GEOTECHNICAL ENGINEERING REPORT
PROPOSED DEVELOPMENT – PROSE FIRCREST
2119 MILDRED STREET WEST
FIRCREST, WASHINGTON

Project No. 21-529

December 14, 2022

Prepared for:

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December 14, 2022
File No. 21-529

Garrett Hodgins
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Subject: **Geotechnical Engineering Report**
Proposed Development – Prose Fircrest
2119 Mildred Street West, Fircrest, Washington

Dear Garrett:

As requested, PanGEO, Inc. completed a geotechnical engineering study to assist you and your project team with the design and construction of the proposed development in Fircrest, Washington. PanGEO previously prepared a draft geotechnical report dated July 19, 2022. The following report is consistent with our draft report, but includes additional recommendations that have been provided to the project team since the draft report was issued.

In summary, the site is underlain by as much as about 35 feet of undocumented fill soil over dense to very dense native silty sand with gravel (glacial till). The fill soils are generally loose, and will not provide adequate support for the proposed structures. In our opinion, where more than about five feet of loose fill is present, such as within the eastern half of the site, a feasible foundation system consists of supporting the structures on a shallow foundation bearing on ground improved with aggregate piers. Along the west side of the site, where the fill is generally less than five feet thick, we anticipate that the building footings could be deepened to reach the native soils, or the unsuitable fill soils can be over-excavated and replaced with lean-mix concrete or structural fill. Ground improvement may also be used below the buildings along the west side of the site to reduce earthwork quantities associated with over-excavation and backfill.

The re-use of on-site fill soils may be possible below proposed landscaping or pavement areas during periods of dry weather, but will be difficult or impossible to re-use during periods of wet weather. The on-site soils may be amended with cement to allow their re-use during wet times of the year.

We appreciate the opportunity to work with you on this project. Please do not hesitate to contact us with any questions.

Sincerely,

Jon C. Rehkopf, P.E.
Principal Geotechnical Engineer
(JRehkopf@pangeoinc.com)

Encl.: Geotechnical Engineering Report

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1.0 INTRODUCTION

This report presents the results of our geotechnical engineering study that was undertaken to support the design and construction of the proposed Prose Fircrest development along Mildred Street West in Fircrest, Washington. Our study was performed in general accordance with our mutually agreed scope of work as outlined in our consulting agreement for the project dated November 19, 2021.

Our service scope included reviewing readily available geologic data at the project site which included the results of two previous geotechnical studies that were conducted for the project site, conducting a site reconnaissance, and conducting engineering analyses to develop the geotechnical recommendations outlined in this report. PanGEO will finalize this report once we receive comments from the project team, and the design concept has been finalized.

2.0 SITE AND PROJECT DESCRIPTION

The subject site consists of a generally square-shaped parcel located at 2119 Mildred Street West, in Fircrest, Washington, as depicted in Figure 1. The site has an area of about 9½ acres, and is currently developed with a one-story structure in the northwest portion of the site. The remainder of the site is undeveloped, but has received a significant amount of undocumented fill soils.

The western approximately two-thirds of the site is generally flat, with an elevation around 335 feet to 340 feet (NGVD 1929) with a gentle slope down to the east, while the remainder of the site slopes steeper down to the east to the eastern property line which has an elevation of about 315 feet (NGVD 1929).

An aerial photo of the project site depicting site features is shown in the attached Figure 2, *Site and Existing Exploration Plan*. Plates 1 and 2 on the following page depict current site conditions.

Plate 1. *Looking northeast from Mildred Street West at the existing structure located along the west side of the subject property.*

Plate 2. *Looking north along eastern portion of site, from near the center of site. Note the sloping topography down to the east.*

The current development plan consists of the construction of four primary structures that will be surrounded with open spaces and at-grade surface parking lots and drive lanes. The western two structures (Buildings A and B) will consist of five levels of timber-frame construction, and will be located along Mildred Street West. Buildings A and B will be at-grade structures without basements. We understand that the finished floor elevation of Building A will be around elevation 341.75 feet, and the finished floor elevation for Building B will be around elevation 340.25 feet.

The two eastern structures, designated Building C and D, will contain underground parking in a daylight basement along the east side of the structure. We understand Buildings C and D will contain four above-grade levels, with one concrete deck and timber framing above. Buildings C and D will have a basement finished floor elevation of about 325 feet.

A large stormwater detention vault that will service the majority of the site will be located below the basement floor of Building C, and will have a bottom elevation around 303 feet.

A site retaining wall up to about 12-feet tall will be needed along the eastern property line to allow for the change in grade between the proposed eastern parking lot and the existing ground surface along the eastern property line.

The currently proposed site plan is shown on the following page depicting the proposed buildings and site features.

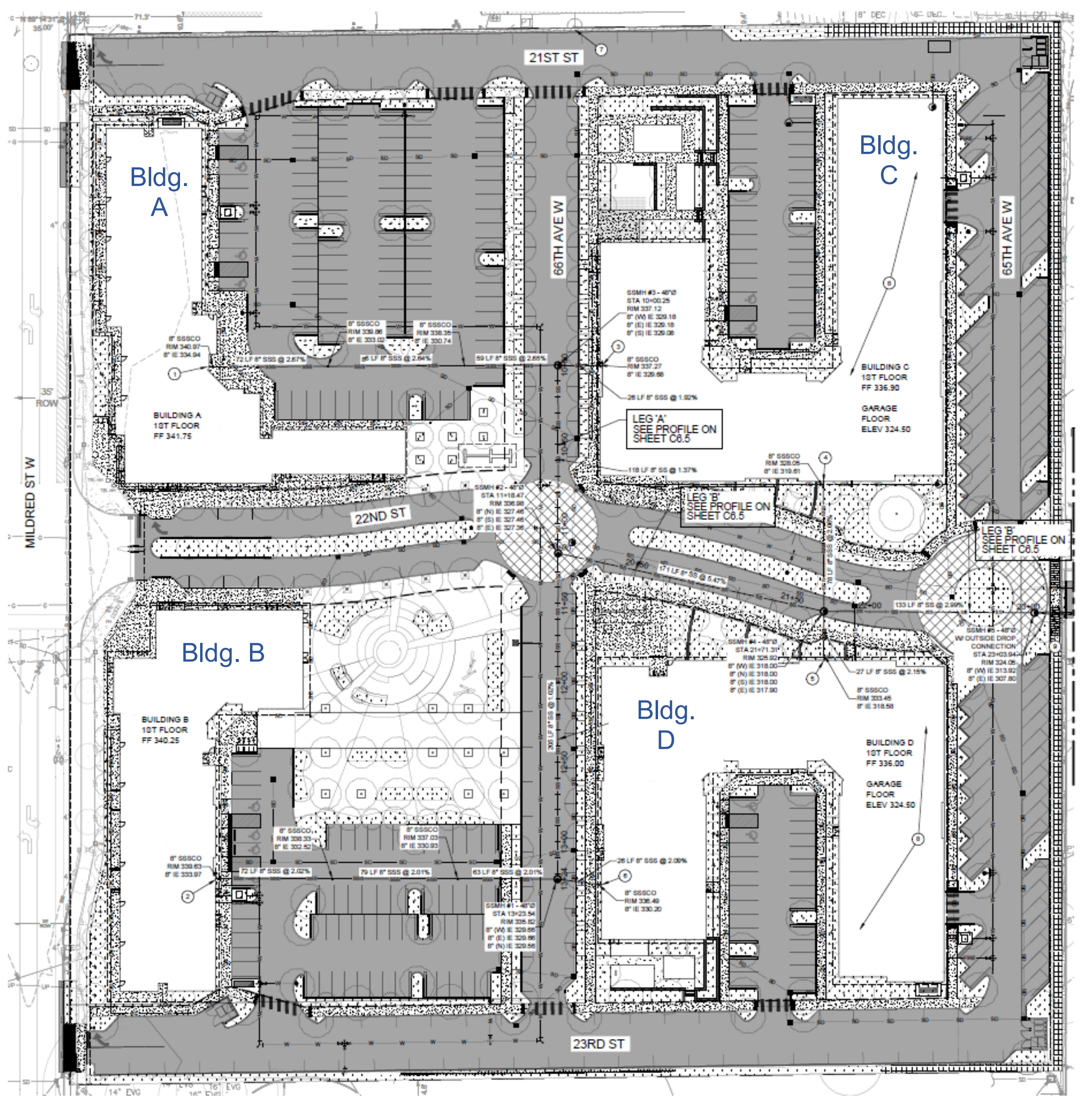

Plate 3. *Proposed site plan modified from Sheet C7.0 prepared by DCG, 12/12/2022. (North is to the top of the plan)*

3.0 SUBSURFACE EXPLORATIONS

In preparing this report we reviewed two previously completed geotechnical studies performed at the site. The previous studies included drilling over sixty test borings at the site. The existing geotechnical information reviewed included the following:

- Final geotechnical report prepared by Kleinfelder (2005) for the subject site that included 56 test borings spaced relatively equally across the site. The report also included laboratory tests of representative soil samples; and

- Preliminary geotechnical report prepared by Terracon (2008) for the subject site that included 9 test borings generally located in the northern half of the subject site.

The approximate locations of the previous explorations are presented in Figures 2 and 3 of this report, and the summary logs are included in Appendix A and B.

Laboratory Testing - The results of previous laboratory tests can be found in Appendix A.

4.0 SUBSURFACE CONDITIONS

4.1 GEOLOGY

Based on a review of the geologic map of the project area (Schuster et. al. 2015), the site is underlain by deposits of the Vashon Stade of the Fraser Glaciation including recessional outwash soils (map unit Qgo). Recessional outwash is described as silt, clay, sand and gravel deposited by glacial meltwater, variable sorted, loose to compact, massive to well stratified, with horizontal to steeply dipping beds. Vashon glacial till (map unit Qgt) is also mapped in close proximity to the north, west and south side of the project site. Vashon glacial till typically consists of an over-consolidated heterogeneous mixture of sand, silt and gravel deposited directly below the glacial ice sheet during the Vashon Stade of the Fraser Glaciation. Glacial till typically exhibits low compressibility and high strength characteristics.

4.2 SOIL

Based on the results of previous explorations at the site, the site soils consist of a thin to thick layer of generally loose undocumented fill over dense glacial till. The subsurface conditions encountered in the explorations differed slightly from the mapped geology in that glacial till was not mapped directly on the subject property.

The site subsurface conditions are summarized below, and logs of the subsurface explorations at the site are included in Appendix A and B. In addition, the attached Figure 3 shows the anticipated elevation of the native glacial till soils across the site, and Figures 4 and 5 include subsurface profiles across the site depicting the anticipated depth of the fill soils and elevation of the native glacial till.

Unit 1: Undocumented Fill – The site is underlain by undocumented fill soils that range in thickness from only about 2 to 5 feet thick along the western side of the site, to up to about 35 feet deep within the eastern portion of the site. Based on our review of the test borings logs, the fill material consists of a mixture of silty sand, sandy silt and silt with various amounts of gravel and debris such as concrete fragments, bricks, wood, organics, and other deleterious materials. The density of the fill is generally very loose to medium dense.

Unit 2: Glacial Till – Underlying the fill soil is a dense to very dense silty sand with varying amounts of gravel that was interpreted to be glacial till. The very dense glacial till was encountered to the termination depth of the test borings. Cobbles and boulders are common in glacial till deposits, as are pockets of clean sand and gravel.

4.3 GROUNDWATER

Significant groundwater was not encountered in the previous test borings. Occasionally perched groundwater was noted in the fill soils, on-top of the dense glacial till soils, or within sandy or gravely zones of the native glacial till. It should be noted that groundwater depths are likely to vary depending on seasonal precipitation, local subsurface conditions, and other factors. Groundwater levels and seepage rates are normally highest during the winter and early spring.

5.0 SEISMIC CONSIDERATIONS

5.1 SEISMIC DESIGN PARAMETERS

The seismic design of the building will be accomplished in accordance with the 2018 International Building Code (IBC). Based on the results of the previous subsurface explorations, as well as our understanding of the geology of the area, we anticipate that a Site Class C would be appropriate for Buildings A and B located on the west side of the subject site. Due to the thick fill soils on the eastern portion of the site, we recommend a Site Class D (stiff soil) would be appropriate for Buildings C and D.

5.2 SOIL LIQUEFACTION POTENTIAL

Liquefaction occurs when saturated sands are subjected to cyclic loading, which causes the pore water pressure to increase in the soils thereby reducing the inter-granular stresses. As the inter-granular stresses are reduced, the shearing resistance between soil particles decreases. If pore pressures develop to the point where the effective stresses acting between the grains become zero, the soil particles will be in suspension and behave like a viscous fluid. Typically loose, saturated, granular soils such as sand and silt, that have a low enough permeability to prevent drainage during cyclic loading, have the greatest potential for liquefaction, while more dense soil deposits with higher silt or clay contents have a lesser potential. Soil liquefaction may cause the temporary loss/reduction of foundation capacity and settlement.

Due to the dense to very dense soils underlying the site, and the lack of groundwater at shallow depths, in our opinion the risk of soil liquefaction is low, and special design considerations for soil liquefaction are not required for the proposed project

6.0 GEOTECHNICAL RECOMMENDATIONS

6.1 BUILDINGS A & B

We understand the proposed first floors for buildings A and B will be near existing grade. Based on the results of the test borings at the site and our understanding of the current building layout, we anticipate that dense native soils will be present at or within about 2 to 5 feet of existing grade over the majority of the building footprint, but could be as deep as 8 to 10 feet in some areas. Figure 3 depicts the anticipated elevation of the glacial till bearing soils at the site. If the glacial till is not present at the design footing subgrade elevation, the footings can either be deepened to bear on the dense native soils, or the undocumented fill can be over-excavated and replaced with lean-mix concrete or properly compacted structural fill. The over-excavation would need to only occur below the footings, and the lean-mix backfill would need to extend about 6-inches wider than the proposed footings. Alternatively, ground improvement can be used, such as rammed aggregate piers, as described below for Buildings C and D.

6.1.1 Allowable Bearing Pressure

We recommend that the footings bearing on native, undisturbed dense to very dense glacial till be designed for a maximum allowable bearing pressure of 6,000 psf. If footings are supported on structural fill placed over dense, undisturbed glacial till, the structural fill should consist of lean-mix concrete (minimum 1½ sack mix). If compacted granular structural fill is placed below the footings, a reduced allowable bearing pressure of 4,000 psf should be used for design. The granular structural fill should extend wider than the footings by a horizontal distance equal to half of the over-excavation depth. For allowable stress design, the recommended allowable bearing pressure may be increased by 1/3 for transient conditions such as wind and seismic loadings.

If some or all of the building footings or mat slab will bear on ground improved with rammed aggregate piers, the bearing pressure will be determined by the ground improvement designer, as described below for Buildings C & D.

All footings should have a minimum width of 24 inches. Exterior foundation elements should be placed at a minimum depth of 18 inches below final exterior grade. Interior spread foundations should be placed at a minimum depth of 12 inches below the top of slab.

6.1.2 Foundation Performance

Total and differential settlements are anticipated to be within tolerable limits for footings designed and constructed as discussed above. Footing settlement under static loading conditions is estimated to be less than approximately 1 inch, and differential settlement between adjacent columns should be less than about ½ inch. Most settlement will occur during construction as loads are applied.

6.1.3 Lateral Resistance

Lateral forces from wind or seismic loading may be resisted by the combination of passive earth pressures acting against the embedded portions of the foundations and by friction acting on the base of the foundations. Passive resistance values may be determined using an equivalent fluid weight of 300 pounds per cubic foot (pcf). This value includes a factor of safety of at least 1.5 assuming that properly compacted structural fill will be placed adjacent to the sides of the footings. A coefficient of friction of 0.35 may be used to determine the frictional resistance at the base of the footings. This coefficient includes a factor of safety of approximately 1.5.

6.1.4 Footing Construction Considerations

All footing subgrades should be carefully prepared. Any loose soil should be removed from the footing excavations or re-compacted. Footing subgrades should be observed by PanGEO to confirm that the exposed footing subgrade is consistent with the expected conditions and adequate to support the design bearing pressure.

6.1.5 Subgrade Protection

The contractor should be aware that the site soils are highly sensitive to moisture, and will become disturbed and soft when exposed to inclement weather conditions. As a result, depending on the groundwater and weather conditions at the time of footing construction, and the actual soil conditions encountered, it may be necessary to place 2 to 4 inches of clean crushed rock or lean-mix concrete (1½ sack) on the exposed footing subgrade to protect it against moisture and disturbance.

If groundwater seepage is encountered, the contractor should be prepared to dewater the footing excavations using sumps and pumps to allow for proper subgrade preparation. In addition, the contractor should consider proper sequencing of earthwork activities during wet weather to minimize moisture exposure of footing and floor subgrade soils.

6.1.6 Slab On Grade

Conventional slab on grade construction may be used for the floor slabs. Due to the potential for up to 4 or 5 feet of loose undocumented fill below the floor slab, to increase the performance of the floor slab, and reduce the potential for cracking, we recommend that a minimum of 2 feet of undocumented fill be removed and replaced with properly compacted structural fill. Prior to re-compaction, any existing loose soil in the over-excavation should be compacted to a firm and unyielding condition. Based on the subgrade preparation recommended above, the floor slab design may be accomplished using a modulus of subgrade reaction of 150 pci.

We recommend that the slab on grade be constructed on a minimum 4-inch thick capillary break placed on the undisturbed native soil or properly compacted structural fill over native soil. The capillary break should have no more than 10 percent passing the No. 40 sieve and less than 2 percent by weight of the material passing the U.S. Standard No. 200 sieve. If portions of the basement floor will house any equipment or facilities that are sensitive to moisture, we recommend that a minimum 10-mil polyethylene vapor barrier be placed below the subject portions of the slab.

6.2 BUILDINGS C & D

We understand the proposed garage floors for buildings C and D will be around elevation 325 feet, and the first floors of the buildings will be around elevation 336 and 337 feet. Based on the results of the test borings at the site, we anticipate that from about 15 to 25 feet of undocumented fill will be present below the proposed structures. One exception is below the proposed detention vault under building C, which may likely reach bearing soils without the need for ground improvement. Due to the loose and variable nature of the fill soils, the fill will not be suitable to support the proposed structures due to the potential for long-term settlement.

In our opinion a feasible foundation support option from a geotechnical standpoint is to install aggregate piers to improve the bearing capacity of the existing fill soils, and to reduce the potential for settlement to a tolerable level. Conventual shallow foundations could then be constructed over the improved ground.

Another option consisting of a deep foundation, such as augercast or driven piles, was considered; however, in our opinion piles would not be as cost-effective as ground improvement using aggregate piers.

6.2.1 Ground Improvement with Aggregate Piers

In our opinion, a feasible soil improvement technique consists of improving the loose to medium dense undocumented fill consisting of sand, silty sand and silt below the proposed structure with aggregate piers. Aggregate piers consist of compacting columns of well-graded crushed rock to increase the bearing capacity of poor soils, and to reduce settlements.

Because specialty contractors install aggregate piers using a proprietary system, the contractor determines the lengths and spacing of piers, the allowable soil bearing pressure of the improved soil, improved soil characteristics and anticipated settlements. Specifically, the specialty contractor is responsible for the ground improvement design, and will provide design drawings and calculations stamped by a registered professional engineer.

We anticipate that the aggregate piers would need to extend through the undocumented fill to reach the undisturbed native soils approximately 15 to 25 feet below the proposed structures. The actual depth of ground improvements should be determined by the design-build contractor to meet the project specifications.

6.2.2 Shallow Foundation

In our opinion it would be feasible to support the new structure on conventional spread and strip footings bearing on closely spaced ground improvement elements or on a mat slab. We anticipate that the ground improvement can be designed to provide an allowable bearing capacity in the range of 4 to 6 ksf, depending on the spacing of aggregate piers. A discussion with the design-build contractor is recommended before selecting the allowable bearing pressure to size the footings or design the mat slab.

6.2.3 Lateral Resistance

Lateral forces from wind or seismic loading may be resisted by a combination of passive earth pressures acting against the embedded portions of the foundation, and by friction acting on the base of the foundation. Passive resistance values may be determined using an equivalent fluid weight of 300 pounds per cubic foot (pcf). This value includes a factor of safety of at least 1.5 assuming that properly compacted structural fill will be placed adjacent to the sides of the foundation, and level ground surface adjacent to the footings.

A friction coefficient of 0.4 may be used to determine the frictional resistance at the base of the foundation on improved ground. This coefficient includes a factor of safety of approximate 1.5.

6.2.4 Slab on Grade

The thick layer of loose undocumented fill below the basement floor slabs has the potential to settle and cause cracking of the floors. As such, to increase the performance of the floor slabs and reduce the potential for settlement, we recommend that ground improvement elements be installed below the floor slab to provide adequate support for the slab on grade. Ground improvement elements to support a floor slab are typically much more widely spaced than ground improvement elements below footings.

We recommend that the slab on grade be constructed on a minimum 4-inch thick capillary break placed on the undisturbed native soil or properly compacted structural fill over native soil. The capillary break should have no more than 10 percent passing the No. 40 sieve and less than 2 percent by weight of the material passing the U.S. Standard No. 200 sieve. If portions of the basement floor will house any equipment or facilities that are sensitive to moisture, we recommend that a minimum 10-mil polyethylene vapor barrier be placed below the subject portions of the slab.

6.3 BASEMENT WALLS

Presented below are our geotechnical recommendations for the design and construction of the proposed basement walls.

6.3.1 Lateral Earth Pressures

The basement walls braced against rotation may be designed for an earth pressure based upon an equivalent fluid weight of 50 pcf (at-rest condition). For the seismic condition, we recommend including an incremental uniform lateral earth pressure of 10H psf (where H is the height of the below grade portion of the wall) as an ultimate seismic load. The recommended lateral pressures assume that the backfill behind the wall consists of a free draining and properly compacted fill with adequate drainage provisions to prevent the development of hydrostatic pressure.

***Buried Structures (Elevator Pits, Detention Vaults, etc.)* -** There is potential for groundwater to accumulate next to buried structures such as elevator pits and detention vaults. If it is not feasible to incorporate footing drains for elevator pits, detention vaults, etc., we recommend that an equivalent fluid weight of 90 pcf be applied for wall design. The recommended 90 pcf includes both the soil pressure and the effects of hydrostatic pressure. Buoyancy force should also be considered in the design of these structures where drainage provisions are not present.

6.3.2 Wall Surcharge

The basement walls should be designed to accommodate traffic surcharge pressures if the traffic load is located within the height dimension of the wall. As minimum, the traffic surcharge should be considered to be a 75 psf uniform horizontal pressure for roadway traffic, and 25 psf if the traffic is limited to lightweight passenger vehicles. Similarly, surcharge loads from construction equipment or soil/material stockpiles should be considered in the basement wall design.

6.3.3 Lateral Resistance

Please see Sections 6.1.3 and 6.2.3 above for a discussion of lateral resistance.

6.3.4 Wall Drainage/Damp Proofing

We recommend that provisions for permanent control of subsurface water be incorporated into the design and construction of the basement walls. Prefabricated drainage mats, such as Mirafi 6000 or equivalent, may be installed behind the basement walls. For backfilled walls, a footing drain consisting of a 4-inch diameter perforated PVC pipe embedded in at least 12 inches of washed gravel wrapped with a geotextile fabric should be placed at the base of the wall footings.

