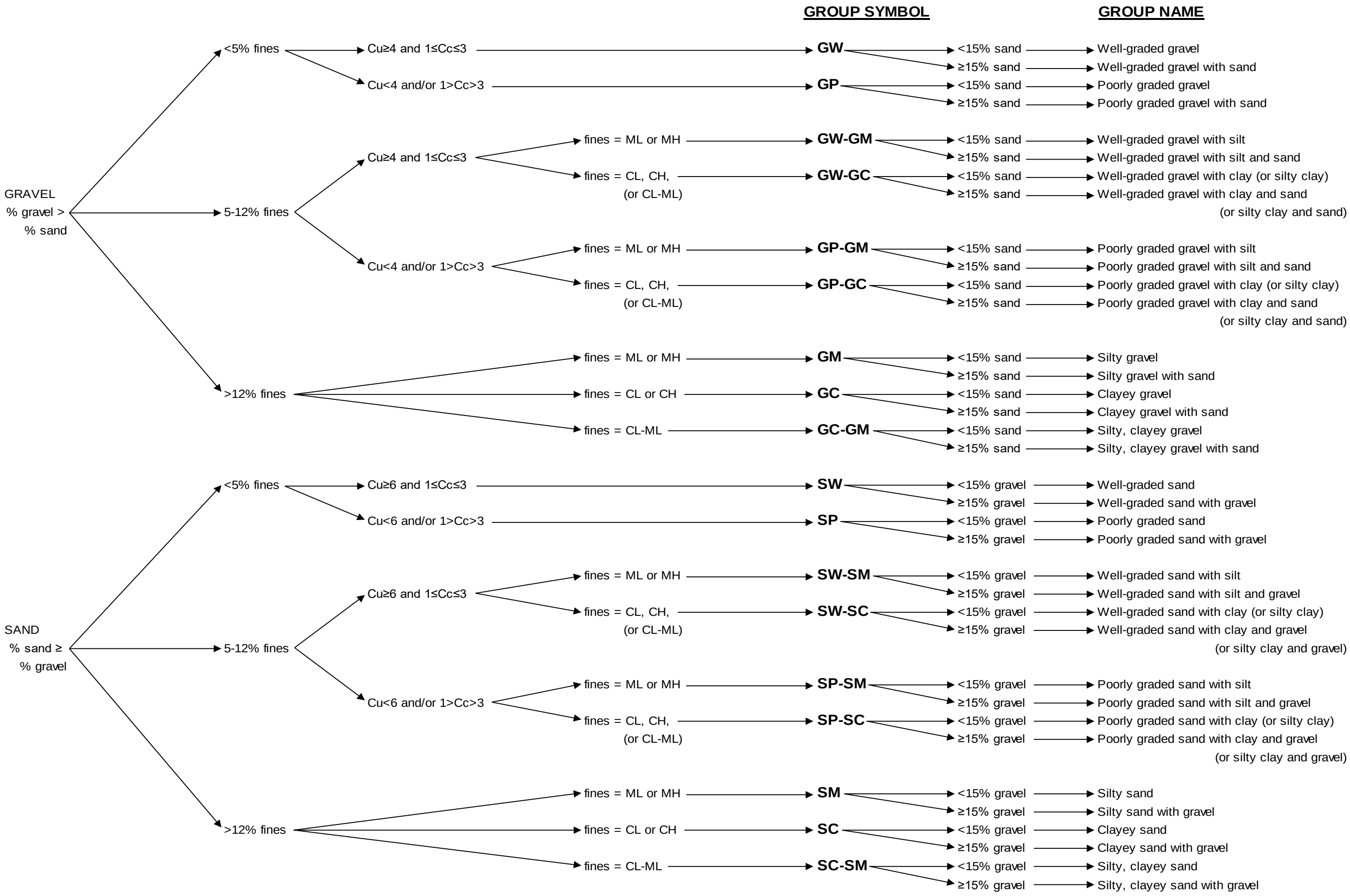
Note: The placing of A-3 before A-2 is necessary in the "left to right elimination process" and does not indicate superiority of A-3 over A-2.