Waterproofing considerations are beyond our scope of work. We recommend that a building envelope specialist be consulted to determine appropriate damp-proofing or water-proofing measures.

6.3.5 Wall Backfill

Where wall backfill will be needed, free draining granular soils such as Gravel Borrow (Section 9-03.14(1) WSDOT) are recommended. We do not recommend using the onsite soils for wall backfill due to its relatively high fines content.

Wall backfill should be moisture conditioned to near its optimum moisture content, placed in loose, horizontal lifts less than 8 to 12 inches in thickness, and systematically compacted to a dense and relatively unyielding condition. If density tests will be performed, the test results should indicate at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557. Within 5 feet of the wall, the backfill should be compacted to at least 90 percent of the maximum dry density.

6.4 SUBSURFACE DRAINAGE PROVISIONS

Footing drains should be installed around the perimeter of the buildings, at or just below the invert of the foundation. The footing drains should consist of a 4-inch diameter perforated drainpipe placed behind and at the base of the footings, embedded in 12 to 18 inches of clean crushed rock or pea gravel wrapped with a layer of filter fabric.

Under no circumstances should roof downspout drain lines be connected to the footing drain systems. Roof downspouts must be separately tightlined to appropriate discharge locations. Cleanouts should be installed at strategic locations to allow for periodic maintenance of the footing drain and downspout tightline systems.

6.5 PERMANENT DRAINAGE & INFILTRATION CONSIDERATIONS

Permanent control of surface water and roof runoff should be incorporated in the final grading design. In addition to these sources, irrigation and rain water infiltrating into landscaped and planter areas adjacent to paved areas or building foundations should also be controlled. All collected runoff should be directed into conduits that carry the water away from the pavement or structure and into storm drain systems or other appropriate outlets. Adequate surface gradients should be incorporated into the grading design such that surface runoff is directed away from structures.

Based on the presence of undocumented fill over dense to very dense glacial till, in our opinion infiltration is not feasible for the project.

6.6 PAVEMENT DESIGN & CONSIDERATIONS

We understand that asphalt paved parking lots and drive lanes will be constructed around the proposed buildings. Assuming the pavement will generally be used by light passenger cars and trucks, as a minimum, we recommend that the pavement section consist of 3-inches HMA, overlying a 6-inch thick layer of crushed surfacing base course (CSBC), overlying properly compacted structural fill. For pavement areas that will receive regular loading of heavy trucks, including delivery trucks or garbage trucks, we recommend a heavier pavement section consisting of a minimum of 4 inches of HMA over 6-inches of

CSBC. As a pavement alternative, the layer of crushed rock maybe substituted for a minimum 12-inch thick layer of cement treated base, as described in the *Section 6.6.2* below. If ATB (Asphalt Treated Base) is to be used as a temporary pavement during construction, and then incorporated into the final pavement design, the bottom one inch of HMA may be replaced with 2 inches of ATB. Alternatively, half of the HMA pavement section could be placed early in the project for construction access. Prior to final paving, any areas of pavement that have become destressed from construction traffic will need to be locally repaired.

It should be noted that actual pavement performance will depend on a number of factors, including the actual traffic loading conditions. The recommended pavement section will need to be revised if the traffic level will be more or less than our assumed value.

6.6.1 Pavement Subgrade Preparation

Following the stripping operation and excavations necessary to achieve construction subgrade elevations, the ground surface where structural fill, or pavements are to be placed should be observed by PanGEO. Proof-rolling should be performed to identify soft or unstable areas. Proof-rolling should be performed using a full loaded, tandem-axle dump truck with a minimum gross weight of 20 tons. Other equipment can be used, provided the subgrade loading is equivalent. The dump truck should make several overlapping passes in perpendicular directions over a given area. Soft or yielding areas identified during proof-rolling should be moisture conditioned as needed and re-compacted in place.

If soft areas are still yielding after re-compaction, they should be over-excavated and replaced with structural fill to a depth that will provide a stable pavement base. The optional use of a geotextile subgrade stabilization fabric, such as Mirafi 600X, or an equivalent product placed directly on the over-excavated surface may help to bridge excessively unstable areas. Over-excavated areas should be and backfilled with 1¼-inch Crushed Surfacing Base Course, or WSDOT gravel borrow to the requirements of structural fill. The subgrade preparation should be observed by PanGEO to verify the adequacy of the prepared subgrade.

Both the structural fill and crushed rock base should be compacted to a minimum of 95% of the materials maximum dry density (Modified Proctor ASTM D-1557). Any soft or loose areas of subgrade soils should be re-compacted or over-excavated prior to structural fill placement.

6.6.2 Cement Treated Base

Cement Treated Base (CTB) is a mixture of aggregate material and/or soils combined with a pre-determined amount of cement and water, which hardens after placement and compaction. After sufficient hardening, a tack coat and HMA wearing course is placed over the CTB to complete the pavement structure. For this project, the existing fill soils should be suitable for cement treatment. The existing soils will be mixed with a pre-determined quantity of cement and water and then compacted. Conventional rollers are used to compact the CTB mixture immediately after the mixing is completed. CTB can be an economical option as it eliminates the need to import base course and can reduce or eliminate the need to export the on-site soils.

If CTB is used for the pavement section, we recommend at least 3 inches of HMA over 12 inches of CTB. We recommend 5% cement by weight be mixed with the fill soil. Assuming a fill soil unit weight of about 125 pcf, a minimum of 6¼ pounds of Type 1 Portland cement should be added to the soil mixture per square foot of 12-inch thick CTB layer. Type 3 cement is also acceptable, however, because Type 3 cement hydrates faster, we suggest Type 1 cement be used so more time is available to properly compact the CTB. We typically do not recommend a layer of crushed rock between the HMA and CTB due to the potential risk of water becoming trapped in the gravel layer.

In our opinion it would be acceptable to reuse the existing asphalt at the site in the cement treated soils. If the asphalt pavement is pulverized for re-use in the CTB construction, we recommend that at least 95% passes a 2-inch sieve, and at least 55% passes a No. 4 sieve. No more than 50% of the final mixed materials should contain more than 50% of the existing bituminous materials. We also recommend that the final mixed materials be moisture conditioned to within 3% of its optimum moisture content (i.e. optimum moisture content before addition of cement) and be compacted to at least 95% of its maximum density as determined using ASTM D1557 (Modified Proctor).

In our opinion cement treatment would also be suitable below the footprints of building C & D to not only provide a stable working surface for the ground improvement contractor, but also to provide a firm subgrade to support the building floor slab.

6.7 SITE RETAINING WALLS

We understand that an approximately 12-foot-tall site retaining wall will be located along the eastern property line of the site, with return walls along the eastern portion of the north and south property lines. Many different wall types are feasible at this location, including MSE (Mechanically Stabilized Walls), gravity walls, cast-in-place concrete walls, or soldier pile walls. We understand that the currently proposed wall type will be an MSE wall over the majority of the wall alignment, with the exception of a concrete cast-in-place wall that will be utilized at the center of the east wall to allow for stairway construction. MSE walls can have a variety of facing elements such as precast-concrete blocks or panels, geotextile wrapped faces, or wire mesh. We understand that the proposed wall will have a modular block wall facing. We offer the following recommendations for MSE walls along the east property line of the site.

6.7.1 Ground Improvement

Based on the results of the existing test borings along the east property line, up to about 10 feet of loose undocumented fill is present below the proposed base of wall elevation. As such, we recommend that ground improvement elements, such as rammed aggregate piers, be installed below the proposed wall alignment. The ground improvement should be installed below the MSE wall facing and the reinforced backfill zone to provide adequate bearing capacity of the foundation soils, and to reduce wall settlement. We anticipated about three rows of aggregate piers may be needed below the wall. The length of the ground improvement elements should be quite short, on the order of 10 feet below the bottom of the wall.

The spacing and size of the ground improvement elements will depend on the wall design and required bearing capacity. We recommend that the ground improvement design provide a minimum allowable bearing capacity of 2,500 psf, unless the wall designer requires a higher bearing capacity, and we recommend that the ground improvement be designed for a total wall settlement of 1 inch or less, unless more settlement is acceptable to the owner. The ground improvement below the wall will also improve the global stability of the wall.

6.7.2 MSE Wall Design Recommendations

An MSE wall or SEW (Structural Earth Wall) consists of placing a reinforcing mesh onto lifts of compacted structural fill to create a reinforced earth mass that functions as the retaining structure. The face of the reinforced fill can receive a variety of treatments depending on cost and aesthetics. We understand that modular blocks, such as those manufactured by Keystone, will be utilized for this project.

We recommend the following soil parameters presented in Table 1 below be utilized for the MSE wall design:

Table 1
Design Parameters for Mechanically Stabilized Earth (MSE) Walls

Soil Properties	Reinforced Wall Backfill[1]	Retained Soil
Unit Weight (pcf)	130	125
Friction Angle (deg)	36	32
Cohesion (psf)	0	0

Notes: [1] – Wall backfill should be Gravel Borrow (WSDOT, 2022).

The following recommendations should be satisfied to provide external stability of the proposed MSE walls. We recommend that MSE walls be constructed in accordance with Section 6-13 of the Standard Specifications (WSDOT, 2022), with the following information included in the project plans.

1. The wall may be constructed near vertical, without a specified batter.
2. The wall should be placed on a level foundation in the horizontal direction perpendicular to the wall face.
3. The reinforcing length should not be less than 70 percent of the wall height, with a minimum reinforcing length of 8 feet. The recommended minimum reinforcing length may need to be increased to maintain adequate external stability based on final design configurations. Greater reinforcing lengths may be needed to provide adequate internal stability.
4. The minimum embedment of the walls should be 2 feet below adjacent finish grade, or 10% of the height of the wall, whichever is greater.

5. The uppermost reinforcing layer should be placed no lower than 2 feet below the top of wall. Welded wire faced systems should include a top mat at the top of the wall.

6. Special drainage elements, such heel drains should be considered based on the final design of the wall.

6.7.3 MSE Walls Backfill

The structural fill in the reinforced zone of the MSE wall should consist of imported granular structural fill such as WSDOT gravel borrow, or equivalent. Due to the high silt content of the on-site soils, the on-site soil should not be reused in the reinforcement zone.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 DEMOLITION, SITE STRIPPING AND GRADING

All footings and floor slabs of the existing buildings, as well as asphalt, building debris and concrete rubble should be removed from the site prior to the start of excavations or grading, unless the existing pavement will be grinded and re-used within cement treated soils. The existing subsurface explorations encountered scatted debris such as concrete and brick fragments within the undocumented fill, and such debris should be expected. Any debris uncovered in the on-site fill during grading should be separated and removed from the site.

We anticipate that topsoil and organic rich soils extend about 8 below the ground surface in the currently vegetated areas of the site. The organic material should be removed prior to placing fill for parking areas, the building pad, or to raise site grades. The organic rich soil should not be re-used in structural areas such as below pavements, the building footprint, or other structural elements. The organic rich soils may be “wasted” in landscaping areas where fill is needed, and ground settlements are not a concern.

7.2 TEMPORARY EXCAVATIONS

In general, maximum temporary excavation depths are expected to be about 10 to 15 feet for the proposed basements and stormwater vault. Temporary excavations greater than 4 feet deep should be properly sloped or shored. All temporary excavations should be performed in accordance with Part N of WAC (Washington Administrative Code) 296-155. The contractor is responsible for maintaining safe excavation slopes and/or shoring. For planning purposes, the temporary excavations may be sloped to as steep as 1H:1V (Horizontal:Vertical). The temporary cut slopes should be re-evaluated by a representative of PanGEO during construction based on actual observed soil conditions.

During periods of precipitation, the temporary cuts should be protected with plastic sheeting. If areas of seepage are encountered during construction, the slopes may need to be flattened.

We recommend that heavy construction equipment, building materials and excavated soil should not be allowed within a distance equal to ½ the slope height from the top of any excavation, or 4-foot minimum. The setback distance of heavy point loads, such as crane or pump truck outriggers, should be evaluated on a case-by-case basis.

7.3 SITE CONDITIONS AND CONSTRUCTION WORKING SURFACE

The site soils are anticipated to be highly moisture sensitive due to their high silt content, and will become disturbed when wet. As such, we anticipate that the exposed soils at the site may need to be improved during wet weather to create a working surface for construction equipment. One option to improve the stability of the site is to install a thick working surface of quarry spalls over geotextile fabric. Another option is to treat the soils with cement, as described above in *Section 6.6.2*. The proper measures needed to stabilize the subgrade will be in part depend on the actual soil conditions exposed at the bottom of the excavation, and the contractor's construction methods and sequence.

7.4 PAVEMENT SUBGRADE PREPARATION

Following the stripping operation and excavations necessary to achieve construction subgrade elevations, the ground surface where structural fill or pavements are to be placed should be observed by PanGEO. Proof-rolling should be performed to identify soft or unstable areas. Proof-rolling should be performed using a fully loaded, tandem-axle dump truck with a minimum gross weight of 20 tons. Other equipment can be used, provided the subgrade loading is equivalent. The dump truck should make several overlapping passes in perpendicular directions over a given area. Soft or yielding areas identified during proof-rolling should be moisture conditioned as needed and re-compacted in place.

If soft areas are still yielding after re-compaction, they should be over-excavated and replaced with structural fill to a depth that will provide a stable pavement base. The optional use of a geotextile subgrade stabilization fabric, such as Mirafi 600X, or an equivalent product placed directly on the over-excavated surface may help to bridge excessively unstable areas. Over-excavated areas should be and backfilled with 1¼-inch Crushed Surfacing Base Course, or WSDOT gravel borrow (WSDOT 9-03.14(1)) compacted to the requirements of structural fill. The subgrade preparation should be observed by PanGEO to verify the adequacy of the prepared subgrade.

7.5 STRUCTURAL FILL AND COMPACTION

If structural fill is needed at the site, we recommend using a granular fill material such as Gravel Borrow (WSDOT 9-03.14(1)), or other approved equivalent. Alternatively, in our opinion, the on-site material, may be re-used as structural fill below pavements and sidewalks provided that it can be adequately compacted. We do not recommend the re-use of on-site material below building footings.

Based on the relatively high fines content of the on-site soils, we anticipate that cement treatment will be needed to adequately re-use the on-site soils other than in the summer when the soils can be dried to near optimum moisture content. It should be noted that the on-site fill includes scattered debris, which should be screened from the fill prior to using as structural fill. Recommendations for cement treatment are provided in *Section 6.6.2* of this report.

The structural fill should be moisture conditioned to near optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and unyielding condition, and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557.

7.6 EROSION AND DRAINAGE CONSIDERATIONS

Surface runoff can be controlled during construction by careful grading practices. This may include the construction of shallow, upgrade perimeter ditches or low earthen berms to collect runoff and prevent water from entering the excavation. All collected water should be directed to a positive and permanent discharge system such as a storm sewer. It should be noted that some of the site soils are prone to surficial erosion. Special care should be taken to avoid surface water on open cut excavations, and exposed slopes should be protected with plastic sheeting.

Permanent control of surface water and roof runoff should be incorporated in the final grading design. In addition to these sources, irrigation and rain water infiltrating into any landscape and/or planter areas adjacent to paved areas or building foundations should also be controlled. Water should not be allowed to pond immediately adjacent to buildings or paved areas. All collected runoff should be directed into conduits that carry the water away from pavements or the structure and into storm drain systems or other appropriate outlets. Adequate surface gradients should be incorporated into the grading design such that surface runoff is directed away from structures.

7.7 WET WEATHER EARTHWORK AND EROSION CONSIDERATIONS

The fill soils at the site are expected to contain a moderate to high amount of fines, and are therefore considered moisture sensitive. As a result, it may be more economical to perform earthwork in the drier summer months to reduce the potential of site soils becoming soft due to excessive moisture. Any softened soils should be removed and replaced with structural fill.

General recommendations relative to earthwork performed in wet weather or in wet conditions are presented below:

- Because site soils are considered moisture sensitive, all subgrade surfaces should be protected against inclement weather.
- Earthwork may need to be performed in small areas to minimize subgrade exposure to wet weather. Excavation or the removal of unsuitable soil should be followed promptly by the placement and compaction of structural fill. The size and type of construction equipment used may have to be limited to reduce soil disturbance.
- During wet weather, the allowable fines content of the structural fill should be reduced to no more than 5 percent by weight based on the portion passing ¾-inch sieve. The fines should be non-plastic.

- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water, and to prevent surface water from entering the excavations.
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of sediment. Erosion control measures should be installed along all the property boundaries.
- Excavation slopes and soils stockpiled on site should be covered with plastic sheeting.
- Under no circumstances should soil be left uncompacted and exposed to moisture.

8.0 LIMITATIONS

We have prepared this report for use by Alliance Residential and the project team. Recommendations contained in this report are based on a site reconnaissance, a review of existing subsurface explorations, and our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

Variations in soil conditions may exist between the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at the site that are different from those described in this report, we should be notified immediately to review the applicability of our recommendations. Additionally, we should also be notified to review the applicability of our recommendations if there are any changes in the project scope.

The scope of our work does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our work specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use this report.

Within the limitation of scope, schedule and budget, PanGEO engages in the practice of geotechnical engineering and endeavors to perform its services in accordance with generally accepted professional principles and practices at the time the Report or its contents were prepared. No warranty, express or implied, is made.

We appreciate the opportunity to be of service to you on this project. Please feel free to contact our office with any questions you have regarding our study, this report, or any geotechnical engineering related project issues.

Sincerely,

PanGEO, Inc.

JON C. REHKOPF
40412

12/14/22

Jon C. Rehkopf, P.E.
Principal Geotechnical Engineer

9.0 REFERENCES

ASCE (2016). “SEI/ASCE 7-16, Minimum Design Loads for Buildings and Other Structures,” American Society of Civil Engineers.

International Building Code (IBC), 2018, International Code Council.

Kleinfelder (2005). *Summary Boring Logs B-1 through B-56, Proposed Retail Development, 2119 Mildred Street, Fircrest, Washington*, February 2005.

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Terracon (2008). *Summary Boring Logs B-1 through B-9, WinCo Foods, Inc., 2119 Mildred Street West, Fircrest, Washington*, May 2008.

Washington State Department of Transportation (WSDOT), 2022, Geotechnical Design Manual, M 46-03-13, Olympia, Washington.

Reference: Pierce County Public GIS

N

No Scale

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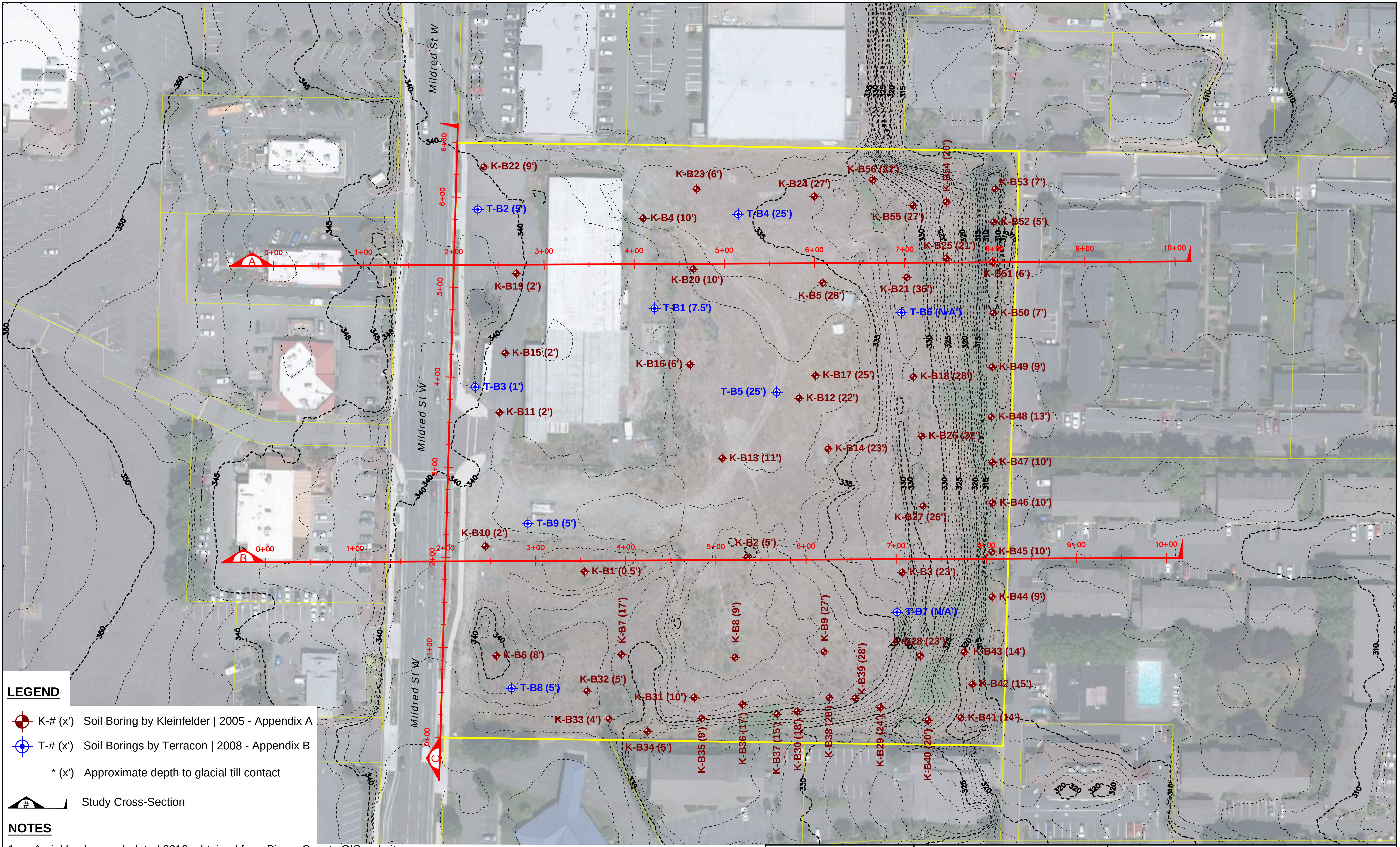
Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

VICINITY MAP

Project No. **21-529**

Figure No. **1**



LEGEND

⌖	K-# (x')	Soil Boring by Kleinfelder | 2005 - Appendix A
⌖	T-# (x')	Soil Borings by Terracon | 2008 - Appendix B
	* (x')	Approximate depth to glacial till contact
#		Study Cross-Section

NOTES

1. Aerial background, dated 2018, obtained from Pierce County GIS website.
2. Topology derived 2017 Green River Service Area LiDAR data obtained from Washington DNR website.
3. Additional features are based on GIS data obtained from Pierce County and WA DNR wesbsites.
4. Topology and GIS features are provided for relative information only and are not a substitution for field survey.
5. Locations of subsurface explorations are approximate and based on the relative locations of known site features.
6. Vertical Datum: NGVD 1929 = (NAVD 1988 - 3.50 ft) per City of Tacoma Public Works Department

50' 0 50' 100'
scale in feet
Scale: 1" = 100'

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Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

SITE AND EXISTING EXPLORATION PLAN

PROJECT NO. 21-529
FIGURE NO. 2

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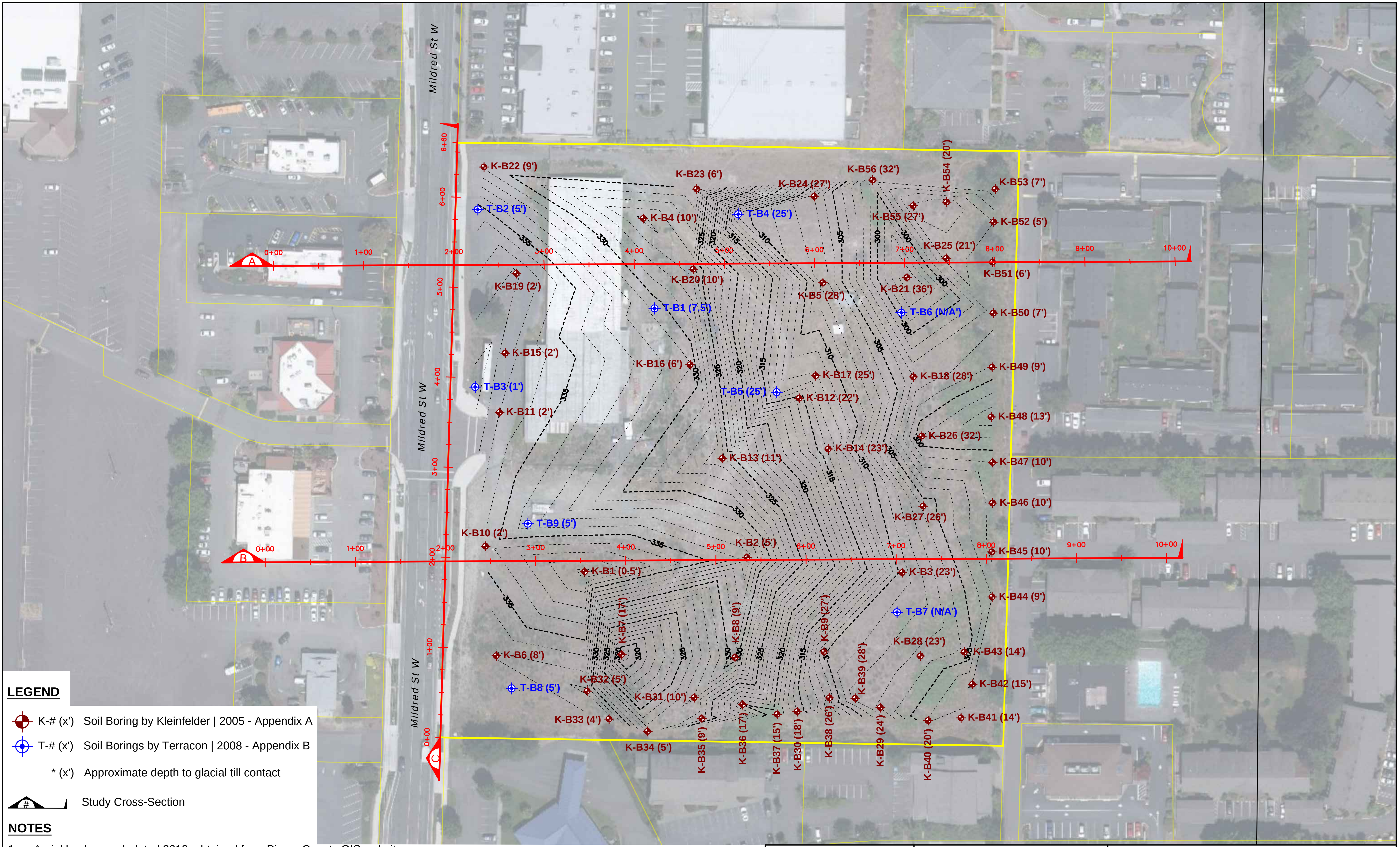

LEGEND

✦	K-# (x')	Soil Boring by Kleinfelder | 2005 - Appendix A
⊕	T-# (x')	Soil Borings by Terracon | 2008 - Appendix B
	* (x')	Approximate depth to glacial till contact
#		Study Cross-Section

NOTES

1. Aerial background, dated 2018, obtained from Pierce County GIS website.
2. Approximate elevations of glacial till contact inferred from subsurface explorations by others.
3. Additional features are based on GIS data obtained from Pierce County and WA DNR wesbsites.
4. Topology and GIS features are provided for relative information only and are not a substitution for field survey.
5. Locations of subsurface explorations are approximate and based on the relative locations of known site features.
6. Vertical Datum: NGVD 1929 = (NAVD 1988 - 3.50 ft) per City of Tacoma Public Works Department

N

50' 0 50' 100'
scale in feet

Scale: 1" = 100'

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Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

APPROXIMATE ELEVATION OF
GLACIAL TILL CONTACT

PROJECT NO. 21-529

FIGURE NO. 3

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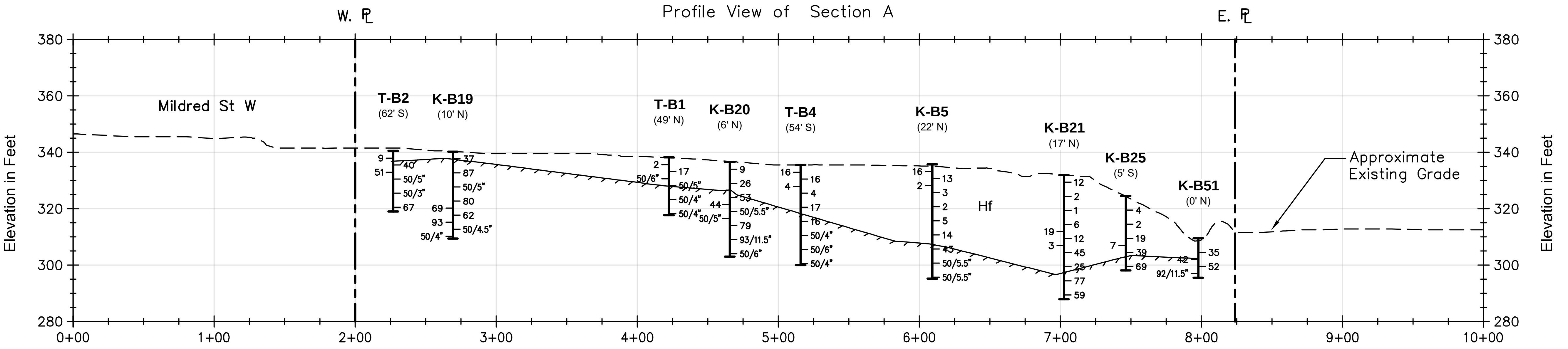
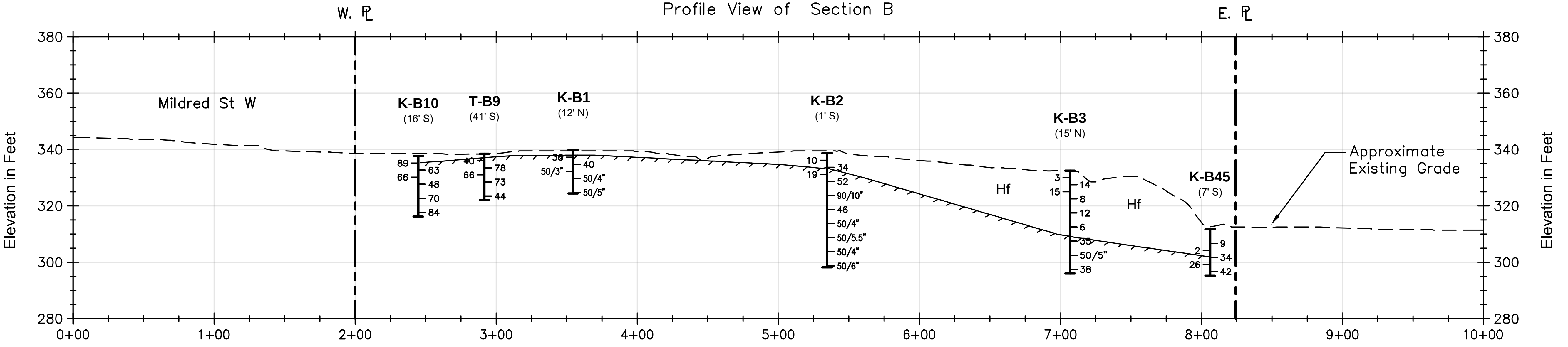
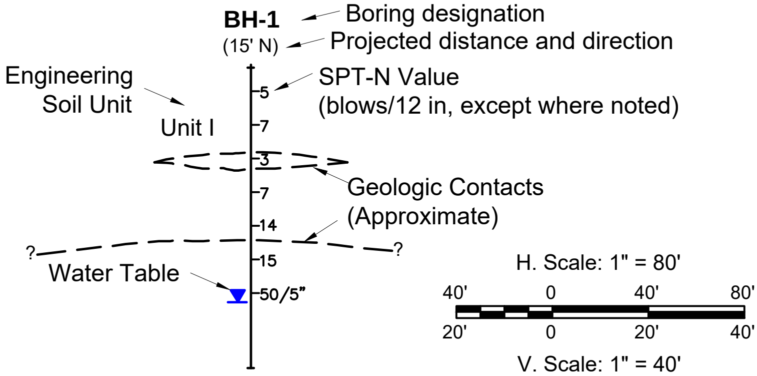

Profile View of Section A


Profile View of Section B

NOTES

1. Topology derived 2017 Green River Service Area LiDAR data obtained from Washington DNR website.
2. Locations of glacial till contact are approximate and based on subsurface explorations by others.
3. Locations of subsurface explorations are approximate and based on the relative locations of known site features.
4. Geologic contacts between explorations are inferred.
5. Vertical Datum: NGVD 1929 = (NAVD 1988 - 3.50 ft) per City of Tacoma Public Works Department.

LEGEND



— — — — Approximate Existing Ground Surface

/ / / / Approximate Glacial Till Contact

H. Scale: 1" = 80'

40' 0 40' 80'

20' 0 20' 40'

V. Scale: 1" = 40'

2 x Vertical Exaggeration

ENGINEERING SOIL UNITS

See text of report for soil unit descriptions.

Hf	Fill
Qvt	Vashon Glacial Till

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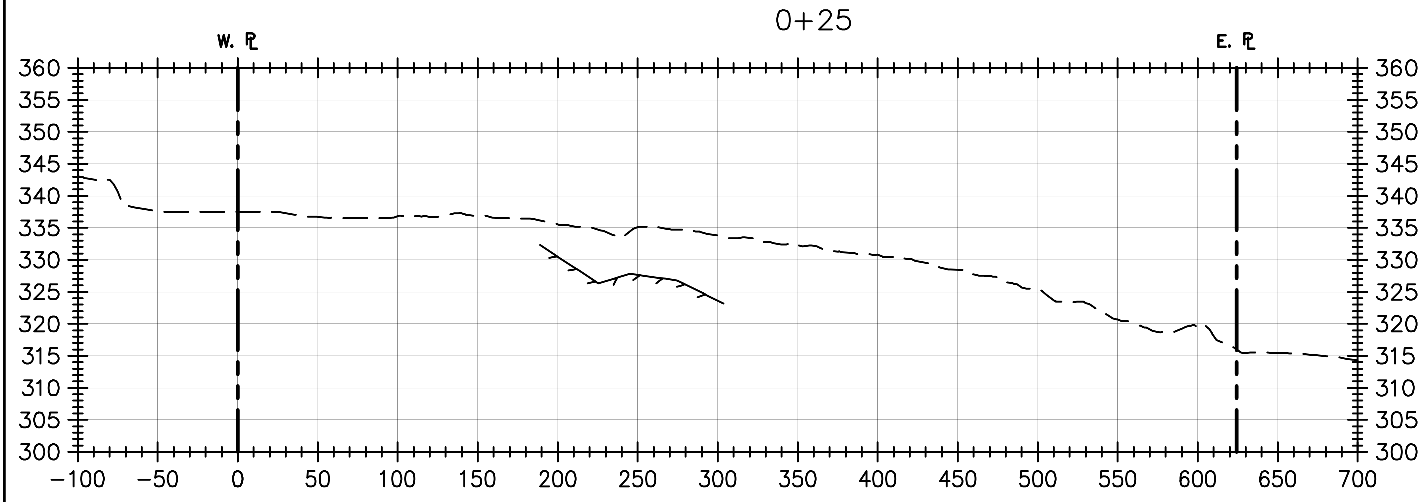
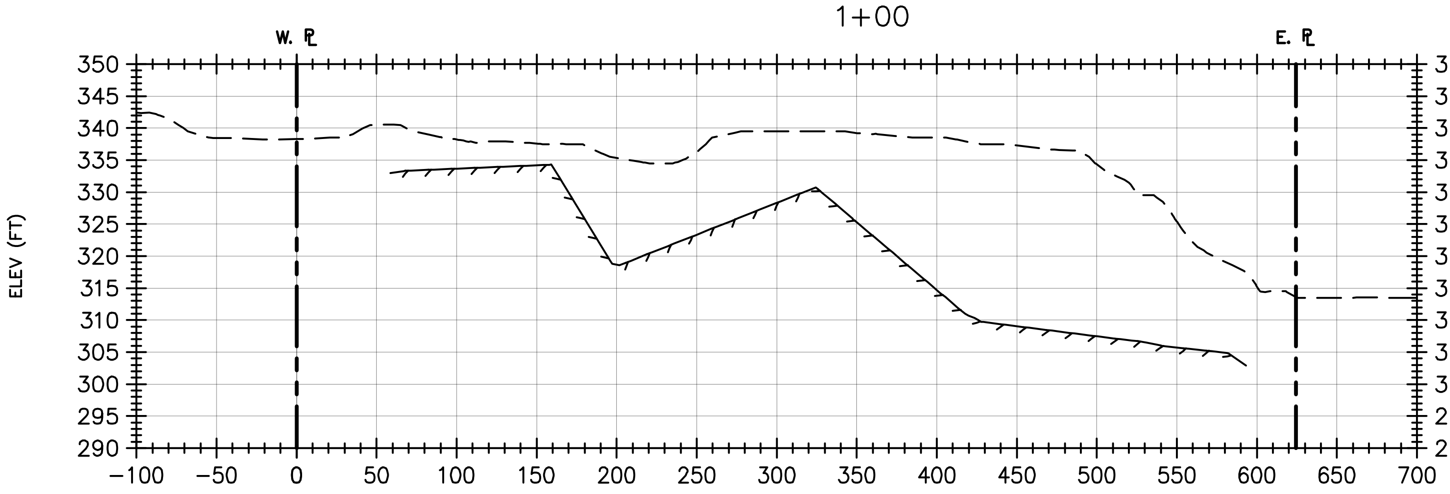
Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

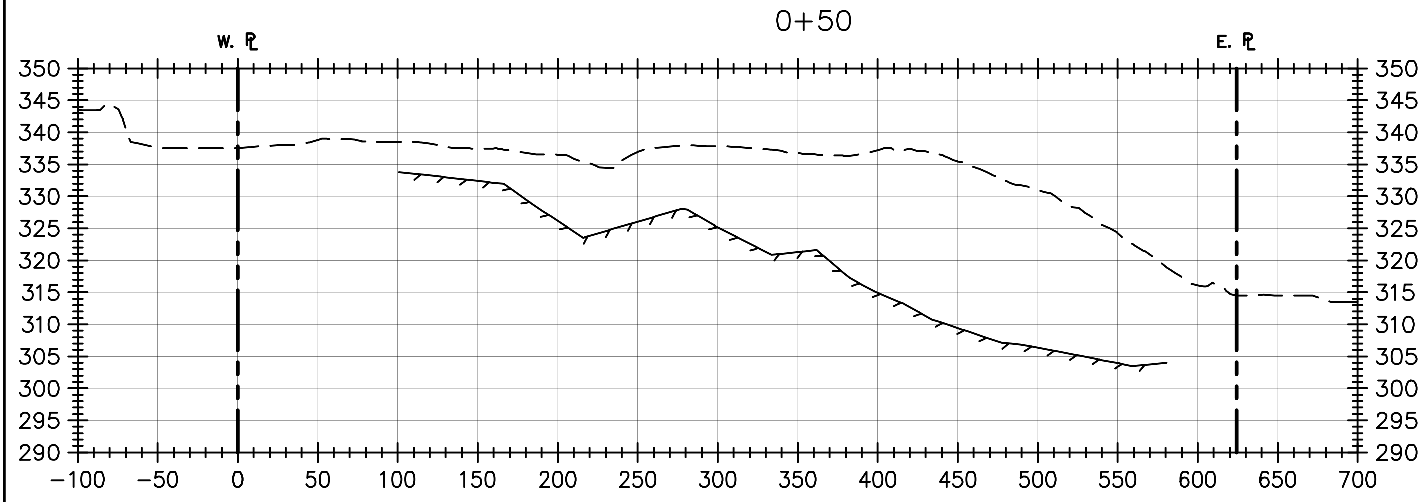
CROSS-SECTIONS
Study Sections A & B

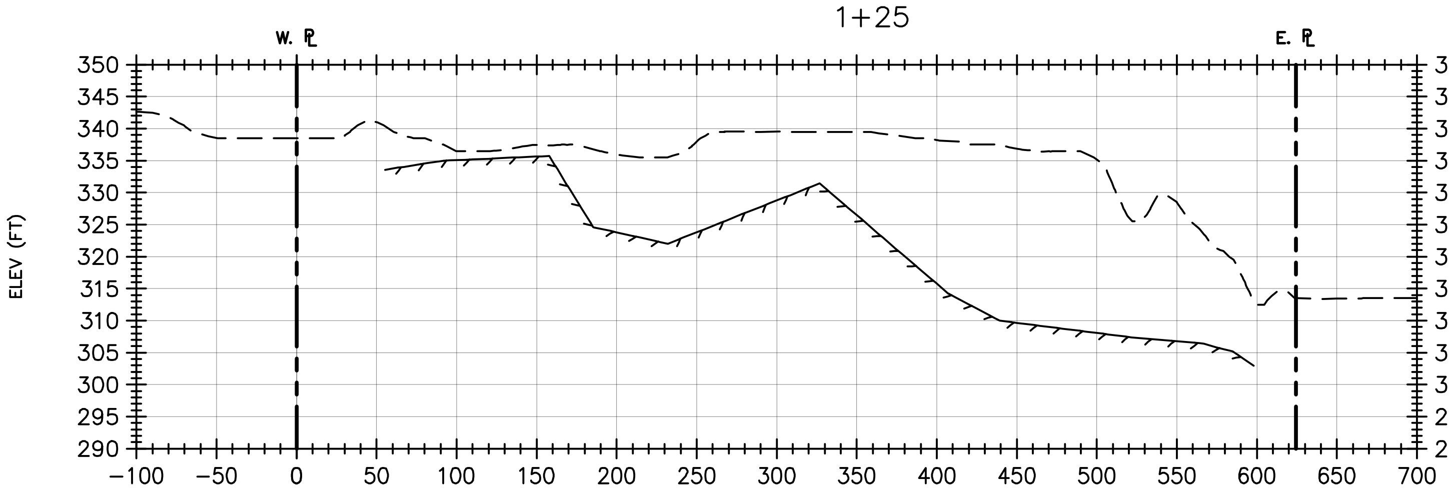
PROJECT NO. 21-529

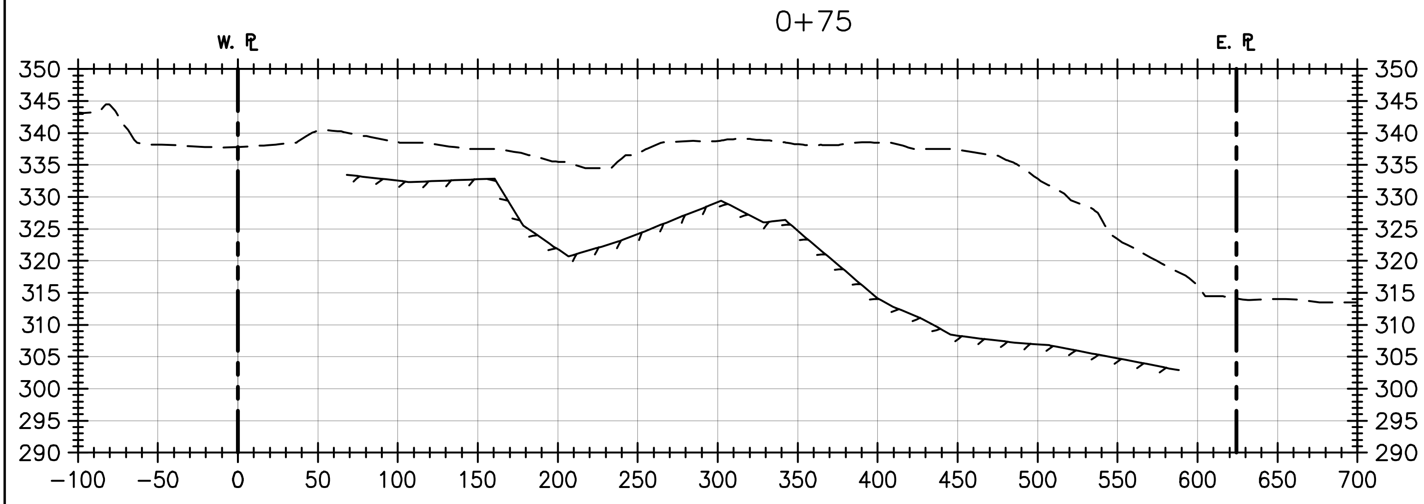
FIGURE NO. 4

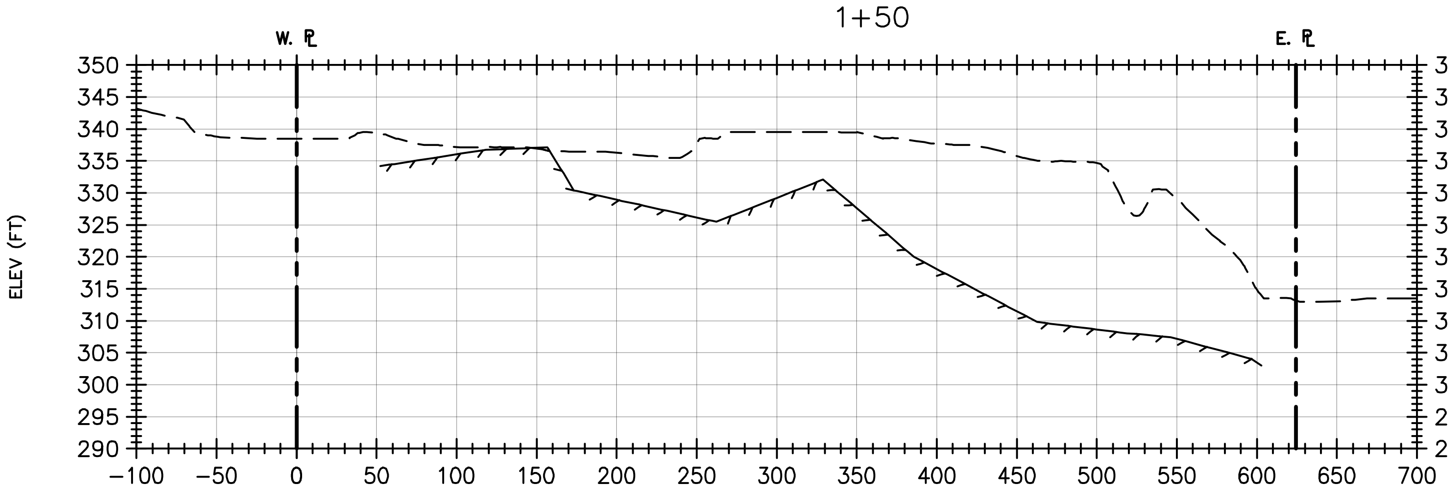












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LEGEND

— — — —	Approximate Existing Ground Surface
⟋⟋⟋⟋	Approximate Glacial Till Contact