TABLE 2. Classification of Soils and Soil-Aggregate Mixtures

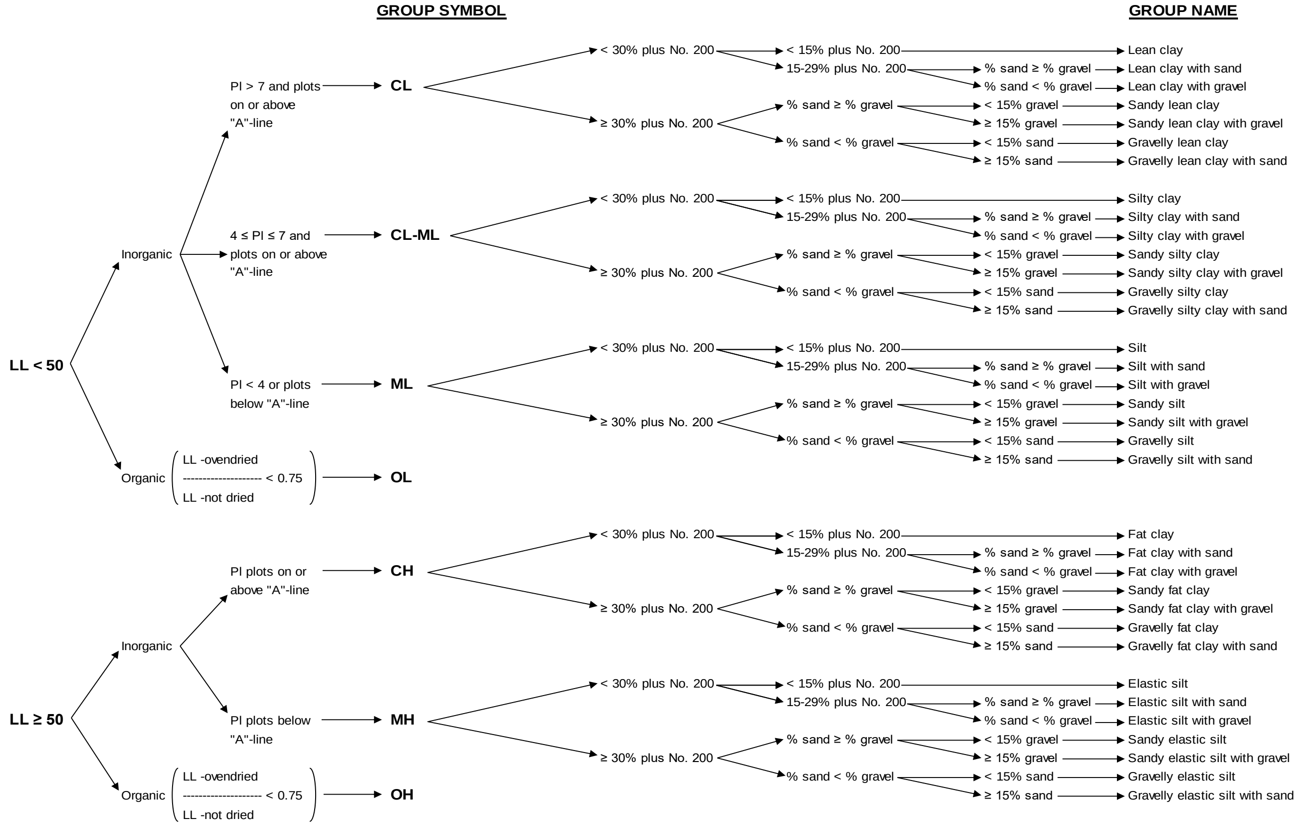
General Classification	Granular Materials (35 Percent or Less Passing 0.075 mm)							Silt-Clay Materials (More than 35 Percent Passing 0.075 mm)			
	A-1			A-2							A-7
Group Classification	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-5, A-7-6
Sieve analysis, percent passing:											
2.00 mm (No. 10)	50 max	-	-	-	-	-	-	-	-	-	-
0.425 mm (No. 40)	30 max	50 max	51 min	-	-	-	-	-	-	-	-
0.075 mm (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)											
Liquid limit				40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11min
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General ratings as subgrade	Excellent to Good							Fair to poor			

Note: Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30 (see Figure 2).

AASHTO = American Association of State Highway and Transportation Officials



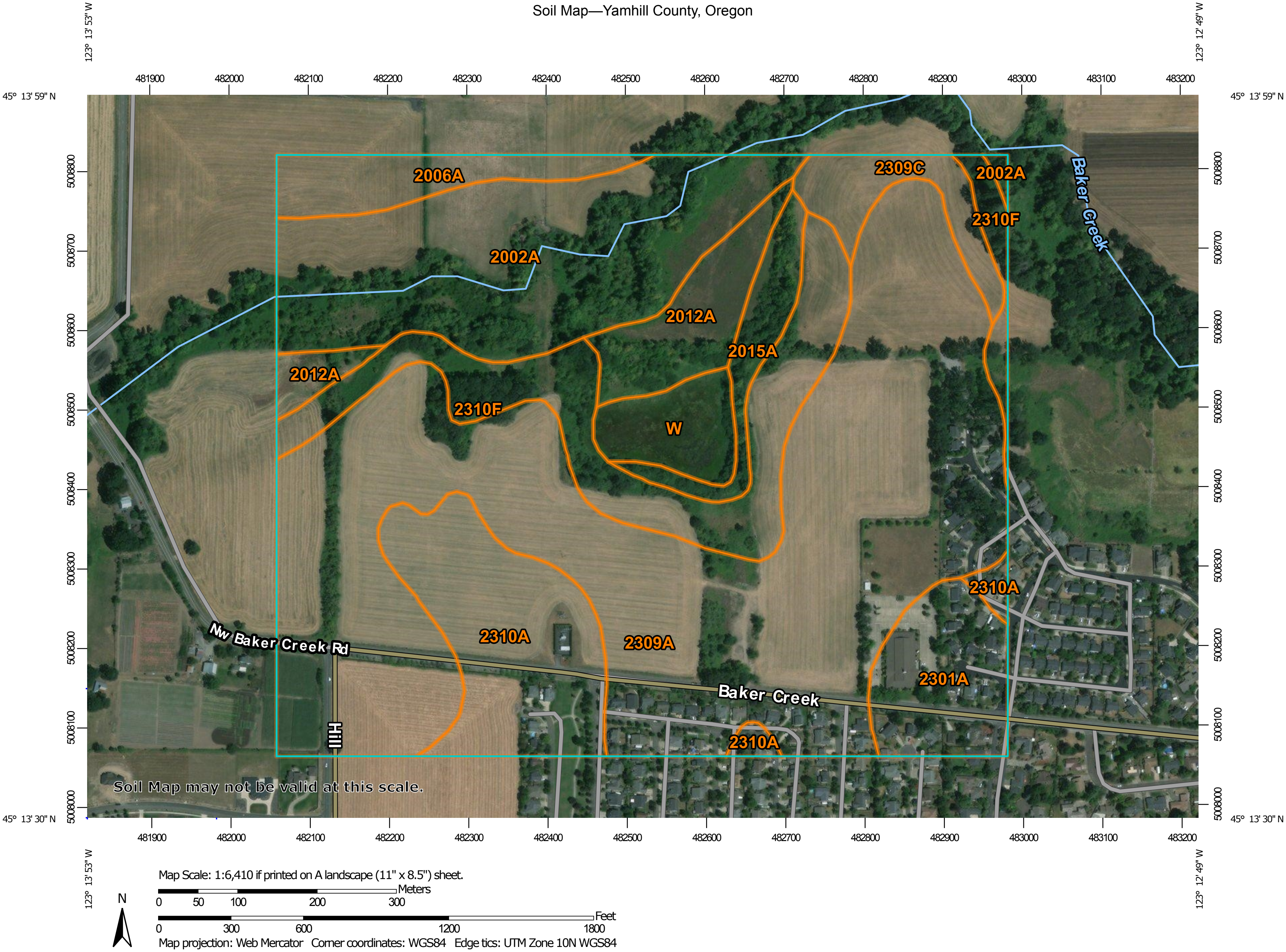
Flow Chart for Classifying Coarse-Grained Soils (More Than 50% Retained on No. 200 Sieve)



Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)

SITE RESEARCH

Soil Map—Yamhill County, Oregon



Map Scale: 1:6,410 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yamhill County, Oregon
Survey Area Data: Version 4, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 16, 2015—Feb 12, 2017