NOTES

1. Topology derived 2017 Green River Service Area LiDAR data obtained from Washington DNR website.
2. Locations of glacial till contact are approximate and based on subsurface explorations by others.
3. Vertical Datum: NGVD 1929 = (NAVD 1988 - 3.50 ft) per City of Tacoma Public Works Department

H. Scale: 1" = 120'

V. Scale: 1" = 30'

4 x Vertical Exaggeration

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Prose Fircrest
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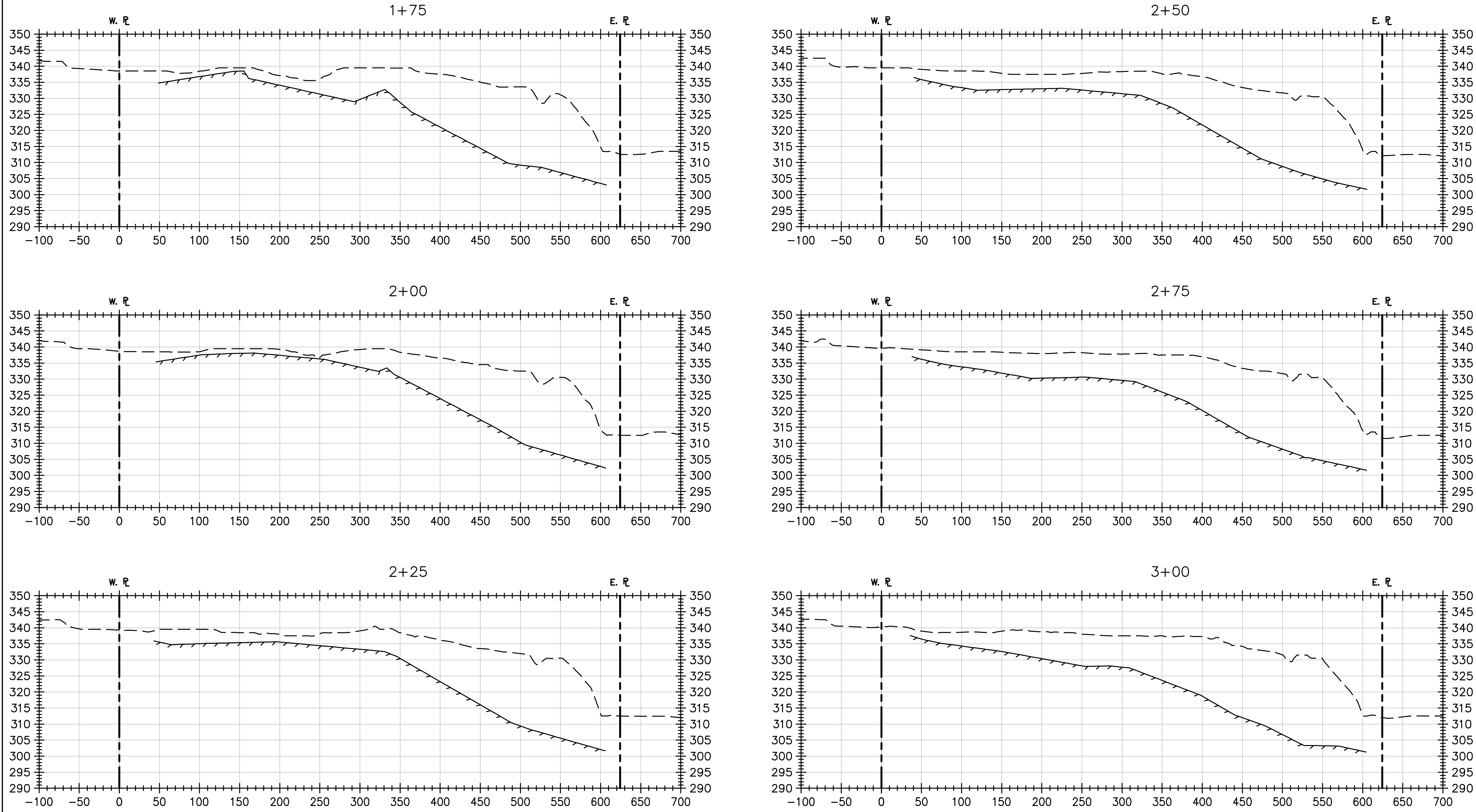
Fircrest, Washington

CROSS-SECTIONS
SECTION C | 0+00 TO 1+50

PROJECT NO.	FIGURE NO.
21-529	5A



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LEGEND

— — — Approximate Existing Ground Surface

⟋⟋⟋ Approximate Glacial Till Contact

NOTES

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H. Scale: 1" = 120'
60' 0 60' 120'
15' 0 15' 30'
V. Scale: 1" = 30'
4 x Vertical Exaggeration

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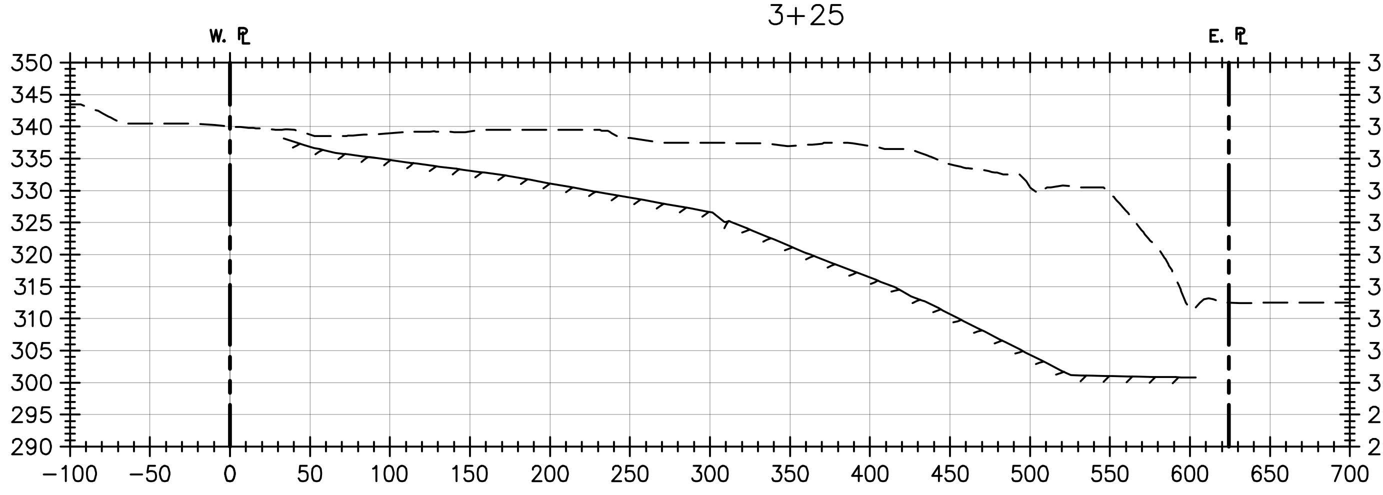
Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

CROSS-SECTIONS
SECTION C | 1+75 TO 3+00

PROJECT NO. 21-529

FIGURE NO. 5B

3+25



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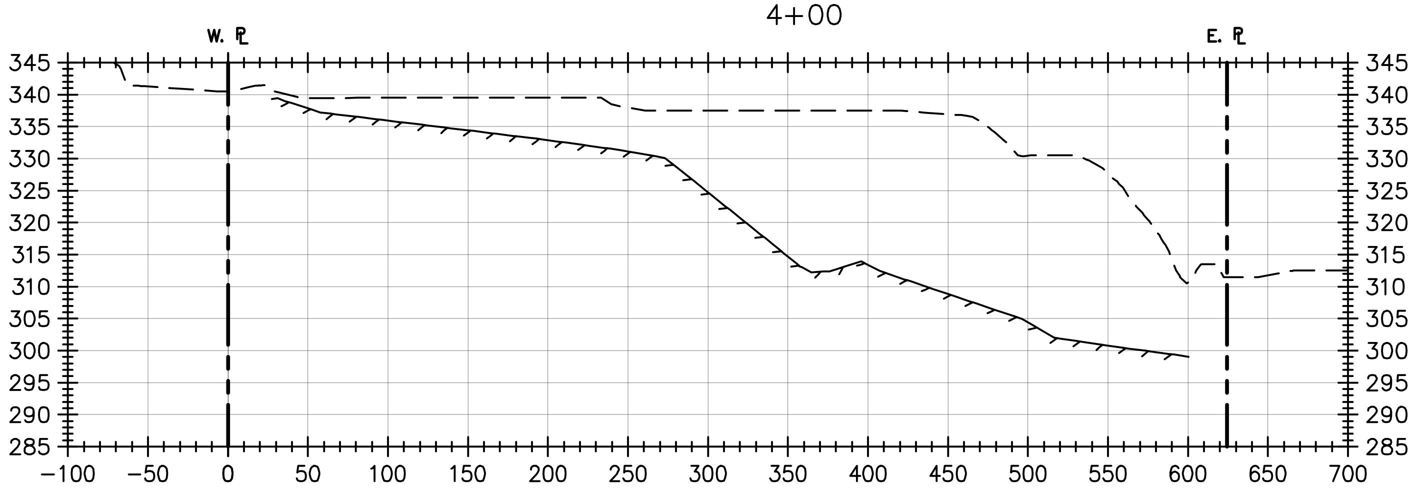

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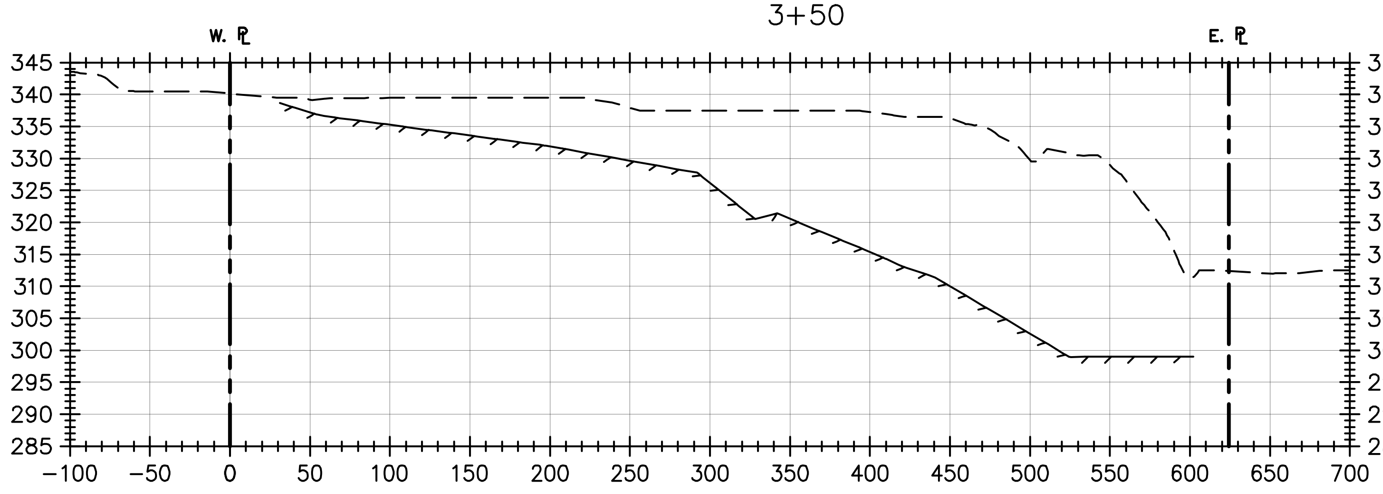

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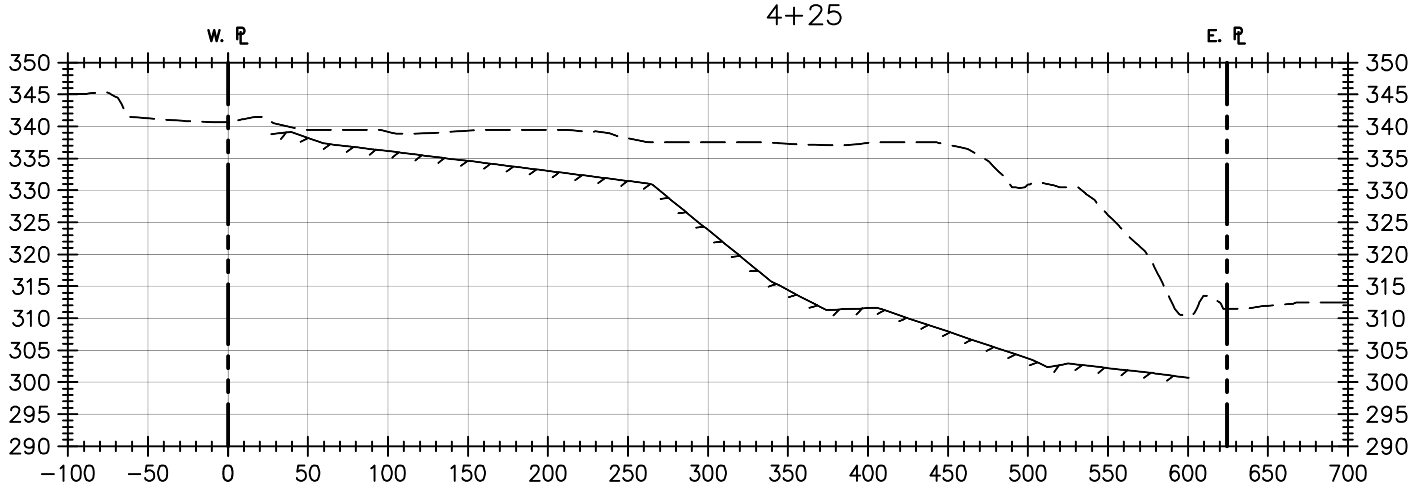

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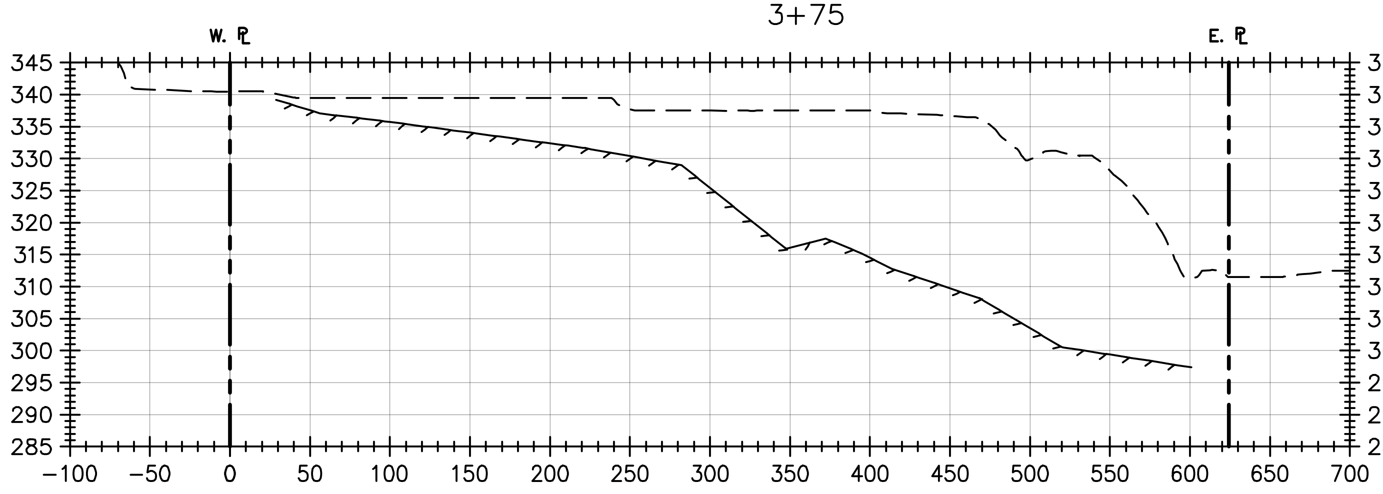

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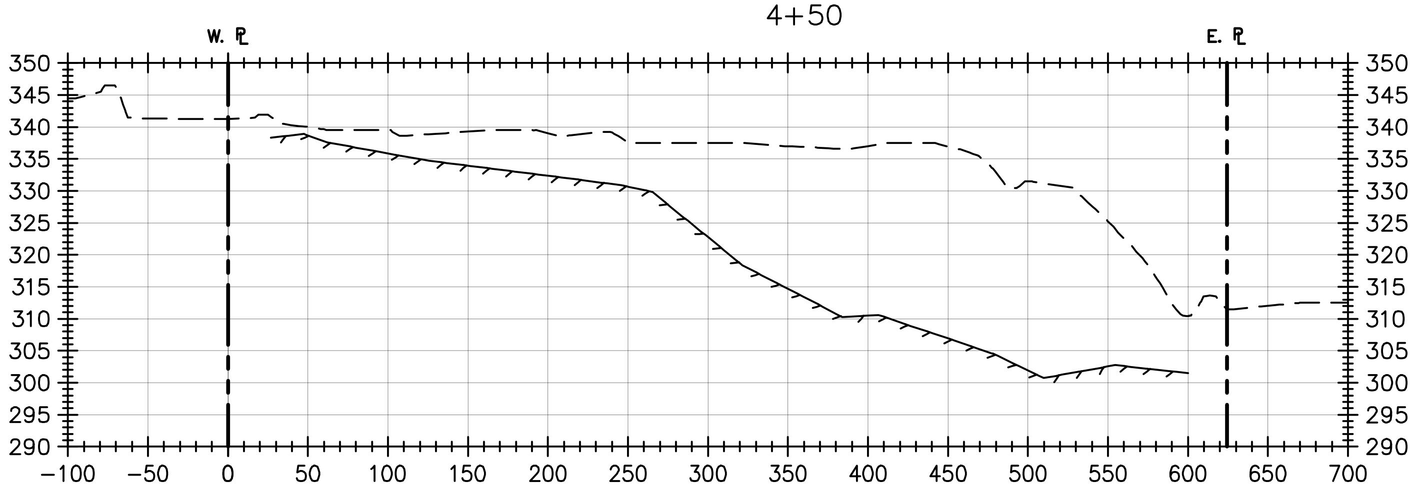

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LEGEND

— — — Approximate Existing Ground Surface

⟋⟋⟋ Approximate Glacial Till Contact

NOTES

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2. Locations of glacial till contact are approximate and based on subsurface explorations by others.
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H. Scale: 1" = 120'

60' 0 60' 120'

15' 0 15' 30'

V. Scale: 1" = 30'

4 x Vertical Exaggeration

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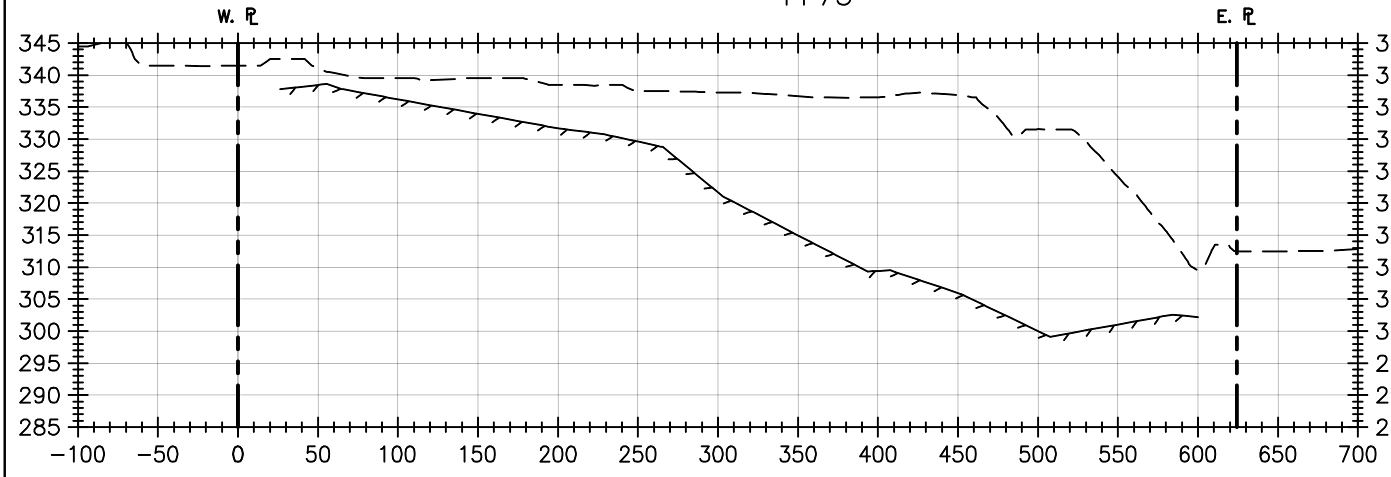
Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

CROSS-SECTIONS
SECTION C | 3+25 TO 4+50

PROJECT NO. 21-529

FIGURE NO. 5C

4+75



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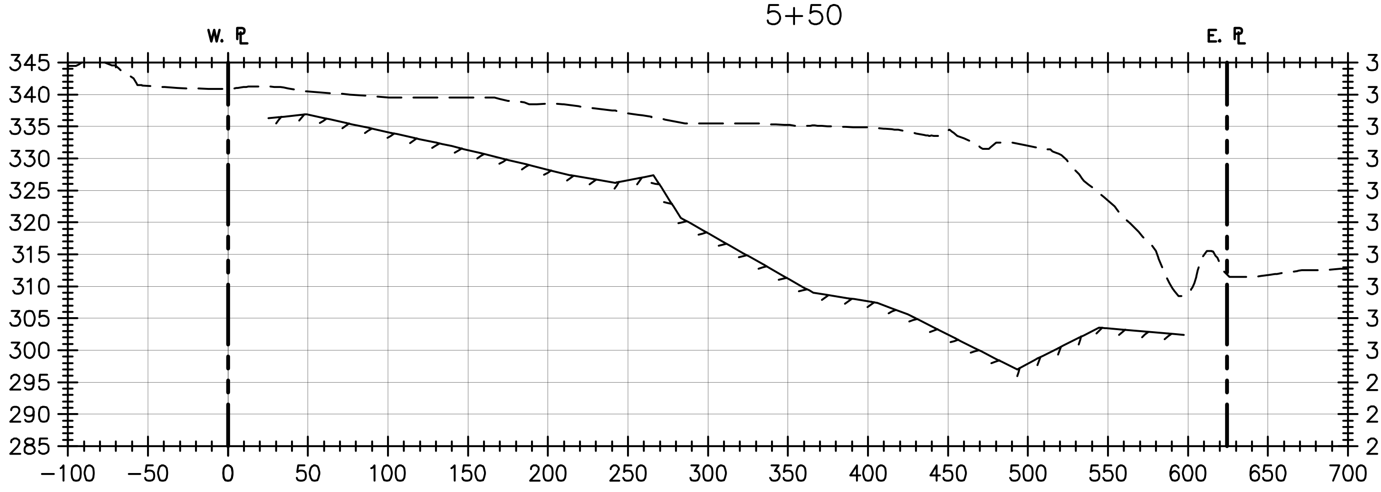