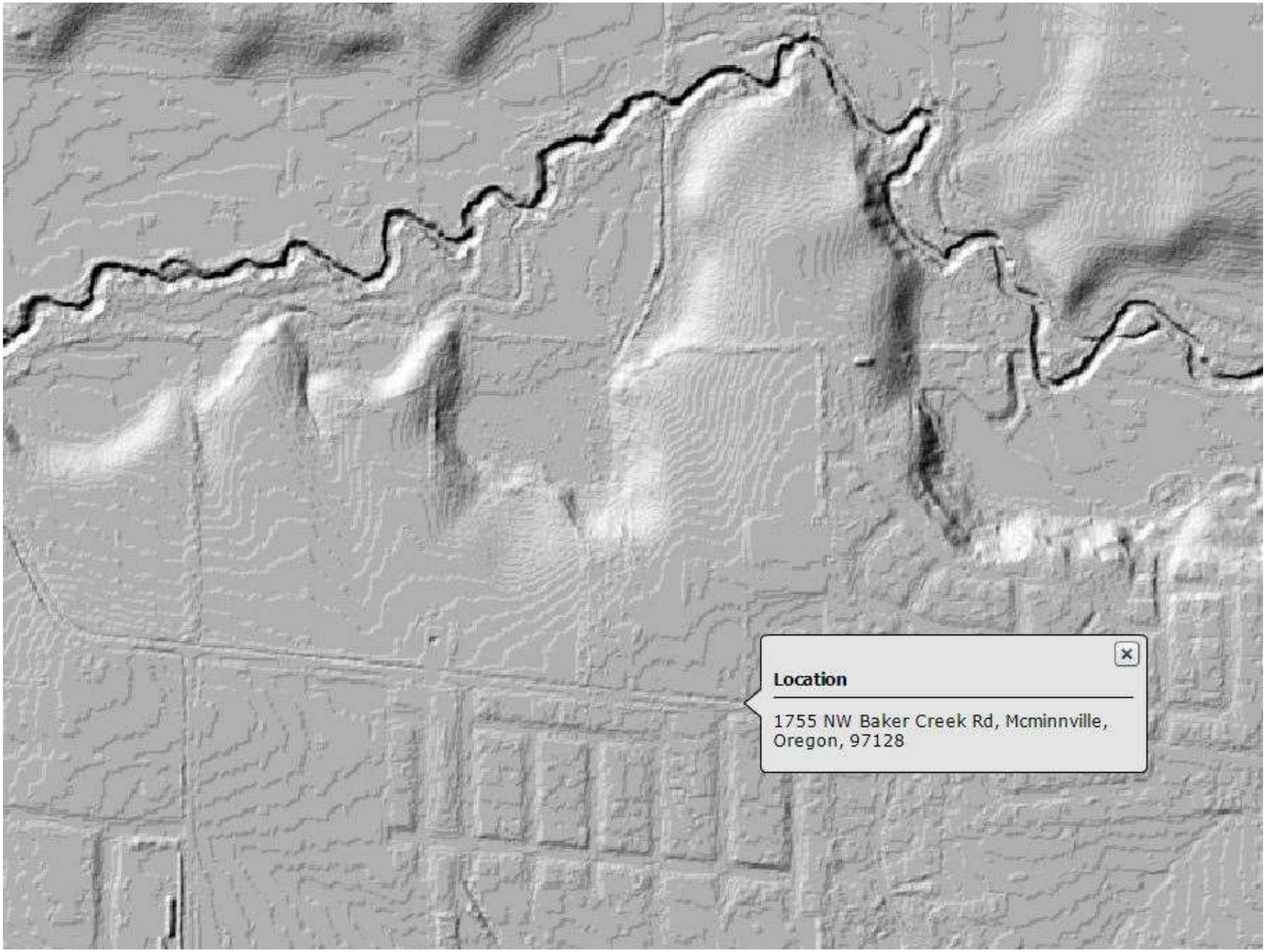
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Yamhill County, Oregon (OR071)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2002A	Chehalis silty clay loam, 0 to 3 percent slopes	27.8	16.0%
2006A	McBee silty clay loam, 0 to 3 percent slopes	5.5	3.2%
2012A	Waldo silty clay loam, 0 to 3 percent slopes	7.8	4.5%
2015A	Cove silty clay loam, flooded, 0 to 3 percent slopes	4.2	2.4%
2301A	Amity silt loam, 0 to 3 percent slopes	8.1	4.7%
2309A	Willamette silt loam, 0 to 3 percent slopes	76.9	44.4%
2309C	Willamette silt loam, 3 to 12 percent slopes	4.6	2.7%
2310A	Woodburn silt loam, 0 to 3 percent slopes	15.8	9.1%
2310F	Woodburn silt loam, 20 to 55 percent slopes	17.9	10.4%
W	Water	4.5	2.6%
Totals for Area of Interest		**173.2**	**100.0%**

Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: Statewide Geohazards Viewer
Landslide Hazard Mapping; www.oregongeology.org/hazvu

Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: Statewide Geohazards Viewer
LIDAR Mapping; www.oregongeology.org/hazvu



GeoPacific Engineering, Inc. Project No. 17-4694, Baker Creek North Subdivision, 1755 NW Baker Creek Road, McMinnville, Oregon 97128

Design Maps Summary Report

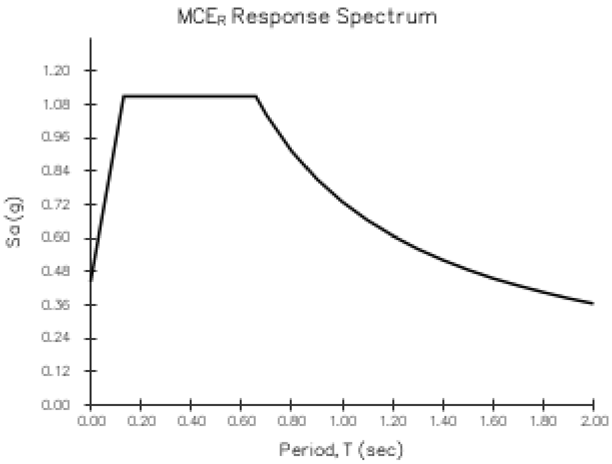
User–Specified Input

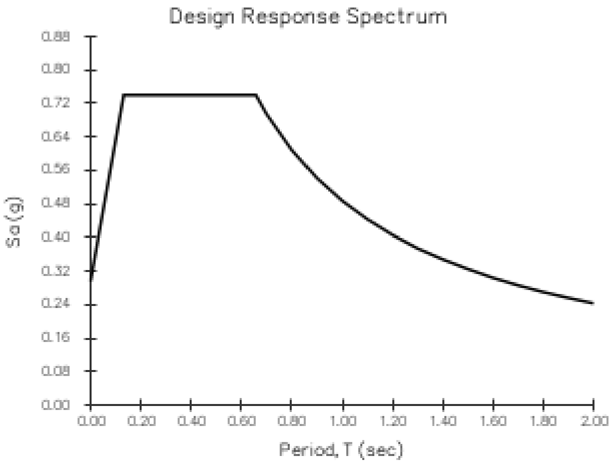
Report Title	17-4694, Baker Creek North Subdivision Fri September 22, 2017 19:22:19 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	45.22881°N, 123.22156°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S =	1.014 g	S_{MS} =	1.110 g	S_{DS} =	0.740 g
S_1 =	0.481 g	S_{M1} =	0.730 g	S_{D1} =	0.487 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA$_M$, T$_L$, C$_{RS}$, and C$_{R1}$ values, please view the detailed report.

Design Maps Detailed Report

ASCE 7-10 Standard (45.22881°N, 123.22156°W)

Site Class D – “Stiff Soil”, Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 1.014 g
From Figure 22-2 [2]	S_1 = 0.481 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.014 g, F_a = 1.094

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.481 g, F_v = 1.519

Equation (11.4–1): $S_{MS} = F_aS_S = 1.094 \times 1.014 = 1.110$ g

Equation (11.4–2): $S_{M1} = F_vS_1 = 1.519 \times 0.481 = 0.730$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