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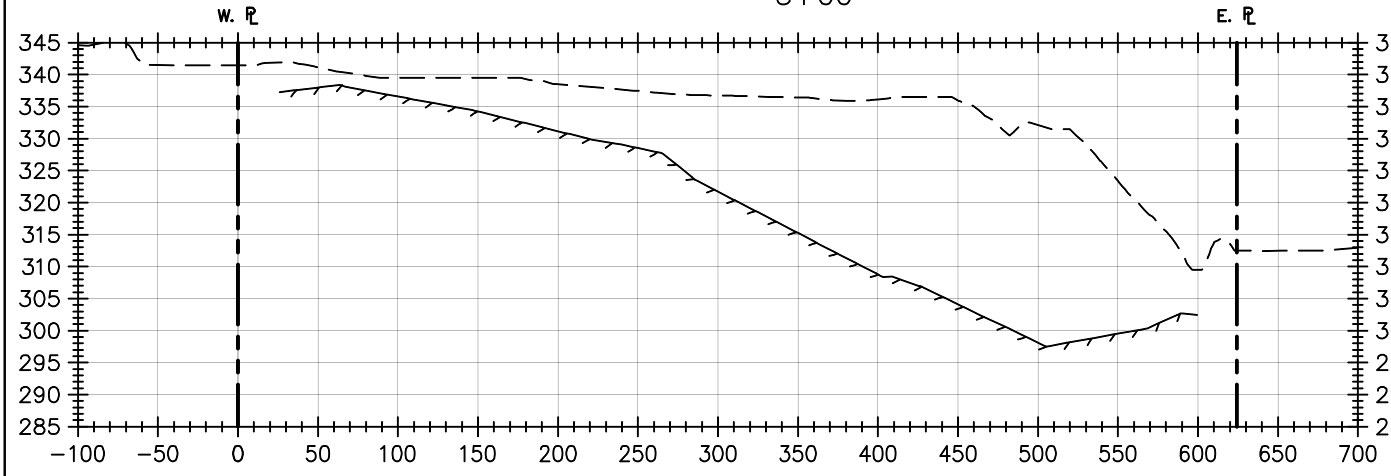

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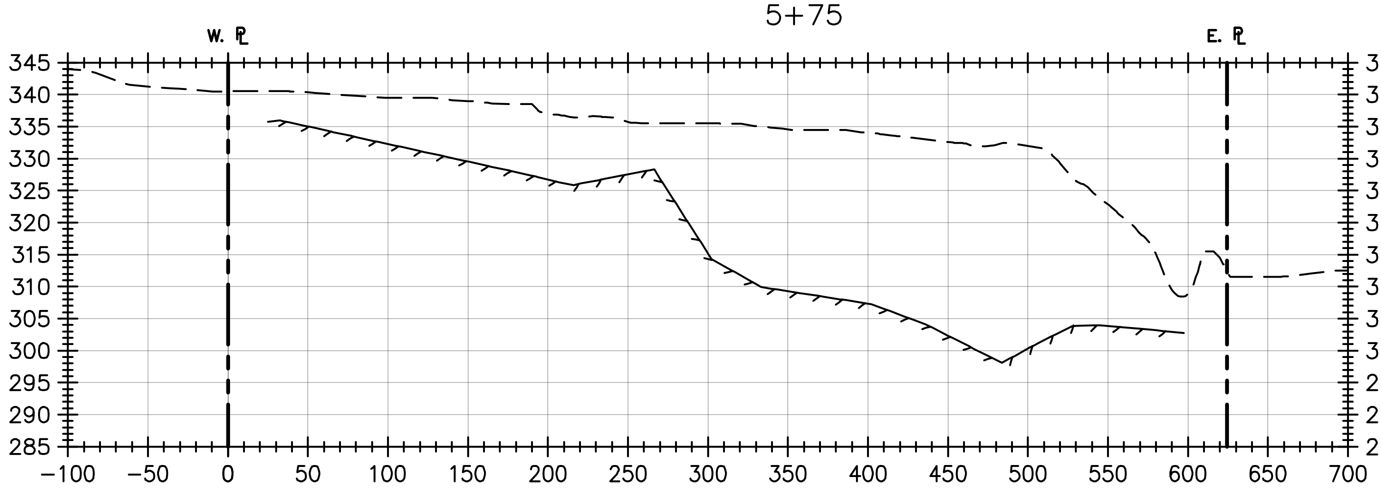

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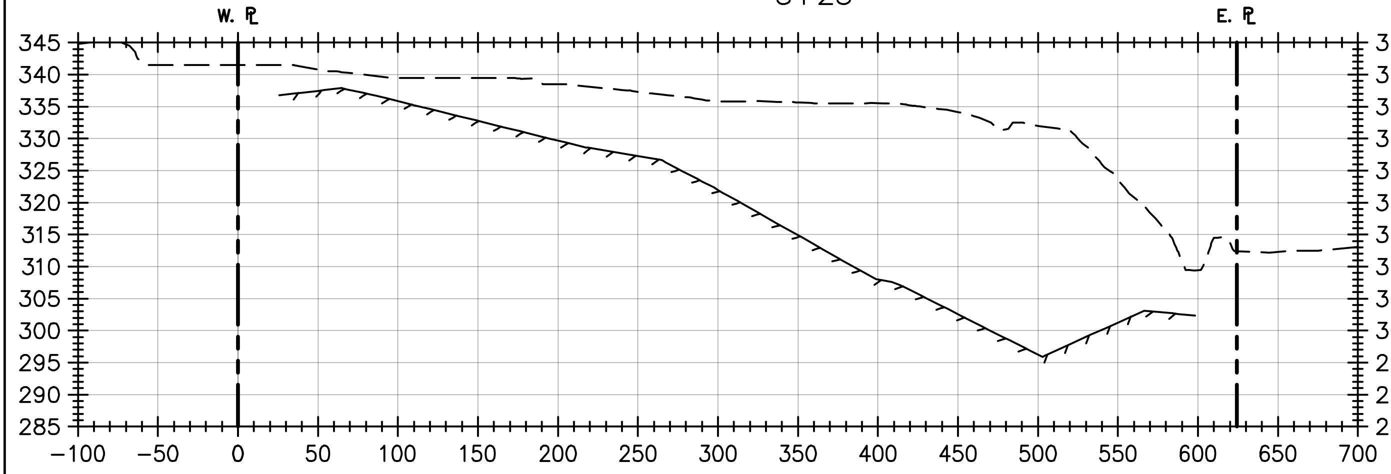
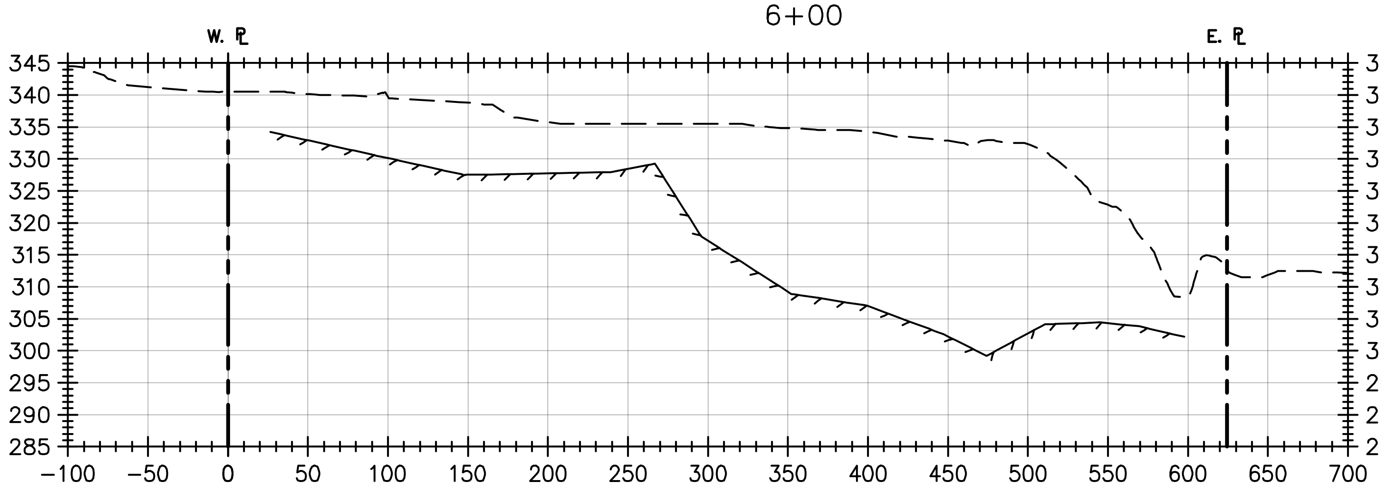


6+00



LEGEND

— — — — Approximate Existing Ground Surface

⟋⟋⟋⟋ Approximate Glacial Till Contact

NOTES

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H. Scale: 1" = 120'

60' 0 60' 120'

15' 0 15' 30'

V. Scale: 1" = 30'

4 x Vertical Exaggeration

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Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

CROSS-SECTIONS
SECTION C | 4+75 TO 6+00

PROJECT NO. 21-529

FIGURE NO. 5D

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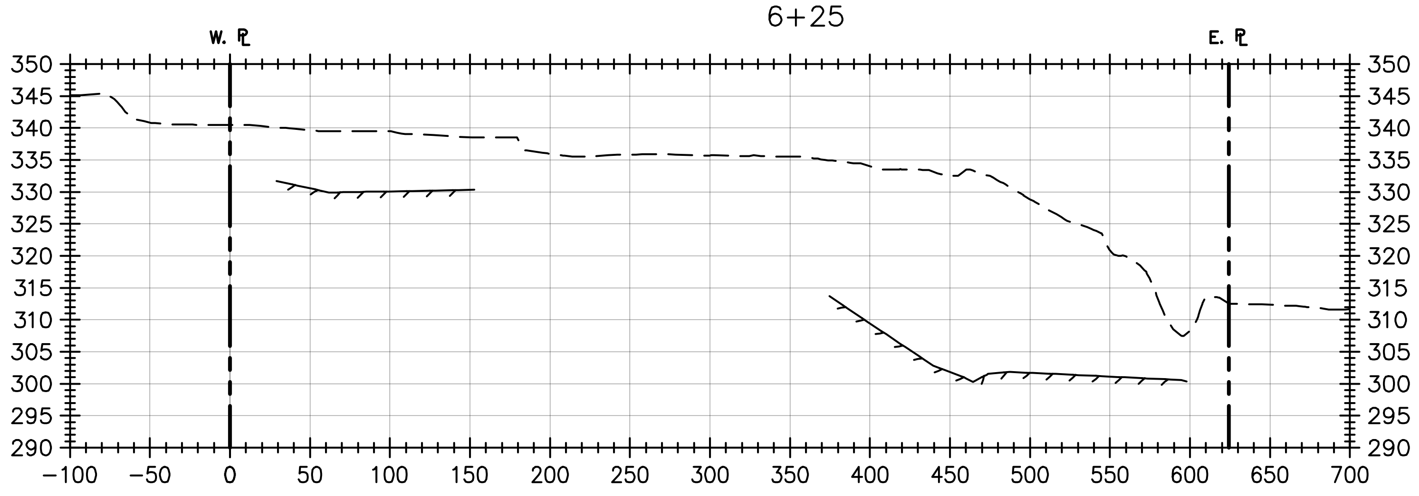
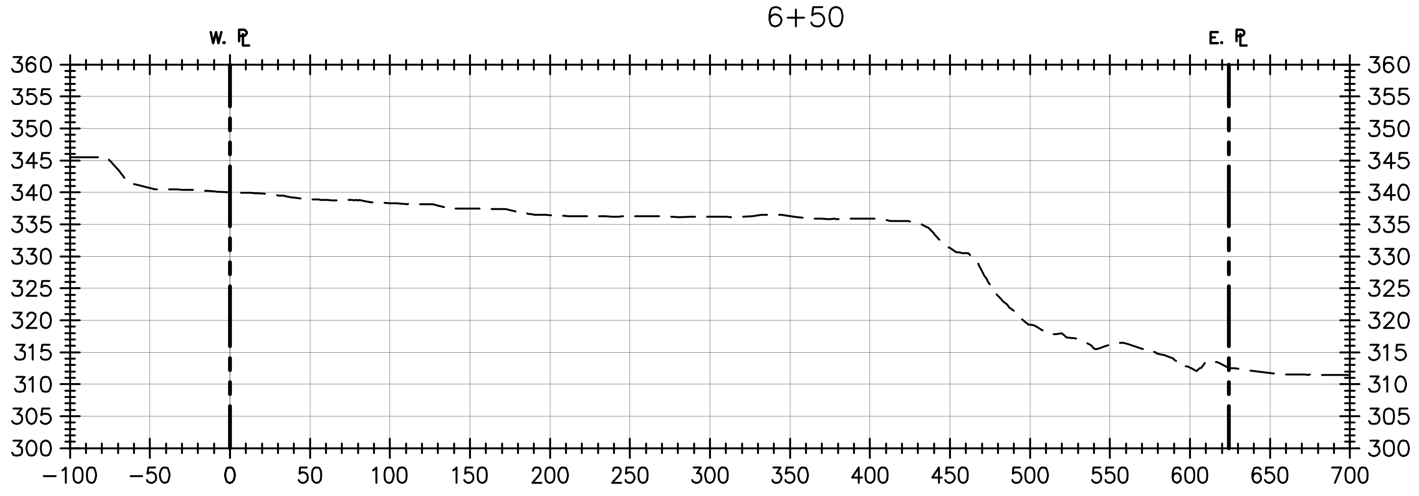
DRAWN BY: NTW





Z:\Projects\2021 Projects\21-529 Prose Fircrest - 2119 Mildred Street W\Figures\CADD

DATE: 2021.11.10

CHECKED BY: JCR

DRAWN BY: NTW

LEGEND

— — — — Approximate Existing Ground Surface

⟋⟋⟋⟋ Approximate Glacial Till Contact

NOTES

1. Topology derived 2017 Green River Service Area LiDAR data obtained from Washington DNR website.
2. Locations of glacial till contact are approximate and based on subsurface explorations by others.
3. Vertical Datum: NGVD 1929 = (NAVD 1988 - 3.50 ft) per City of Tacoma Public Works Department

H. Scale: 1" = 120'
60' 0 60' 120'
15' 0 15' 30'
V. Scale: 1" = 30'
4 x Vertical Exaggeration

PanGEO
INCORPORATED

Prose Fircrest
2119 Mildred Street West
Fircrest, Washington

CROSS-SECTIONS
SECTION C | 6+25 TO 6+50

PROJECT NO.	FIGURE NO.
21-529	5E

APPENDIX A

EXISTING SUBSURFACE EXPLORATIONS

(Kleinfelder, 2005)

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOIL MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	●	GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, 0% TO 15% FINES
			○	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, 0% TO 15% FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	○	GM	SILTY GRAVELS, SILTY GRAVEL-SAND MIXTURES
			▨	GC	CLAYEY GRAVELS, CLAYEY GRAVEL-SAND MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)	░	SW	WELL-GRADED SANDS, GRAVELLY SANDS, 0% TO 15% FINES
			░	SP	POORLY-GRADED SANDS, GRAVELLY SAND, 0% TO 15% FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	░	SM	SILTY SANDS, SILTY SAND-GRAVEL MIXTURES
			▨	SC	CLAYEY SANDS, CLAYEY SAND-GRAVEL MIXTURES
FINE GRAINED SOIL MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			▨	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			▤	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	▥	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			▨	CH	INORGANIC CLAYS OF HIGH PLASTICITY
			≈	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			░	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

KLEINFELDER

Proposed Retail Development
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Fircrest, Washington
Project: 54568 August 2005

SOIL CLASSIFICATION LEGEND

APPENDIX
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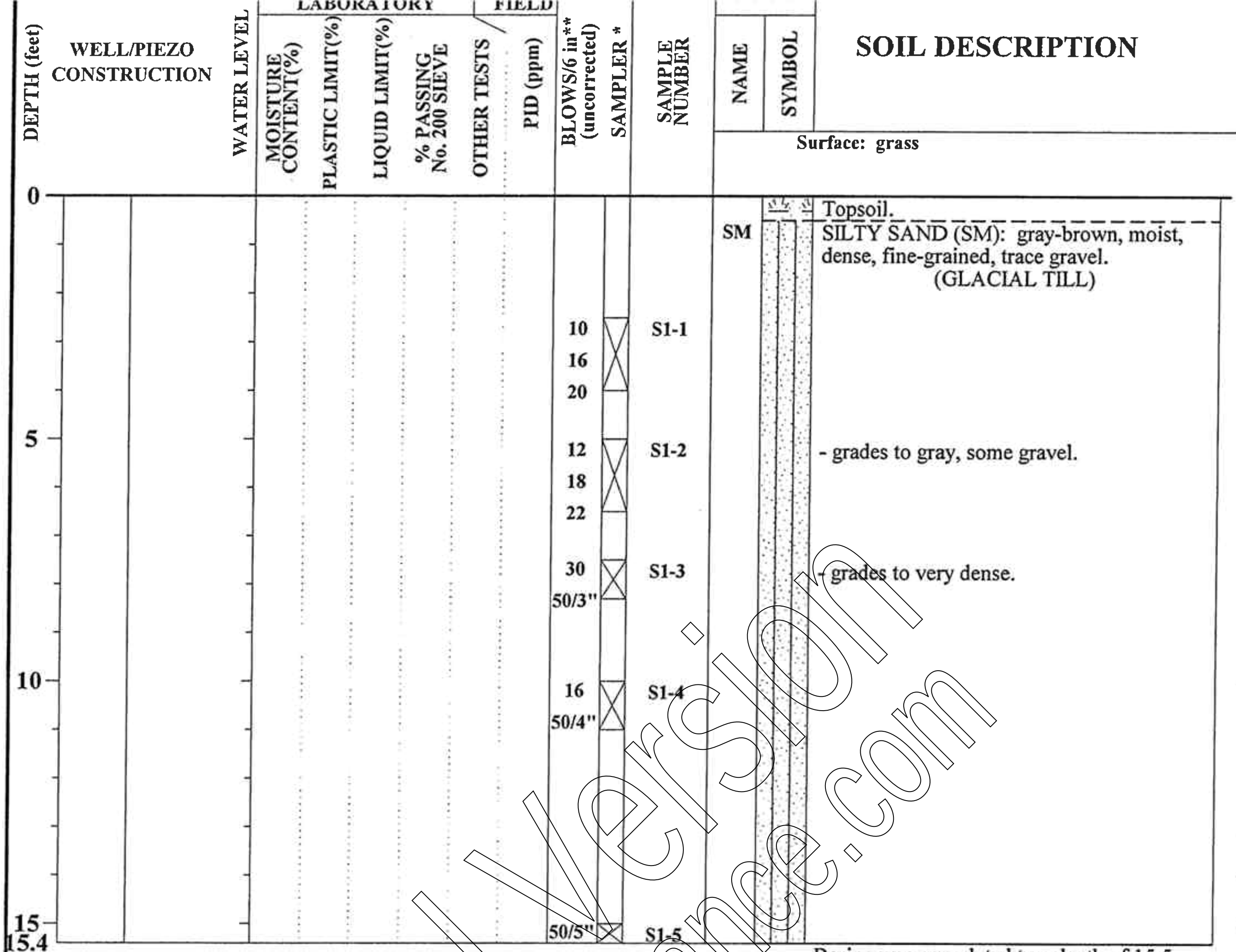

SOIL DESCRIPTION

Surface: grass

Topsoil.

SILTY SAND (SM): gray-brown, moist, dense, fine-grained, trace gravel.
(GLACIAL TILL)

- grades to gray, some gravel.

- grades to very dense.

Boring was completed to a depth of 15.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 2-28-05	SURFACE ELEVATION (feet): 339.8	DRILLING METHOD: HSA
LOGGED BY: I. LaVielle	TOTAL DEPTH (feet): 15.4	DRILLER: Holt Drilling
REVIEWED BY: J. Schmidt	DIAMETER OF BORING (in): 8 inches	CASING SIZE: N/A

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

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BORING LOG
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APPROV: ______

BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, loose, medium- to coarse-grained. (FILL)
									5 4 6		S2-1			
5									8 12 22		S2-2	SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, dense, medium- to coarse-grained. (GLACIAL TILL)
									8 10 9		S2-3			- grades to thin seams of wet.
10									14 32 20		S2-4			
15									29 40 50/4"		S2-5			
														- grades to very dense, seams of sand and sand with silt.
20									9 20 26		S2-6	ML		SANDY SILT (ML): gray, moist, hard, low plasticity. (GLACIAL TILL)
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 2-28-05
LOGGED BY: I. LaVielle
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 338.7
TOTAL DEPTH (feet): 40.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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BORING LOG
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Appendix
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APPROV: ______ BY: ______

			LABORATORY					FIELD						SOIL DESCRIPTION
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	
25									20 50/4"	☒	S2-7	SM	▨	SILTY SAND WITH GRAVEL (SM): gray-brown, moist, very dense, medium- to coarse-grained. (GLACIAL TILL)
30									50/5.5"	☒	S2-8		▨	
35									24 50/4"	☒	S2-9		▨	
40									50/6"	☒	S2-10		▨	
40.5														

Boring was completed to a depth of 40.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

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LABORATORY: MOISTURE CONTENT(%), PLASTIC LIMIT(%), LIQUID LIMIT(%), % PASSING No. 200 SIEVE, OTHER TESTS

FIELD: PID (ppm)

WELL/PIEZO CONSTRUCTION

WATER LEVEL

SOIL DESCRIPTION

Surface: grass

DEPTH (feet)	BLOWS/6 in** (uncorrected)	SAMPLE NUMBER	NAME	SOIL DESCRIPTION
0				Topsoil.
			SM	SILTY SAND WITH GRAVEL (SM): gray-brown, moist, very loose, medium-grained. (FILL)
	1 2 1	S3-1		
5	4 6 8	S3-2		- grades to medium dense.
	9 10 5	S3-3		
10	3 5 3	S3-4		- grades to black, low plasticity, some wood debris and organics.
15	1 5 7	S3-5		- grades to with lenses of sandy silt.
20	4 4 2	S3-6		
			SM	SILTY SAND (SM): brown, moist, medium dense, fine-grained, with organics. (RELIC TOPSOIL)
			SM	SILTY SAND WITH GRAVEL (SM): gray-brown, moist, dense, medium-grained. (GLACIAL TILL)
25				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 2-28-05
LOGGED BY: I. LaVielle
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 332.5
TOTAL DEPTH (feet): 36.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

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Proposed Retail Development
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									7 13 22	☒	S3-7			- grades to trace gravel, lenses of sand.
30									25 50/5"	☒	S3-8			- grades to very dense.
35									9 17 21	☒	S3-9			- grades to lenses of wet, fine-grained, gray sand.
36.5														

Boring was completed to a depth of 36.5 feet below ground surface. Groundwater was encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	◨ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____________

BY: ____________

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY: MOISTURE CONTENT(%)	LABORATORY: PLASTIC LIMIT(%)	LABORATORY: LIQUID LIMIT(%)	LABORATORY: % PASSING No. 200 SIEVE	LABORATORY: OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: asphaltic concrete pavement
0														Asphaltic concrete pavement (2 inches thick).
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist to dry, very dense, fine- to coarse-grained. (GLACIAL TILL) - grades to with cobbles. - grades to brown, moist.
									6 13 50/3"		S4-1			
5									18 50/5"		S4-2			
									24 50/3"		S4-3			- grades to gray-pink.
10									21 37 43		S4-4	SP-SM		SAND WITH SILT (SP-SM): gray, moist, very dense, fine-grained. (GLACIAL TILL)
15									50/5.5"		S4-5	SM		SILTY SAND WITH GRAVEL (SM): gray, moist, very dense, fine- to coarse-grained. (GLACIAL TILL)
20									50/5.5"		S4-6			
20.5														