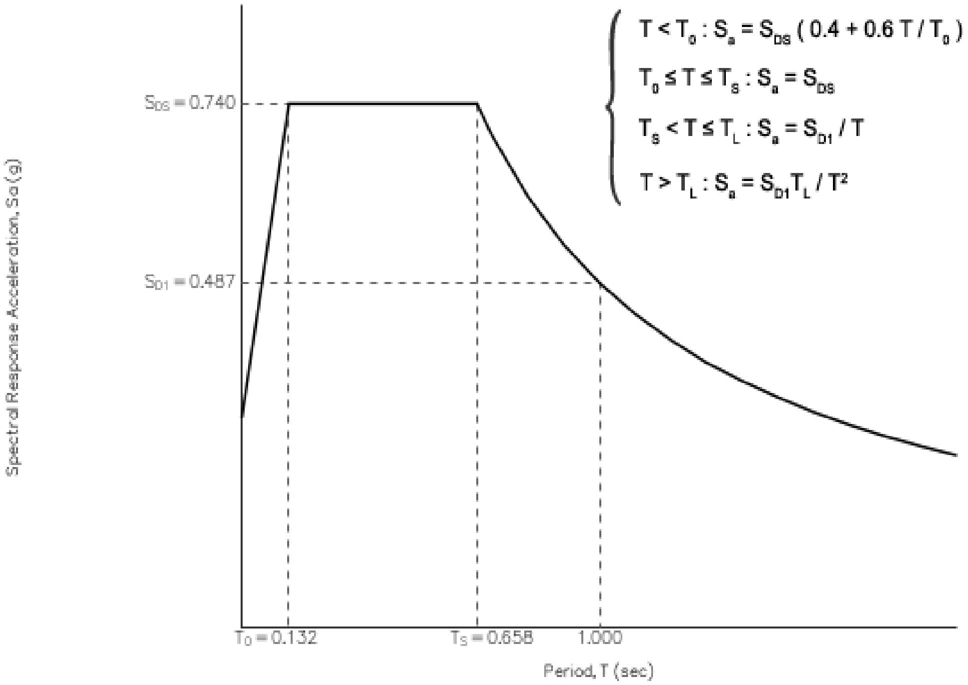
Equation (11.4–3): $S_{DS} = ⅔\, S_{MS} = ⅔ \times 1.110 = 0.740$ g

Equation (11.4–4): $S_{D1} = ⅔\, S_{M1} = ⅔ \times 0.730 = 0.487$ g

Section 11.4.5 — Design Response Spectrum

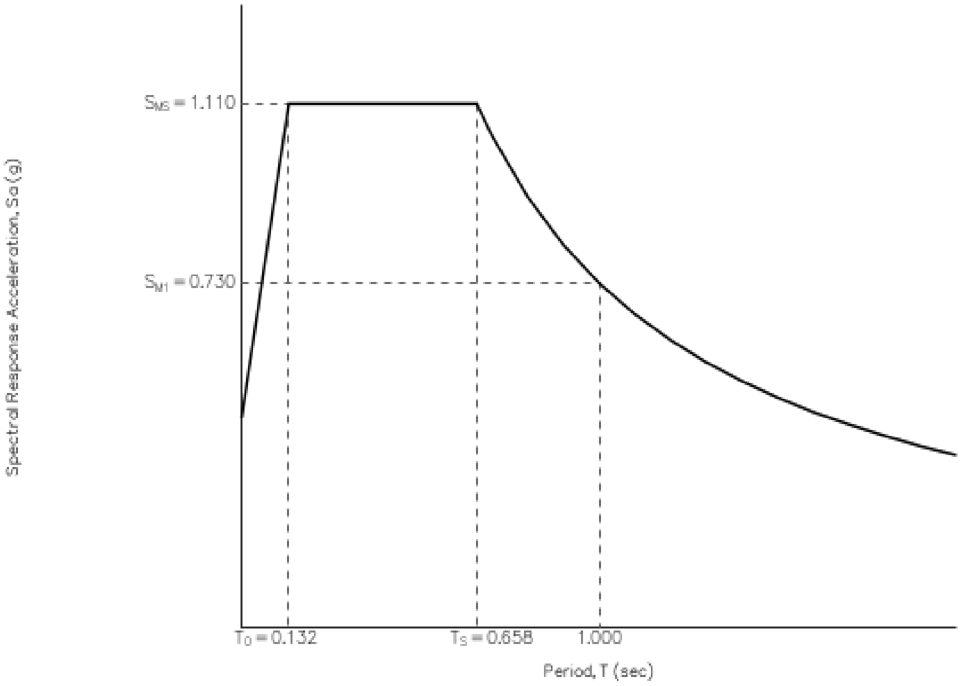
From Figure 22-12 [3] $T_L = 16$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.467