Boring was completed to a depth of 20.5 feet below ground surface. No groundwater encountered. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 2-28-05
LOGGED BY: I. LaVielle
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 335.8
TOTAL DEPTH (feet): 20.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ________

BY: ________

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, medium dense, fine- to coarse-grained. (FILL)
									4 10 6		S5-1			
5									12 7 6		S5-2			- grades to with cobbles.
									1 1 1		S5-3			- grades to dark brown, very loose, with roots and other organics.
10									2 2 1		S5-4			- asphaltic concrete and wood debris encountered during drilling.
15									0 1 1		S5-5			- grades to wet.
20									5 4 1		S5-6			
														- groundwater seepage encountered during drilling.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 2-28-05	SURFACE ELEVATION (feet): 335.7	DRILLING METHOD: HSA
LOGGED BY: I. LaVielle	TOTAL DEPTH (feet): 40.5	DRILLER: Holt Drilling
REVIEWED BY: J. Schmidt	DIAMETER OF BORING (in): 8 inches	CASING SIZE: N/A

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APPROV: ____________

BY: ____________

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						
25									4 6 9	☒	S5-7			- grades to black, with lenses of gray silty sand.
												SM		SILTY SAND WITH GRAVEL (SM): gray, moist, dense, fine- to coarse-grained. (GLACIAL TILL)
30									5 18 25	☒	S5-8			
35									21 50/5.5"	☒	S5-9			
40 40.5									50/5.5"	☒	S5-10			

Boring was completed to a depth of 40.5 feet below ground surface. Groundwater seepage was encountered at 23 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

KLEINFELDER

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND (SM): brown, moist, loose, fine-grained, trace wood fragments. (FILL)
									3 2 2		S6-1			
5														- grades to light brown, fine- to medium-grained.
									6 12 16		S6-2			- grades to light gray to brown, medium dense, trace gravel.
									6 25 50/6"		S6-3	SM		SILTY SAND WITH GRAVEL (SM): green-gray to gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
10									20 25 18		S6-4			- grades to dense.
15									14 12 26		S6-5	ML		SILT WITH SAND (ML): light gray, moist, hard. (GLACIAL TILL)
												SM		SILTY SAND WITH GRAVEL (SM): olive gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
20									15 50/6"		S6-6			
21														

Boring was completed to a depth of 21 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 340.9
TOTAL DEPTH (feet): 21.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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Fircrest, Washington

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): olive gray to brown, moist, very dense, fine- to medium-grained. (FILL)
			7.7			22			7 37 50/5"		S7-1			
5									50/6"		S7-2			- grades to light gray.
									19 50/5"		S7-3			- grades to olive gray, moist to dry, some gravel.
10									30 50/4"		S7-4			
15									0 10 4		S7-5			SILTY SAND (SM): olive gray to brown, moist, medium dense, fine-grained, some gravel. (FILL)
												SM		An apparent void was encountered at a depth of 15 feet below the existing ground surface. SILTY SAND (SM): olive-gray, moist, dense, fine-grained, som gravel. (GLACIAL TILL)
20									5 16		S7-6			
21.5									14					

Boring was completed to a depth of 21.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-26-05	SURFACE ELEVATION (feet): 335.2	DRILLING METHOD: HSA
LOGGED BY: D. Divine	TOTAL DEPTH (feet): 21.5	DRILLER: Holt Drilling
REVIEWED BY: J. Schmidt	DIAMETER OF BORING (in): 8 inches	CASING SIZE: N/A

APPROV: ______

BY: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): light brown, moist, loose, fine- to medium-grained. (FILL)
5									5 5 3	☒	S8-1			
												SM		SILTY SAND WITH GRAVEL (SM): olive gray, moist, very dense, fine- to medium-grained, with small seams of wet. (GLACIAL TILL)
10									10 42 50/5"	☒	S8-2			
15									7 29 45	☒	S8-3			
20									16 37 50/3"	☒	S8-4	SM		SILT WITH SAND (ML): light gray to olive gray, moist, hard. (GLACIAL TILL) SILTY SAND WITH GRAVEL (SM): light gray to brown, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									33 40 50	☒	S8-5			
25														

DATE DRILLED: 4-27-05

LOGGED BY: D. Divine

REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 339.7

TOTAL DEPTH (feet): 41.0

DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA

DRILLER: Holt Drilling

CASING SIZE: N/A

KLEINFELDER

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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PROJECT NUMBER: 54568

Proposed Retail Development
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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									33 40 50/5"	☒	S8-6			
									36 41 50/5"	☒	S8-7			
30									26 50/6"	☒	S8-8			
35									50/5"	☒	S8-9			
40									25 50/6"	☒	S8-10			
41														Boring was completed to a depth of 41 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

APPROV: ____________

BY: ____________

KLEINFELDER

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND (SM): olive-gray to brown, moist, medium dense, fine- to medium-grained, some gravel. (FILL)
5			10.9			25			4 10 6	☒	S9-1			
10									12 7 6	☒	S9-2			- grades to dark brown, loose to medium dense, fine-grained, trace wood fragments.
15									1 1 1	☒	S9-3			- grades to loose.
												SP		SAND WITH GRAVEL (SP): gray, moist, loose, fine-grained, trace fines. (FILL)
20									2 2 1	☒	S9-4			
												SM		SILTY SAND WITH GRAVEL (SM): olive-gray, moist, very dense, fine- to medium-grained. (FILL)
									0 1 1	☒	S9-5			
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-26-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.1
TOTAL DEPTH (feet): 41.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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APPROV: ______
BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD				U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	
25									5 4 1	☒	S9-6			- grades to loose.
									4 6 9	☒	S9-7	SM		SILTY SAND WITH GRAVEL (SM): olive gray to light gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
30									5 18 25	☒	S9-8			
35									21 50/5.5"	☒	S9-9			
40									50/5.5"	☒	S9-10			
41.5														

Boring was completed to a depth of 41.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	BLOWS/6 in** (uncorrected)	SAMPLE NUMBER	NAME	SOIL DESCRIPTION
				Surface: grass
0				Topsoil.
			SM	SILTY SAND WITH GRAVEL (SM): light brown, moist, medium dense, fine- to medium-grained. (FILL)
			SM	SILTY SAND WITH GRAVEL (SM): olive gray to light gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
	29 39 50	S10-1		
5	14 23 40	S10-2		- grades to olive gray to brown.
	20 24 42	S10-3		- grades to olive gray.
10	17 23 25	S10-4		- grades to dense.
15	10 32 38	S10-5		- grades to very dense.
20	15 40 44	S10-6		
21.5				

Boring was completed to a depth of 21.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

DATE DRILLED: 4-27-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.7
TOTAL DEPTH (feet): 21.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: asphaltic concrete pavement
0												SP-SM		Asphaltic concrete pavement (1.5 inches thick). Base course gravel. SAND WITH SILT AND GRAVEL (SP-SM): brown, dry to moist, medium dense, fine- to medium-grained. (FILL)
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, dense, fine- to medium-grained. (GLACIAL TILL)
									5 20 22		S11-1			
5									15 29 45		S11-2			- grades to wet. - grades to gray, moist. - grades to gray-brown, very dense.
									48 50/3"		S11-3			
10									11 30 37		S11-4			- grades to dry.
									15 22 36		S11-5			
15														
									12 30 34		S11-6			
19														

Boring was completed to a depth of 19 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips, and capped with Portland cement concrete.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 5-3-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 339.0
TOTAL DEPTH (feet): 19.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): olive gray, moist, medium dense, fine- to medium-grained. (FILL)
			8.7			18			4 4 2		S12-1			
5									1 0 2		S12-2			- grades to wet, very loose.
									6 10 9		S12-3			- grades to dark brown, medium dense, groundwater seepage encountered.
														- grades to olive gray.
10									3 2 2		S12-4			- grades to moist, loose.
									50/2"		S12-5			- sampler pounding on piece of Portland cement concrete driller reported as approximately 1 to 2 feet in dimension.
15														
									8 9 5		S12-6			- grades to olive gray to light brown, medium dense.
20														
												SM		SILTY SAND WITH GRAVEL (SM): olive gray, moist, dense, fine- to medium-grained. (GLACIAL TILL)
									1 8		S12-7			
24									35					

Boring was completed to a depth of 24 feet below ground surface. Groundwater

DATE DRILLED: 4-28-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.6
TOTAL DEPTH (feet): 24.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

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BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														seepage was encountered at a depth of 7.5 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	SPT (2" OD) Split Spoon	Core Sample	Shelby Tube	Grab	No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY: MOISTURE CONTENT(%)	LABORATORY: PLASTIC LIMIT(%)	LABORATORY: LIQUID LIMIT(%)	LABORATORY: % PASSING No. 200 SIEVE	LABORATORY: OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.: NAME	U.S.C.S.: SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												GM		SILTY GRAVEL WITH SAND (GM): light brown, moist, very loose, fine-grained. (FILL)
			9.1			14			2 1 1		S13-1			
5														
									3 10 15		S13-2			- grades to light gray to olive-gray, moist to wet, medium dense, trace wood fragments.
10														
												SM		SILTY SAND WITH GRAVEL (SM): light gray, moist, dense, fine- to medium-grained, seams of sand with silt. (GLACIAL TILL)
									10 18 26		S13-3			
15														
									30 50/6"		S13-4			- grades to very dense.
20									11 12 15		S13-5	ML		SILT WITH SAND (ML): light gray to olive gray, moist, very stiff. (GLACIAL TILL)
												SM		SILTY SAND WITH GRAVEL (SM): light gray, moist, dense, fine- to medium-grained. (GLACIAL TILL)
									12 23 21		S13-6			
25														

DATE DRILLED: 4-29-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.3
TOTAL DEPTH (feet): 39.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD				U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	
25									19 40 48	☒	S13-7			- grades to very dense.
									13 19 14	☒	S13-8			- grades to dense.
30														
									11 19 17	☒	S13-9			
35														
									6 7 5	☒	S13-10	ML		SILT WITH SAND (ML): light brown, moist, stiff to very stiff. (GLACIAL TILL)
39														

Boring was completed to a depth of 39 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

APPROV: ________

BY: ________

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): light brown, moist, very loose, fine- to medium-grained. (FILL)
									1 1 0	☒	S14-1			
5														
									11 30 17	☒	S14-2			- grades to olive gray, wet, dense. Groundwater seepage encountered during drilling.
10														
									3 2 2	☒	S14-3			- grades to moist, loose.
15														
									9 6 5	☒	S14-4			- grades to light gray with dark brown lenses, medium dense, trace wood debris and roots.
20									4 6 4	☒	S14-5			
									2 21 21	☒	S14-6	SM		SILTY SAND WITH GRAVEL (SM): light gray, moist, dense, fine- to medium-grained. (GLACIAL TILL)
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-29-05	SURFACE ELEVATION (feet): 336.7	DRILLING METHOD: HSA
LOGGED BY: D. Divine	TOTAL DEPTH (feet): 38.4	DRILLER: Holt Drilling
REVIEWED BY: J. Schmidt	DIAMETER OF BORING (in): 8 inches	CASING SIZE: N/A

APPROV: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									16 43 50/5.5"	☒	S14-7			- grades to very dense.
									16 32 36	☒	S14-8			- grades to olive gray.
30														
									18 50/6"	☒	S14-9			
35														
									15 50/5"	☒	S14-10			
38.4														

Boring was completed to a depth of 38.4 feet below ground surface. Groundwater seepage was encountered at a depth of 8 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ________

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			LABORATORY					FIELD				U.S.C.S.	
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL
0												SP-SM	
												SM	
									17 27 28	☒	S15-1		
5													
									16 29 47	☒	S15-2		
10													
									40 50/2.5"	☒	S15-3		
15													
									50/5"	☒	S15-4		
20													
									32 50/4"	☒	S15-5		
			5.3						50/4.5"	☒	S15-6		
25													

SOIL DESCRIPTION

Surface: asphaltic concrete pavement

Asphaltic concrete pavement (2 inches thick).

Base course gravel.

SAND WITH SILT AND GRAVEL (SP-SM): brown, moist, medium dense, fine- to medium-grained.
(FILL)

SILTY SAND WITH GRAVEL (SM): gray-brown, dry, dense, fine- to medium-grained.
(GLACIAL TILL)

- grades to dry to moist, very dense.

DATE DRILLED: 5-3-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 339.4
TOTAL DEPTH (feet): 31.4
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									13 17 25	☒	S15-7			- grades to dense, seams of sand with silt and gravel.
									50/2.5"	☒	S15-8			- grades to very dense.
30									13 35 50/4.5"	☒	S15-9			- grades to dry, very dense, seams of silt and sand with silt.
31.4														

Boring was completed to a depth of 31.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips, and capped with Portland cement concrete.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

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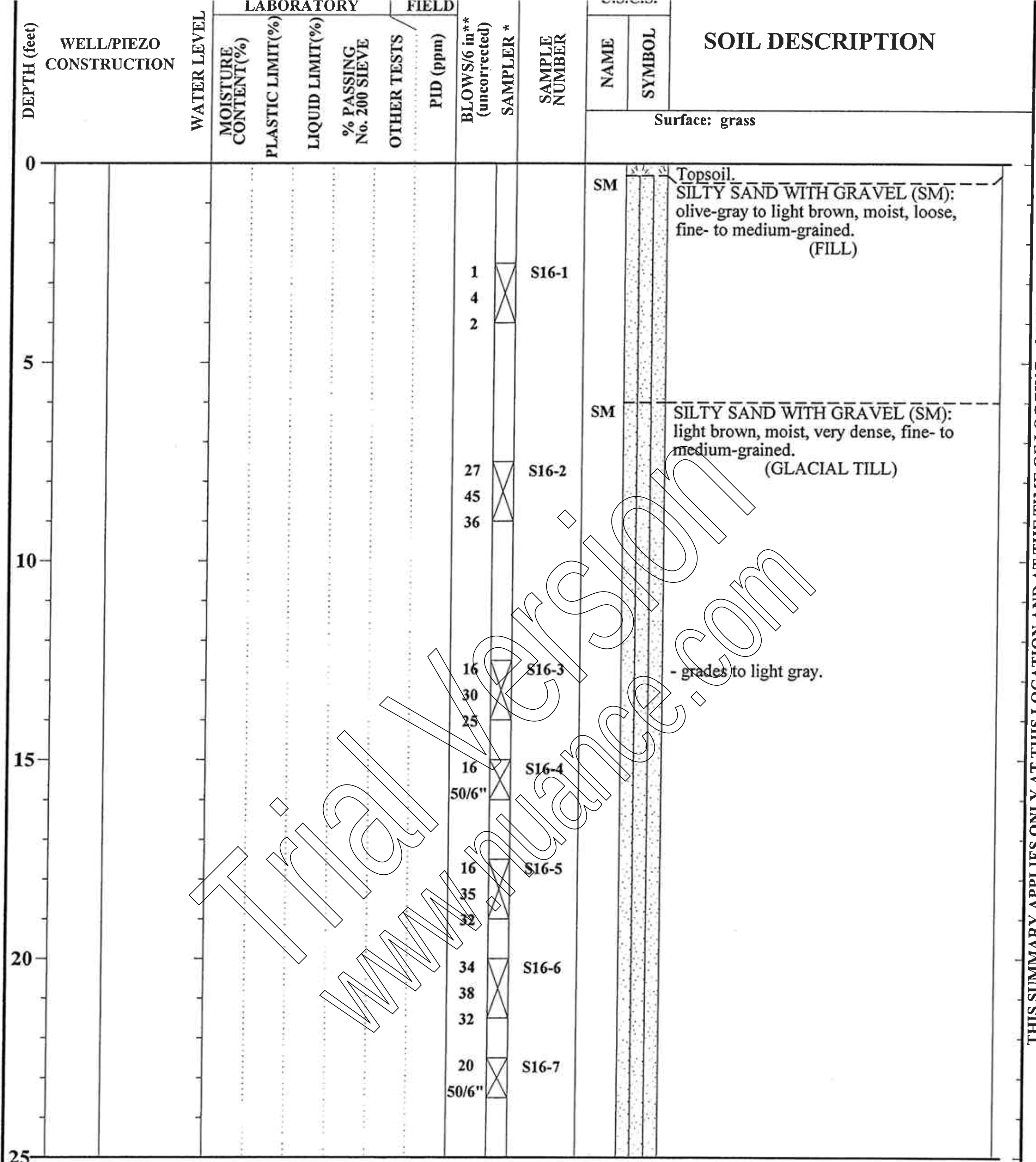

Surface: grass

BLOWS/6 in** (uncorrected)	SAMPLE NUMBER
1 4 2	S16-1
27 45 36	S16-2
16 30 25	S16-3
16 50/6"	S16-4
16 35 32	S16-5
34 38 32	S16-6
20 50/6"	S16-7

NAME	SOIL DESCRIPTION
	Topsoil.
SM	SILTY SAND WITH GRAVEL (SM): olive-gray to light brown, moist, loose, fine- to medium-grained. (FILL)
SM	SILTY SAND WITH GRAVEL (SM): light brown, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
	- grades to light gray.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-28-05	SURFACE ELEVATION (feet): 337.1	DRILLING METHOD: HSA
LOGGED BY: D. Divine	TOTAL DEPTH (feet): 33.4	DRILLER: Holt Drilling
REVIEWED BY: J. Schmidt	DIAMETER OF BORING (in): 8 inches	CASING SIZE: N/A

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BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25														
									29 50/6"	☒	S16-8			
30														
33.4									34 50/5"	☒	S16-9			

Boring was completed to a depth of 33.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	SPT (2" OD) Split Spoon	Core Sample	Shelby Tube	Grab	No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

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BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): olive-gray to brown, moist, very loose, fine- to medium-grained. (FILL)
									3 2 1		S17-1			
5														
									1 1 12		S17-2			- grades to dark brown, medium dense, with wood fragments and roots.
10														
									3 3 2		S17-3			- grades to olive-gray, loose.
15														
									4 5 5		S17-4			- grades to olive-gray to light brown, loose to medium dense.
20														
									3 6 4		S17-5			- grades to dark brown, trace wood fragments.
									1 6 10		S17-6			- grades to dark brown to olive-gray, moist to wet, medium dense, seams of relic topsoil up to 3 inches thick.
25												SM		SILTY SAND WITH GRAVEL (SM):

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

DATE DRILLED: 4-27-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.2
TOTAL DEPTH (feet): 38.3
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									20 50/6"	☒	S17-7			light gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									30 30 43	☒	S17-8			- groundwater seepage encountered during drilling.
30														
									20 50/4"	☒	S17-9			- grades to olive gray.
35														
38.3									33 50/3"	☒	S17-10			

Boring was completed to a depth of 38.3 feet below ground surface. Groundwater seepage was encountered at a depth of 29 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	▨ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ________

BY: ________

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown to olive-gray, moist, very loose, fine- to medium-grained. (FILL)
									1 1 1		S18-1			
5														
									0 0 1		S18-2			- grades to brown, some gravel.
10														
									0 0 1		S18-3			
15														
									2 4 7		S18-4			- grades to dark brown, medium dense, trace roots and wood fragments.
20									2 5 6		S18-5			- grades to olive-gray to brown.
									5 20 12		S18-6			- grades to dense.
														- grades to gray, dry.
25														

DATE DRILLED: 4-29-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 331.0
TOTAL DEPTH (feet): 38.9
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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APPROV: ______ BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									5 6 1	☒	S18-7			- grades to olive-gray, moist, loose.
									3 12 16	☒	S18-8	SM		SILTY SAND WITH GRAVEL (SM): olive-gray, moist, medium dense, fine- to medium-grained. (GLACIAL TILL) - grades to dense.
30														
									12 20 16	☒	S18-9			
35														
									16 45 50/2.4"	☒	S18-10			- grades to light brown to light gray, very dense.
38.9														

Boring was completed to a depth of 38.9 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: asphaltic concrete pavement
0												SP-SM		Asphaltic concrete pavement (1 inch thick). Base course gravel. SAND WITH SILT AND GRAVEL (SP-SM): brown, moist, medium dense, fine- to medium-grained. (FILL)
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, dry to moist, dense, fine- to medium-grained. (GLACIAL TILL)
									12 17 20		S19-1			
5														
									9 45 42		S19-2			- grades to very dense.
10														
									20 50/5"		S19-3			
15														
			6.6						20 44 36		S19-4			
20									13 32 37		S19-5			
									12 30 32		S19-6			- grades to seams of sand with silt.
25														

DATE DRILLED: 5-3-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 340.2
TOTAL DEPTH (feet): 30.8
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

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BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD				U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	
25									16 43 50	☒	S19-7			
									20 50/4.5"	☒	S19-8			
30									19 50/4"	☒	S19-9			- grades to fine-grained.
30.8														

Boring was completed to a depth of 30.8 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips, and capped with Portland cement concrete.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▥ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

APPROV: ____

BY: ____

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0														Topsoil.
												SM	▨	SILTY SAND WITH GRAVEL (SM): brown to olive-gray, moist, loose, fine- to medium-grained. (FILL)
									3 5 4	⊠	S20-1			
5														
									1 0 26	⊠	S20-2			- grades to medium dense.
10												SM	▨	SILTY SAND WITH GRAVEL (SM): olive-gray to brown, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									16 26 27	⊠	S20-3			
15									10 17 27	⊠	S20-4			- grades to dense.
									22 50/5.5"	⊠	S20-5			- grades to very dense.
20									30 50/5"	⊠	S20-6			
									10 32 47	⊠	S20-7			
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-28-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 336.5
TOTAL DEPTH (feet): 33.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ____

BY: ____

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25														
									21 43 50/5.5"	☒	S20-8			- grades to dark gray, moist, medium-grained.
30														
									27 50/6"	☒	S20-9			- grades to olive gray, fine- to medium-grained.
33.5														Boring was completed to a depth of 33.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

* SAMPLER TYPE	⧓ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): light brown, moist, medium dense, fine- to medium-grained. (FILL)
									2 7 5		S21-1			
5														
									1 1 1		S21-2			- grades to very loose.
10														
									1 0 1		S21-3			- grades to dark brown, trace wood fragments.
15														
														- groundwater seepage encountered during drilling.
									2 4 2		S21-4			- grades to wet, loose.
20									6 10 9		S21-5			- grades to dark brown to olive-gray, moist, medium dense.
									5 7 5		S21-6			- grades to brown to olive-gray, some gravel.
25														

DATE DRILLED: 4-29-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 331.9
TOTAL DEPTH (feet): 44.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

KLEINFELDER
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	U.S.C.S. SYMBOL	SOIL DESCRIPTION
25									1 2 1	☒	S21-7			- grades to very loose.
									2 1 44	☒	S21-8			
30														
														- grades to olive-gray, moist to wet, medium dense.
									10 9 16	☒	S21-9			
35														- groundwater seepage encountered during drilling.
												SM		SILTY SAND WITH GRAVEL (SM): olive-gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									15 30 47	☒	S21-10			
40														
									27 29 30	☒	S21-11			- grades to light gray.
44														

Boring was completed to a depth of 44 feet below ground surface. Groundwater seepage was encountered at 15 and 34 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: asphaltic concrete pavement
0												SM		Asphaltic concrete pavement (2 inches thick). Base course gravel. SILTY SAND WITH GRAVEL (SM): red-brown, moist, medium dense, fine- to medium-grained, with bark and wood fragments. (FILL) - grades to gray-brown, dry to moist, very dense, no visible organics.
			6.2						19 27 23		S22-1			
5									10 37 45		S22-2			
									12 20 24		S22-3	SP-SM		SAND WITH SILT (SP-SM): gray-brown, dry, dense, fine- to medium-grained, some gravel, appeared to be bedding sand for marked sewer line near boring. (FILL)
10									50/4"		S22-4	SM		SILTY SAND WITH GRAVEL (SM): gray-brown, dry, very dense, fine- to medium-grained. (GLACIAL TILL)
									31 50/5"		S22-5			
15														
									19 43 49		S22-6			- grades to seams of fine-grained silty sand and silt with sand.
19														

Boring was completed to a depth of 19 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips, and capped with Portland cement concrete.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______ BY: ______

DATE DRILLED: 5-3-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 339.8
TOTAL DEPTH (feet): 19.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): dark gray to olive-gray, moist, loose, fine- to medium-grained, plastic debris encountered in sampler. (FILL)
									3 4 4	☒	S23-1			
5														- garbage encountered in cuttings.
												SM		SILTY SAND WITH GRAVEL (SM): light brown to light gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									6 30 50/5.5"	☒	S23-2			
10														
									13 24 16	☒	S23-3			- grades to light brown to olive-gray, dense.
15									6 22 37	☒	S23-4			- grades to olive gray, very dense.
									25 37 38	☒	S23-5			
20									27 50/5"	☒	S23-6			
									22 50/6"	☒	S23-7			
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

DATE DRILLED: 4-28-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 335.9
TOTAL DEPTH (feet): 34.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	SYMBOL	SOIL DESCRIPTION
25														
									22 47 40	☒	S23-8			
30														
									35 30 21	☒	S23-9			
34														

Boring was completed to a depth of 34 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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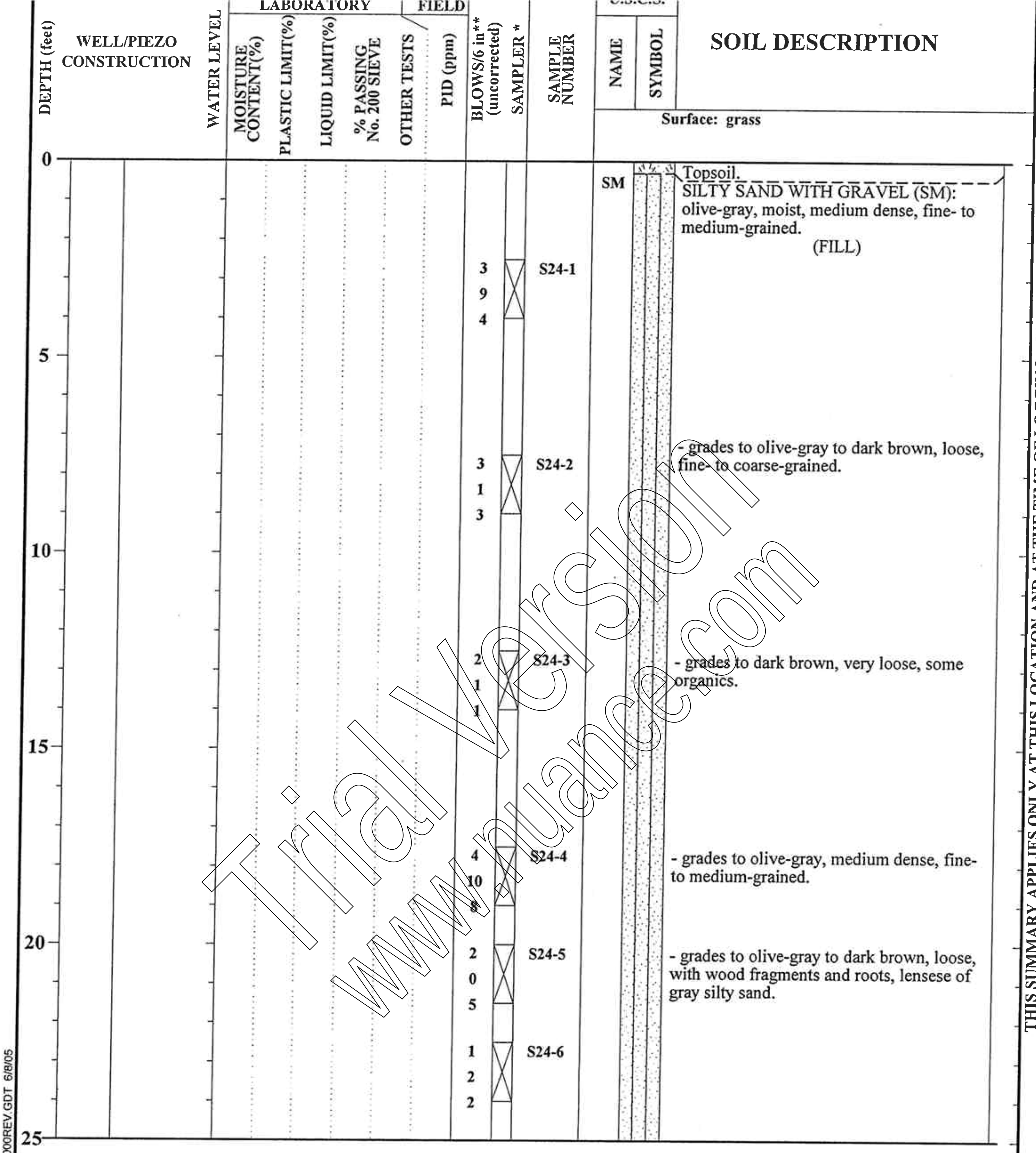

SOIL DESCRIPTION

Surface: grass

Topsoil.

SILTY SAND WITH GRAVEL (SM): olive-gray, moist, medium dense, fine- to medium-grained.

(FILL)

- grades to olive-gray to dark brown, loose, fine- to coarse-grained.

- grades to dark brown, very loose, some organics.

- grades to olive-gray, medium dense, fine- to medium-grained.

- grades to olive-gray to dark brown, loose, with wood fragments and roots, lensese of gray silty sand.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-28-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 334.0
TOTAL DEPTH (feet): 39.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ____ BY: ____

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY: MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	SYMBOL	SOIL DESCRIPTION
25									5 14 10	☒	S24-7			- grades to light gray, medium dense.
									25 45 30	☒	S24-8	SM		SILTY SAND WITH GRAVEL (SM): olive-gray to light gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
30														
												SP		SAND (SP): light brown, dry to moist, very dense, medium-grained, trace fines. (GLACIAL TILL)
									25 47 40	☒	S24-9	SM		SILTY SAND WITH GRAVEL (SM): light gray, moist, very dense, fine-grained. (GLACIAL TILL)
35														
									10 16 26	☒	S4-10			- grades to dense.
39														

Boring was completed to a depth of 39 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	SPT (2" OD) Split Spoon	Core Sample	Shelby Tube	Grab	No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ________

BY: ________

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY				FIELD		BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, loose, fine- to medium-grained. (FILL)
5									3 2 2	☒	S25-1			- grades to gray-brown, trace roots.
10									1 1 1	☒	S25-2			- grades to dark brown, wet, very loose, with wood fragments and roots.
15									6 16 3	☒	S25-3			- grades to gray, moist, loose.
									3 5 2	☒	S25-4			- grades to lenses of dark brown, wet organic silt.
20									2 10 29	☒	S25-5			
												SM		SILTY SAND WITH GRAVEL (SM): gray, wet, dense, fine- to medium-grained, low plasticity. (GLACIAL TILL)
									4 30 39	☒	S25-6			- grades to moist, very dense, lenses of silt, seams of sand with silt.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-28-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 324.5
TOTAL DEPTH (feet): 26.4
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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PROJECT NUMBER: 54568

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BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD				U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	
25									19	☒	S25-7		▨	
									37					
26.4									50/5"					

Boring was completed to a depth of 26.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, very loose, fine- to medium-grained. (FILL)
			9.7						1 1 1	☒	S26-1			- grades to moist to wet.
5														
									2 0 1	☒	S26-2			- grades to gray to brown, wet, trace roots.
10														
									1 1 1	☒	S26-3			- grades to gray.
15														
									2 2 3	☒	S26-4			- grades to dark brown, wet, loose, with organics.
20														
									4 2 2	☒	S26-5			- interbedded layers of gray silty sand with dark brown silty sand with wood fragments.
25														

DATE DRILLED: 5-2-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 331.0
TOTAL DEPTH (feet): 44.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

KLEINFELDER
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PROJECT NUMBER: 54568

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25														
									2 4 8	☒	S26-6			- grades to gray-brown with gray mottling, medium dense, low plasticity.
30														
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									12 21 39	☒	S26-7			
35									25 50/5.5"	☒	S26-8			
									17 31 30	☒	S26-9			
40									6 35 50/5"	☒	S26-10			
									8 33 50/5.5"	☒	S26-11			
44														

Boring was completed to a depth of 44 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, wet, very loose, fine- to medium-grained, trace roots. (FILL)
									1 0 1		S27-1			
5														
									1 1 2		S27-2			- grades to dark brown to gray, trace roots.
10														
									7 7 5		S27-3			- large gravel or cobbles encountered during sampling.
15														
									1 1 2		S27-4			- log encountered during sampling.
20														
									1 1 1		S27-5			- grades to gray-brown, wet, very loose, trace roots and wood fragments.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 5-2-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 331.8
TOTAL DEPTH (feet): 43.4
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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BY: ________

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	SYMBOL	SOIL DESCRIPTION
25														
												SM		SILTY SAND WITH GRAVEL (SM): gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									19 34 40	☒	S27-6			
30														
									12 14 21	☒	S27-7			- grades to wet, dense, seams of sand with silt and sandy silt.
35									24 50/4"	☒	S27-8			- grades to dry to moist, very dense.
									28 50/4"	☒	S27-9			- grades to moist to wet.
40									50/1"		S27-10			
									29 50/5"	☒	S27-11			- grades to moist.
43.4														

Boring was completed to a depth of 43.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

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LABORATORY | FIELD

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, loose, fine- to medium-grained, occasional 2- to 4-inch quarry spall encountered. (FILL)
5									2 1 2	☒	S28-1			- grades to very loose, no quarry spalls.
10									3 2 2	☒	S28-2			- grades to loose.
15									3 3 3	☒	S28-3			- grades to dark brown, moist to wet, with wood fragments.
20									1 1 9	☒	S28-4			- grades to gray, wet, medium dense, fine- to medium-grained, no visible organics.
												SM		SILTY SAND WITH GRAVEL (SM): gray, dry, very dense, fine- to coarse-grained. (GLACIAL TILL)
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-28-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 329.7
TOTAL DEPTH (feet): 43.9
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									21 46 50/5.5"	⊠	S28-5			
30									1 30 50/4"	⊠	S28-6			
35									13 43 40/4.5"	⊠	S28-7			
									3 50/6"	⊠	S28-8			
40									20 38 50/5.5"	⊠	S28-9			- grades to moist.
									7 46 50/5"	⊠	S28-10			
43.9														

Boring was completed to a depth of 43.9 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE: Cal. (3"OD) Split Spoon; SPT (2" OD) Split Spoon; Core Sample; Shelby Tube; Grab; No Recovery

**HAMMER WEIGHT: 300 lbs (30" Drop); 140 lbs (30" Drop)

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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APPROV: ____

BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense, fine- to medium-grained, som roots. (FILL)
5									5 3 3		S29-1			- grades to loose.
10									2 1 2		S29-2			- grades to very loose.
15									2 2 2		S29-3			- grades to dark brown, wet, loose, fine-grained, no visible gravel.
20									3 2 6		S29-4			
												SM		SILTY SAND WITH GRAVEL (SM): gray, moist, very dense, fine- to
25														

DATE DRILLED: 4-25-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 330.9
TOTAL DEPTH (feet): 45.8
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

DEPTH (feet)	BLOWS/6 in** (uncorrected)	SAMPLE NUMBER	SOIL DESCRIPTION
25	11 50/6"	S29-5	medium-grained. (GLACIAL TILL)
30	50/6"	S29-6	
35	2 33 41	S29-7	
	3 26 50	S29-8	
40	34 50/2.5"	S29-9	
	2 35 50/4"	S29-10	
45	22 50/3"	S29-11	
45.8			

Boring was completed to a depth of 45.8 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, medium dense, fine- to medium-grained. (FILL)
														- grades to wet.
5			14.2						1 5 3		S30-1			- grades to dark brown, moist, loose, fine-grained, with roots and wood fragments.
10									4 5 5		S30-2			- grades to medium dense, some organics.
									2 2 2		S30-3			- grades to brown, moist to wet, loose, with wood fragments.
15									5 5 7		S30-4			
												SP-SM		SAND WITH SILT (SP-SM): gray, moist, medium dense, fine-grained. (FILL)
									1 17 47		S30-5	SM		SILTY SAND WITH GRAVEL (SM): gray, wet, very dense, fine-grained. (GLACIAL TILL)
20									20 36 50/5"		S30-6			
21.4														

Boring was completed to a depth of 21.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-25-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 333.9
TOTAL DEPTH (feet): 21.4
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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	LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, loose, fine- to medium-grained. (FILL)
									5 5 5		S31-1			
5									3 4 3		S31-2			- grades to brown to gray, moist to wet, loose.
									2 1 1		S31-3			- grades to brown, very loose
10									20 50/6"		S31-4	SM		SILTY SAND WITH GRAVEL (SM): brown to olive-gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
11														

Boring was completed to a depth of 11 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-25-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 338.1
TOTAL DEPTH (feet): 11.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______
BY: ______

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown, moist, loose, fine- to medium-grained. (FILL)
									2 1 3		S32-1			
5									15 16 34		S32-2	SM		SILTY SAND WITH GRAVEL (SM): brown, moist, dense, fine- to medium-grained. (GLACIAL TILL)
									19 27 46		S32-3			- grades to light gray-brown, very dense.
10									7 35		S32-4			
11.5									50/5.5"					

Boring was completed to a depth of 11.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____________ BY: ____________

DATE DRILLED: 4-25-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 336.8
TOTAL DEPTH (feet): 11.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown to olive-gray, moist, medium dense, fine- to medium-grained. (FILL)
									7 8 11	☒	S33-1			
5												SM		SILTY SAND WITH GRAVEL (SM): light gray to olive-gray, moist to wet, dense, fine- to medium-grained. (GLACIAL TILL)
									8 15 29	☒	S33-2			
									25 38 50	☒	S33-3			- grades to light brown, moist, very dense.
10									21 22 44	☒	S33-4			- grades to light gray to brown, fine-grained.
11.5														

Boring was completed to a depth of 11.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-25-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 336.6
TOTAL DEPTH (feet): 11.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING
PROJECT NUMBER: 54568

Proposed Retail Development
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense, fine- to medium-grained. (FILL)
									5 7 11	☒	S34-1			
5												SM		SILTY SAND WITH GRAVEL (SM): light gray to olive-gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									16 28 34	☒	S34-2			
									43 43 50	☒	S34-3			
10									17 48 50/2"	☒	S34-4			
11.2														

Boring was completed to a depth of 11.2 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-25-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 332.7
TOTAL DEPTH (feet): 11.2
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ____________

BY: ____________

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): light gray-brown, moist, medium dense, fine- to medium-grained. (FILL)
									5 7 11	☒	S35-1			
5									10 9 3	☒	S35-2			- grades to black, with organics and asphaltic concrete fragments.
									4 5 11	☒	S35-3			- grades to light brown to light gray, no visible organics or debris.
10									32 50/6"	☒	S35-4	SM		SILTY SAND WITH GRAVEL (SM): light gray to olive-gray, wet to moist, very dense, fine-grained. (GLACIAL TILL)
11														

Boring was completed to a depth of 38.9 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-25-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 335.5
TOTAL DEPTH (feet): 11.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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Proposed Retail Development
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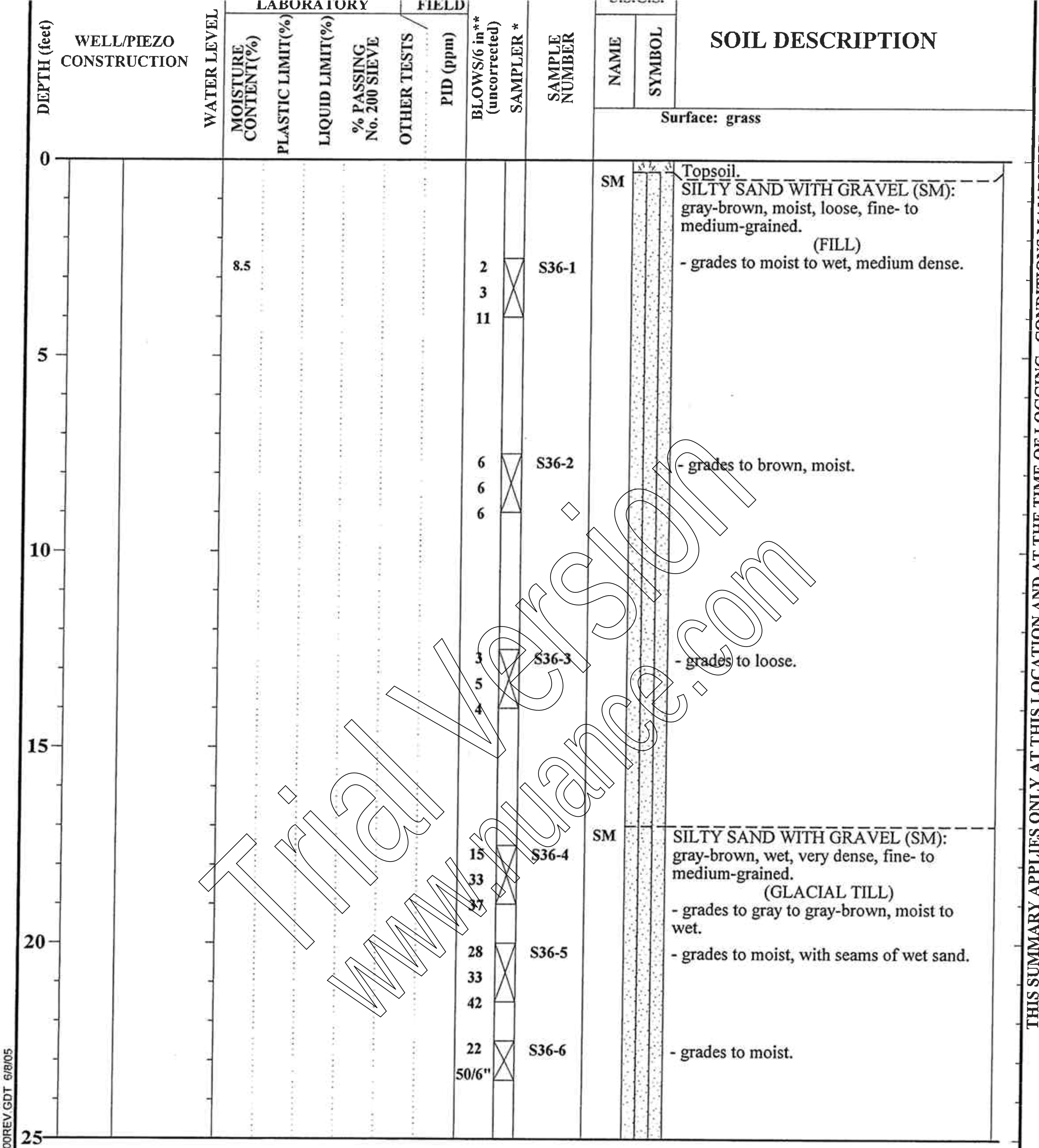
APPROV: ____

BY: ____



DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY: MOISTURE CONTENT(%)	LABORATORY: PLASTIC LIMIT(%)	LABORATORY: LIQUID LIMIT(%)	LABORATORY: % PASSING No. 200 SIEVE	LABORATORY: OTHER TESTS	FIELD: PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, loose, fine- to medium-grained. (FILL)
			8.5						2 3 11		S36-1			- grades to moist to wet, medium dense.
5														
									6 6 6		S36-2			- grades to brown, moist.
10														
									3 5 4		S36-3			- grades to loose.
15														
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, wet, very dense, fine- to medium-grained. (GLACIAL TILL)
									15 33 37		S36-4			- grades to gray to gray-brown, moist to wet.
20									28 33 42		S36-5			- grades to moist, with seams of wet sand.
									22 50/6"		S36-6			- grades to moist.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DILLED: 5-2-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.0
TOTAL DEPTH (feet): 26.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									19 50/6"	☒	S36-7		▨	
26														

Boring was completed to a depth of 26 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown to gray, moist, medium dense, fine- to medium-grained. (FILL)
5									5 5 5		S37-1			
10									3 2 3		S37-2			- grades to dark brown, loose.
15									14 20 17		S37-3			SILT (ML): light gray to olive gray, moist, hard, trace sand. (GLACIAL TILL)
												SM		SILTY SAND WITH GRAVEL (SM): light gray, dry, very dense, fine- to medium-grained. (GLACIAL TILL)
20									28 47 50		S37-4			
									39 50/3"		S37-5			- grades to olive-gray, moist.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-26-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 334.0
TOTAL DEPTH (feet): 30.4
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD						SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	
25									25 50/6"	☒	S37-6			
									50/6"	☒	S37-7			
30 30.4									50/5"	☒	S37-8			

Boring was completed to a depth of 30.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	SPT (2" OD) Split Spoon	Core Sample	Shelby Tube	Grab	No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____________

BY: ____________

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown to light gray, moist, medium dense, fine- to medium-grained, lenses of wet. (FILL)
5									3 4 10		S38-1			
10									6 3 3		S38-2			- grades to loose, some wood fragments.
15									6 4 4		S38-3			
20									6 6 8		S38-4			- grades to olive-gray to light gray, moist, medium dense.
												SP		SAND (SP): light gray, wet, medium dense to dense, fine-grained, trace fines.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-25-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 337.5
TOTAL DEPTH (feet): 36.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									9 37 34	⊠	S38-5	ML SM		(FILL) SILT (ML): light gray, wet, hard. (GLACIAL TILL) SILTY SAND WITH GRAVEL (SM): light gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									31 50/5"	⊠	S38-6			
30									41 50/6"	⊠	S38-7			
									28 34 50/5"	⊠	S38-8			
35									22 37 45	⊠	S38-9			
36.5														

Boring was completed to a depth of 36.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	⊠ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	◫ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ________

BY: ________

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown to olive-gray, moist, very loose, fine- to medium-grained. (FILL)
5									1 1 1		S39-1			
10									1 1 1		S39-2			- grades to moist to wet.
15									1 1 1		S39-3			- grades to dark brown, wet, fine-grained, some gravel, with bark and wood fragments.
20									1 3 1		S39-4			- grades to gray to brown, moist, fine- to medium-grained, trace organics.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-26-05
LOGGED BY: D. Divine
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 335.5
TOTAL DEPTH (feet): 41.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
25									4 4 4		S39-5			
												SP		SAND (SP): light gray, moist, loose, fine-grained. (FILL)
												SM		SILTY SAND WITH GRAVEL (SM): light gray to olive-gray, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
30									20 29 47		S39-6			
									50/6"		S39-7			
35									18 29 32		S39-8			
									31 50/6"		S39-9			
40									25 50/6"		S39-10			
41														

Boring was completed to a depth of 41 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	Cal. (3"OD) Split Spoon	SPT (2" OD) Split Spoon	Core Sample	Shelby Tube	Grab	No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______ BY: ______

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense, fine- to medium-grained, with roots. (FILL)
5									3 6 7		S40-1			
10									2 2 2		S40-2			- grades to brown to gray-brown, loose, trace roots.
15									1 1 2		S40-3			- grades to wet, very loose, trace wood fragments.
									1 2 3		S40-4			- grades to gray, loose.
20									9 18 25		S40-5	SP-SM		SAND WITH SILT AND GRAVEL (SP-SM): gray, wet, dense, medium-grained. (GLACIAL TILL)
									3 34 50/3"		S40-6	SM		SILTY SAND WITH GRAVEL (SM): gray, moist to wet, very dense, fine- to medium-grained. (GLACIAL TILL)
25														

DATE DRILLED: 4-25-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 323.9
TOTAL DEPTH (feet): 25.9
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

KLEINFELDER
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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25 25.9									13 50/5"	☒	S40-7			- grades to moist.