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.033 \times 0.467 = 0.482$ g

---

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.467 g, F_{PGA} = 1.033

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] $C_{RS} = 0.879$

From Figure 22-18 [6] $C_{R1} = 0.851$

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	**III**	**IV**
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.740 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	**III**	**IV**
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.487 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ “the more severe design category in accordance with Table 11.6-1 or 11.6-2” = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

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WATER RESOURCES DEPT
SALEM, OREGON

4S/4W/18cc

Yamh
3072

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

PAGE 1

(START CARD) # 59918

(1) OWNER:

Well Number 1425

Name LLOYD A TOWN
Address PO BOX 207
City MCMINNVILLE State OR Zip 97128

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:

☒ Rotary Air ☐ Rotary Mud ☐ Cable
☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval ☐ Yes ☒ No Depth of Completed Well 128 ft.
Explosives used ☐ Yes ☒ No Type Amount

HOLE			SEAL			Amount
Diameter	From	To	Material	From	To	sacks or pounds
10	0	6	BENTONITE	0	6	2 SAX
8	6	68	CEMENT	6	68	12 SAX
6	68	130				

How was seal placed: Method ☒ A ☐ ~~B~~ ~~☒ C~~ ☐ D ☐ E
A
☐ Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:					☐	☐	☐	☐
	6	+2	68	.25	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
	4	0	128	160#	☐	☒	☒	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

68

☒ Perforations Method SAW
~~☒ Screens~~ Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
88	128	6"	80			☐	☒
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
100.00		128	1 hr.

Temperature of Water 53 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:

County YAMHILL Latitude Longitude
Township 4 S N or S. Range 4 W E or W. WM.
Section 18 SW ¼ SW ¼
Tax Lot 4418CC 100 Block Subdivision
Street Address of Well (or nearest address)
11710 FOX RIDGE RD MCMINNVILLE,

(10) STATIC WATER LEVEL:

42 ft. below land surface. Date 03/31/94
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 95

From	To	Estimated Flow Rate	SWL
95	105	100	42

(12) WELL LOG:

Ground elevation

Material	From	To	SWL
TOP SOIL W/BOULDERS	0	7	
BOULDERS	7	22	
DECAYED BASALT	22	39	
LOOSE CAVING, BASALT	39	54	
DECAYED BASALT	54	62	
GRAY SHALE	62	95	
DICED SHALE	95	105	42
GRAY SHALE	105	130	
DAVE PAYSINGER			
BLUE WATER DRILLING CO.			
DAYTON, OR. 97114			

Date started 03/21/94 Completed 03/31/94

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number
Signed Date

(bonded) Water Well Constructor Certification:

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

WWC Number 1438
Signed David G. Paysinger Date 03/31/94

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 10/91

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PHOTOGRAPHIC LOG

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Eastern Portion of Site, Facing South

Eastern Portion of Site, Facing Northeast

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Test Pit TP-1, Eastern Portion of Site Facing North

Test Pit TP-1

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Facing South, Looking Upwards from Wetland Area in North-Central Portion of Site

Facing North, Looking Down at Wetland Area and Sloping Ground, North-Central

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Test Pit TP-2, North-Central Portion of Site, in Wetland Area

Test Pit TP-2

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Test Pit TP-5, Facing Northwest, Looking at Western Portion of Site

Test Pit TP-5

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Facing West, Western Portion of Site

Facing South, East-Facing Slope Along Northwestern Edge of Site

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Test Pit TP-8, Facing South

Test Pit TP-8

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Facing North, Test Pit TP-9

Test Pit TP-9

BAKER CREEK NORTH SUBDIVISION
GEOTECHNICAL SITE INVESTIGATION
PHOTOGRAPHIC LOG

Test Pit TP-15, Facing South

Test Pit TP-15