Boring was completed to a depth of 25.9 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense, fine- to medium-grained. (FILL)
5									1 1 2		S41-1			- grades to very loose.
10									1 2 2		S41-2	OL		ORGANIC SILT (OL): dark brown, moist, soft, trace sand. (FILL)
												SM		SILTY SAND WITH GRAVEL (SM): brown, wet, loose, fine- to medium-grained. (FILL)
												SP-SM		SAND WITH SILT AND GRAVEL (SP-SM): gray, moist, very dense, medium-grained. (GLACIAL TILL)
15									12 30 32		S41-3			
									3 17 50/5"		S41-4	SM		SILTY SAND WITH GRAVEL (SM): gray to gray-brown, moist to wet, very dense, fine- to medium-grained, lenses of gray-brown sand with silt. (GLACIAL TILL)
20									22 50/3"		S41-5			
									2 27 50		S41-6			
25														

DATE DRILLED: 4-26-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 318.5
TOTAL DEPTH (feet): 26.3
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____ BY: ____

2000 STANDARD IN/OUT 54568.GPJ 2000REV.GDT 6/8/05

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									25 36 50/4"	☒	S41-7		▨	
26.3														

Boring was completed to a depth of 26.3 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	⧗	Cal. (3"OD) Split Spoon	☒	SPT (2" OD) Split Spoon	▯	Core Sample	▮	Shelby Tube	◫	Grab	○	No Recovery
**HAMMER WEIGHT		300 lbs (30" Drop)		140 lbs (30" Drop)								

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S.		SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown to gray-brown, moist, medium dense, fine- to medium-grained. (FILL)
5			13.9						3 6 5		S42-1			
														- grades to dark brown, loose, with wood fragments.
10									4 4 2		S42-2			
15									11 18 30		S42-3	SM		SILTY SAND WITH GRAVEL (SM): gray to gray-brown, moist to wet, dense, fine- to medium-grained. (GLACIAL TILL)
									3 20 33		S42-4			- grades to wet, very dense.
20									20 32 50/4.5"		S42-5			
									7 50/5"		S42-6			- grades to dry to moist, with lenses of light brown silt.
25														

DATE DRILLED: 4-26-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 317.9
TOTAL DEPTH (feet): 25.9
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ____

BY: ____

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PROJECT NUMBER: 54568

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						
25									20	☒	S42-7			
25.9									50/5"					

Boring was completed to a depth of 25.9 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

APPROV: ______

BY: ______

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			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense, fine- to medium-grained. (FILL)
														- grades to dark brown, moist, with organics.
5									4 4 14	☒	S43-1			
10									4 3 5	☒	S43-2			- grades to light brown to brown, moist to wet, loose, no visible organics.
												SM		SILTY SAND WITH GRAVEL (SM): gray to gray-brown, moist, very dense, fine- to medium-grained. (GLACIAL TILL)
15									11 35 41	☒	S43-3			
									10 31 46	☒	S43-4			
20									10 34 44	☒	S43-5			- grades to with lenses of wet sand.
									2 30 50/4.5"	☒	S43-6			
25														

DATE DRILLED: 4-26-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 319.8
TOTAL DEPTH (feet): 25.9
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									21 50/5"	☒	S43-7		▨	- grades to gray-brown with yellow-brown mottling, dry to moist.
25.9														

Boring was completed to a depth of 25.9 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: _____ BY: _____

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

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			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown, moist, loose, fine- to medium-grained, trace roots. (FILL)
5									6 4 3		S44-1			
									10 10 17		S44-2			- grades to brown, wet.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, wet, dense, fine-grained. (GLACIAL TILL)
10									5 17 18		S44-3			- grades to moist to wet.
									3 13 25		S44-4			
15									11 19 22		S44-5			- grades to with lenses of sand with silt.
16.5														

Boring was completed to a depth of 16.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-26-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 312.0
TOTAL DEPTH (feet): 16.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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APPROV: ____

BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	LABORATORY PLASTIC LIMIT(%)	LABORATORY LIQUID LIMIT(%)	LABORATORY % PASSING No. 200 SIEVE	LABORATORY OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, loose, fine- to medium-grained. (FILL)
5									2 5 4		S45-1			
									1 0 2		S45-2			- grades to dark brown, wet, very loose, with wood fragments.
10									6 16 18		S45-3	SM		SILTY SAND WITH GRAVEL (SM): gray to gray-brown, moist, dense, fine- to medium-grained. (GLACIAL TILL)
									5 12 14		S45-4			- grades to wet, medium dense, with lenses of sand with silt.
15									10 17 25		S45-5			- grades to dense.
16.5														

Boring was completed to a depth of 16.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 311.7
TOTAL DEPTH (feet): 16.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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APPROV: ____ BY: ____

			LABORATORY					FIELD				U.S.C.S.		
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense to dense, fine- to medium-grained, cobbles encountered during drilling. (FILL)
5									16 16 5		S46-1			
									1 0 3		S46-2			- grades to wet, very loose.
10									2 13 18		S46-3	SM		SILTY SAND WITH GRAVEL (SM): gray-brown with orange-brown mottling, wet, dense, fine- to medium-grained. (GLACIAL TILL)
									20 37 27		S46-4			- grades to gray, moist, very dense.
15									9 22 25		S46-5			- grades to dense, with lenses of sand.
16.5														

Boring was completed to a depth of 16.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 311.6
TOTAL DEPTH (feet): 16.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	U.S.C.S. NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, moist, medium dense, fine- to medium-grained, occasional 2- to 4-inch quarry spall encountered during drilling. (FILL)
5			11.6						2 3 2		S47-1			- grades to moist to wet, loose, trace roots.
									0 1 2		S47-2			- grades to brown with orange-brown mottling, wet, very loose, trace organics.
10									11 18 12		S47-3	SM		SILTY SAND WITH GRAVEL (SM): gray to gray-brown, moist, dense, fine- to medium-grained, with lenses of sand with silt. (GLACIAL TILL)
									4 19 28		S47-4			- grades to gray.
15									13 30 50		S47-5			- grades to very dense.
16.5														

Boring was completed to a depth of 16.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 311.0
TOTAL DEPTH (feet): 16.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER			SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)				NAME	SYMBOL	
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown to gray-brown, moist to wet, loose, fine- to medium-grained. (FILL)
5									1 3 1		S48-1			- grades to wet, very loose, trace organics.
									0 1 5		S48-2			- grades to gray, wet, loose, fine- to medium-grained, low plasticity.
10									6 11 12		S48-3			- grades to medium dense.
									3 17 26		S48-4	SM		SILTY SAND WITH GRAVEL (SM): gray, wet, dense, fine- to medium-grained, with seams of sand with silt. (GLACIAL TILL)
15									11 18 23		S48-5			
16.5														

Boring was completed to a depth of 16.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 310.3
TOTAL DEPTH (feet): 16.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ____

BY: ____

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DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, wet, very loose, fine- to medium-grained, with wood fragments and roots. (FILL)
5									1 0 1		S49-1			
									4 14 13		S49-2			- grades to gray to gray-brown, wet, medium dense.
10									8 21 38		S49-3	SM		SILTY SAND WITH GRAVEL (SM): gray to gray-brown, dry to moist, very dense, fine- to medium-grained. (GLACIAL TILL)
									8 50/5.5"		S49-4			- grades to moist to wet.
15									15 40 50/5"		S49-5			- grades to dry to moist.
16.4														Boring was completed to a depth of 16.4 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 309.9
TOTAL DEPTH (feet): 16.4
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

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			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): gray-brown, wet, loose, fine- to medium-grained. (FILL)
5			15.4						1 2 10		S50-1			- grades to brown, medium dense, trace organics.
									4 15 24		S50-2	SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist to wet, dense, fine- to medium-grained. (GLACIAL TILL)
10									12 23 32		S50-3			- grades to gray to gray-brown, moist, very dense.
									13 40 50/5"		S50-4			- grades to dry to moist.
15									8 24 36		S50-5			
16.5														

Boring was completed to a depth of 16.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt
SURFACE ELEVATION (feet): 309.5
TOTAL DEPTH (feet): 16.5
DIAMETER OF BORING (in): 8 inches
DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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APPROV: ______
BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, wet, loose, fine- to medium-grained. (FILL) - grades to brown.
5									1 9 26		S51-1			
												SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist, very dense, fine- to medium-grained. (GLACIAL TILL) - grades to gray to gray-brown, moist to wet, dense, with lenses of sand with silt.
									9 16 26		S51-2			
10									11 28 24		S51-3			- grades to wet, very dense.
									6 42 50/5.5"		S51-4			
14														Boring was completed to a depth of 14 feet below ground surface. Groundwater seepage was encountered at a depth of 10 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 308.3
TOTAL DEPTH (feet): 14.0
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

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BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)						
														Surface: grass
0														Topsoil.
												SM		SILTY SAND WITH GRAVEL (SM): brown, wet, very loose, fine- to medium-grained, trace roots. (FILL)
									1 1 13	☒	S52-1			- grades to yellow brown, moist to wet, medium dense, some gravel.
5									5 12 19	☒	S52-2	SM		SILTY SAND WITH GRAVEL (SM): gray-brown, moist to wet, dense, fine- to medium-grained. (GLACIAL TILL)
									4 10 21	☒	S52-3			- grades to wet, with lenses of sand with silt.
10									2 22 50/5.5"	☒	S52-4			- grades to moist to wet, very dense.
11.5														

Boring was completed to a depth of 11.5 feet below ground surface. Groundwater seepage was encountered at a depth of 7.5 feet below ground surface during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 308.0
TOTAL DEPTH (feet): 11.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-52

Appendix
A -53

			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	**SOIL DESCRIPTION**
														Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): brown, wet, loose, fine- to medium-grained. (FILL)
									1 4 2	☒	S53-1			
5									4 11 14	☒	S53-2			- grades to gray-brown, medium dense, with lenses of sand with silt.
												10		SILTY SAND WITH GRAVEL (SM): gray-brown, moist to wet, dense, fine- to medium-grained. (GLACIAL TILL)
									3 19 30	☒	S53-3			
10									11 36 50/5.5"	☒	S53-4			- grades to very dense.
11.5														

Boring was completed to a depth of 11.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

DATE DRILLED: 4-27-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 307.3
TOTAL DEPTH (feet): 11.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-53

Appendix
A -54

			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): gray-brown, moist, medium dense, fine- to medium-grained. (FILL)
5			8.6						7 4 3	☒	S54-1			- grades to brown, loose, trace roots.
10									6 4 2	☒	S54-2			
15									3 4 6	☒	S54-3			- grades to gray-brown to gray, moist to wet, medium dense.
									0 1 1	☒	S54-4			- grades to brown, wet, very loose.
20									10 14 18	☒	S54-5	SM		SILTY SAND WITH GRAVEL (SM): gray, moist, dense, fine- to medium-grained. (GLACIAL TILL)
									2 14 38	☒	S54-6			- grades to wet, very dense, seams of sand with silt.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 4-28-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 324.6
TOTAL DEPTH (feet): 26.5
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

APPROV: ______

BY: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-54

Appendix
A 55a

			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									16	☒	S54-7		▨	- grades to gray to gray-brown with yellow-brown mottling, moist.
									43					
26.5									50					

Boring was completed to a depth of 26.5 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

* SAMPLER TYPE	⧗ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	◫ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-54

Appendix

A 55b

APPROV: ______

BY: ______

			LABORATORY					FIELD						
DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): gray, moist, loose, fine- to medium-grained. (FILL)
									3 3 1	☒	S55-1			- grades to very loose.
5														
									1 1 1	☒	S55-2			
10														
									2 2 5	☒	S55-3			- grades to loose.
15														
									1 1 5	☒	S55-4			- grades to brown to gray, wet, with wood fragments.
20									1 5 7	☒	S55-5			- grades to dark brown. - grades to gray.
									6 7 5	☒	S55-6			- grades to gray with gray-brown mottling, moist, medium dense.
25														

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

DATE DRILLED: 5-2-05	SURFACE ELEVATION (feet): 331.2	DRILLING METHOD: HSA
LOGGED BY: F. Reinart	TOTAL DEPTH (feet): 29.0	DRILLER: Holt Drilling
REVIEWED BY: J. Schmidt	DIAMETER OF BORING (in): 8 inches	CASING SIZE: N/A

APPROV: ______

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-55

Appendix
A 56a

BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									1 3 2	☒	S55-7			- grades to brown to gray, wet, loose, fine-grained.
									15 19 19	☒	S55-8	SM		SILTY SAND WITH GRAVEL (SM): gray, moist, dense, fine-grained. (GLACIAL TILL)
29														

Boring was completed to a depth of 29 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	▮ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-55

Appendix

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PAGE 2 of 2

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY					FIELD						SOIL DESCRIPTION
			MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	Surface: grass
0												SM		Topsoil. SILTY SAND WITH GRAVEL (SM): light brown, dry, medium dense, fine- to medium-grained, trace roots. (FILL)
5									2 2 2	☒	S56-1			- grades to loose.
10									1 1 2	☒	S56-2			- grades to brown, wet, very loose, trace roots.
									1 0 2	☒	S56-3			- grades to with wood fragments. - grades to gray, wet, loose.
15									2 2 2	☒	S56-4			- grades to gray to gray-brown with black mottling, no odor (0.0 using PID).
									2 6 5	☒	S56-5			- grades to medium dense, no black mottling.
20									7 11 5	☒	S56-6			
25														

DATE DRILLED: 4-28-05
LOGGED BY: F. Reinart
REVIEWED BY: J. Schmidt

SURFACE ELEVATION (feet): 332.6
TOTAL DEPTH (feet): 35.7
DIAMETER OF BORING (in): 8 inches

DRILLING METHOD: HSA
DRILLER: Holt Drilling
CASING SIZE: N/A

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-56

Appendix
A 57a

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ____

BY: ____

DEPTH (feet)	WELL/PIEZO CONSTRUCTION	WATER LEVEL	LABORATORY MOISTURE CONTENT(%)	PLASTIC LIMIT(%)	LIQUID LIMIT(%)	% PASSING No. 200 SIEVE	OTHER TESTS	FIELD PID (ppm)	BLOWS/6 in** (uncorrected)	SAMPLER *	SAMPLE NUMBER	NAME	SYMBOL	SOIL DESCRIPTION
25									2 2 3	☒	S56-7			- grades to brown, wet, loose, fine-grained, with roots.
30									5 9 18	☒	S56-8			- grades to gray, medium dense, fine- to medium-grained.
												SM		SILTY SAND WITH GRAVEL (SM): gray, wet, dense, fine- to medium-grained. (GLACIAL TILL)
35									44 50/2"	☒	S56-9			- grades to dry to moist, very dense.
35.7														

Boring was completed to a depth of 35.7 feet below ground surface. Groundwater was not encountered during drilling. Boring was backfilled with a mixture of cuttings and bentonite chips.

* SAMPLER TYPE	☒ Cal. (3"OD) Split Spoon	☒ SPT (2" OD) Split Spoon	▯ Core Sample	■ Shelby Tube	▯ Grab	○ No Recovery
**HAMMER WEIGHT	300 lbs (30" Drop)	140 lbs (30" Drop)				

KLEINFELDER
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
SOILS AND MATERIALS TESTING

PROJECT NUMBER: 54568

Proposed Retail Development
2119 Mildred Street
Fircrest, Washington

BORING LOG
B-56

Appendix
A 57b

PAGE 2 of 2

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

APPROV: ______

BY: ______

APPENDIX B
GEOTECHNICAL LABORATORY TESTING

B.1 GENERAL

We conducted laboratory tests on several representative soil samples to better identify the soil classification of the units encountered and to evaluate the material's general physical properties and engineering characteristics. A brief description of the tests performed for this study is provided below. The results of laboratory tests performed on specific samples are provided at the appropriate sample depths on the individual boring logs. However, it is important to note that these test results may not accurately represent in situ soil conditions. All of our recommendations are based on our interpretation of these test results and their use in guiding our engineering judgment. Kleinfelder cannot be responsible for the interpretation of these data by others.

In accordance with your requirements, the soil samples for this project will be retained a period of 6 months following completion of this report, or until the foundation installation is complete, unless we are otherwise directed in writing.

B.2 SOIL CLASSIFICATION

Soil samples were visually examined in the field by our representative at the time they were obtained. They were subsequently packaged and returned to our laboratory where they were reexamined and the original description checked and verified or modified. With the help of information obtained from the other classification tests, described below, the samples were described in general accordance with the Unified Classification System, ASTM Standard D2487. The resulting descriptions are provided at the appropriate locations on the individual boring logs, located in Appendix A, and are qualitative only.

B.3 MOISTURE CONTENT

Moisture content tests were performed on 15 samples obtained from the borings. The purpose of these tests is to approximately ascertain the in-place moisture content of the soil sample at the time it was collected. The moisture content is determined in general accordance with ASTM Standard D2216. The information obtained assists us by providing qualitative information regarding soil compressibility. The results of these tests are presented at the appropriate sample depths on the boring logs.

B.4 GRAIN-SIZE DISTRIBUTION

Detailed grain-size distribution analyses were conducted in general accordance with ASTM Standard D422 on 5 representative soil samples to determine the grain-size distribution of the on-site soil. The information gained from this analysis allows us to provide a detailed description and classification of the in-place materials. In turn, this information helps us to understand how the in-place materials will react to conditions such as heavy seepage, traffic action, loading, potential liquefaction, and so forth. The results of these tests are presented in this Appendix.

B.5 MODIFIED PROCTOR

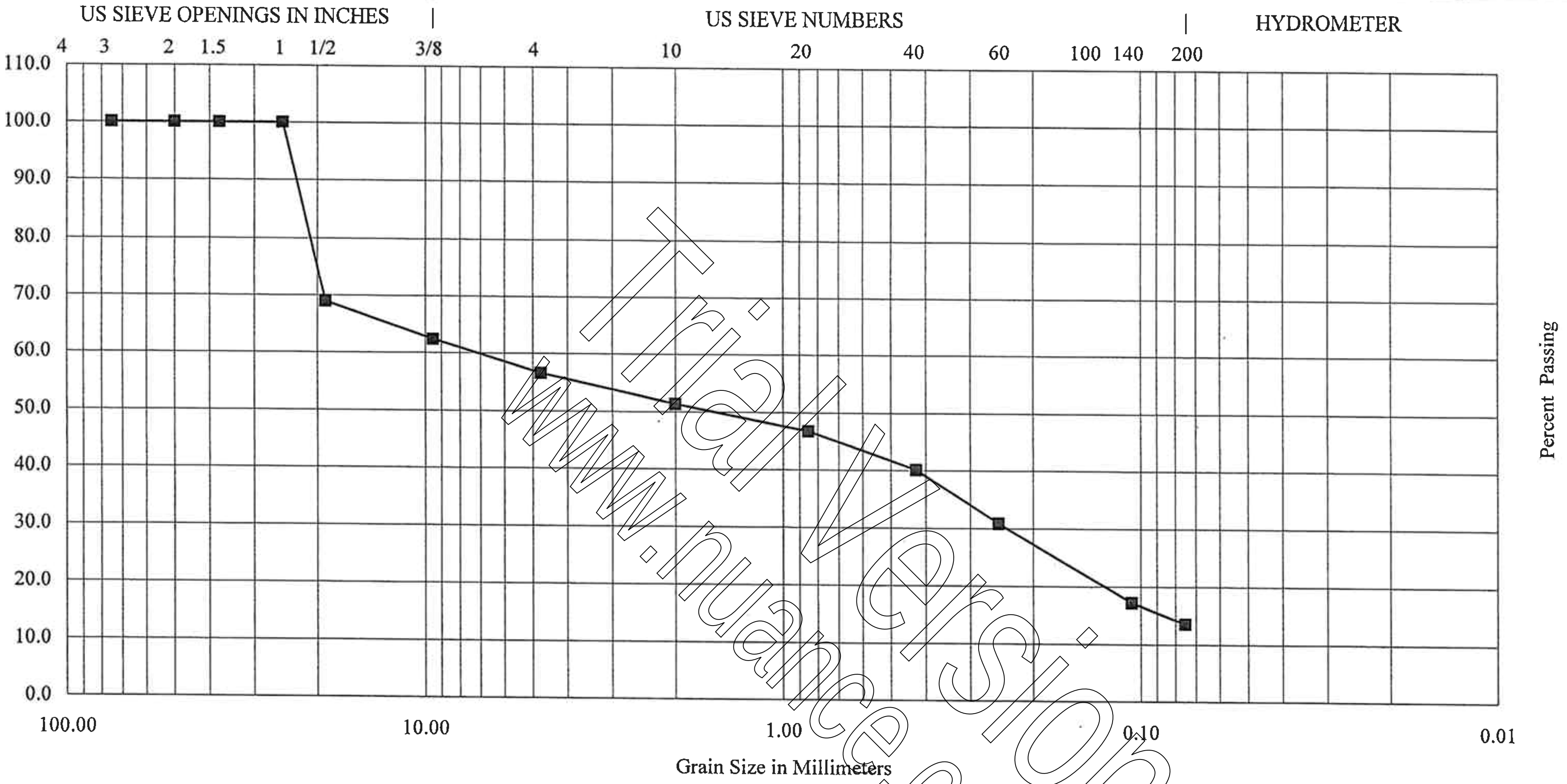
We performed one compaction test on a composite bulk sample obtained from borings performed in the proposed parking lot. The test was performed in accordance with ASTM Standard D1557 (Modified Proctor). The test was performed to obtain a compaction value for the on-site soils for use in performing a California Bearing Ratio test. The results of this test is presented in this Appendix.

B.6 CALIFORNIA BEARING RATIO

We performed one CBR test on a composite bulk sample obtained from borings performed in the proposed parking lot. The test was performed in general accordance with ASTM Standard D1883. A CBR value of 19 was obtained from this test.

B.7 DIRECT SHEAR

We performed a direct shear test on one relatively undisturbed samples to determine the shear strength of the in-place native soil. The test was performed in general accordance with ASTM Standard D3080 on a sample at the field moisture conditions. A normal load, appropriate to the anticipated foundation conditions, was applied to the test sample and the sample was then sheared under a constant strain control. The results of this test is presented in this Appendix.



GRAVEL		SAND			FINES (SILTS OR CLAYS)
coarse	fine	coarse	medium	fine	

Sa. No.	S13-2
Boring	B-13 / 7.5'
Desc.	GM

Silty Gravel with Sand

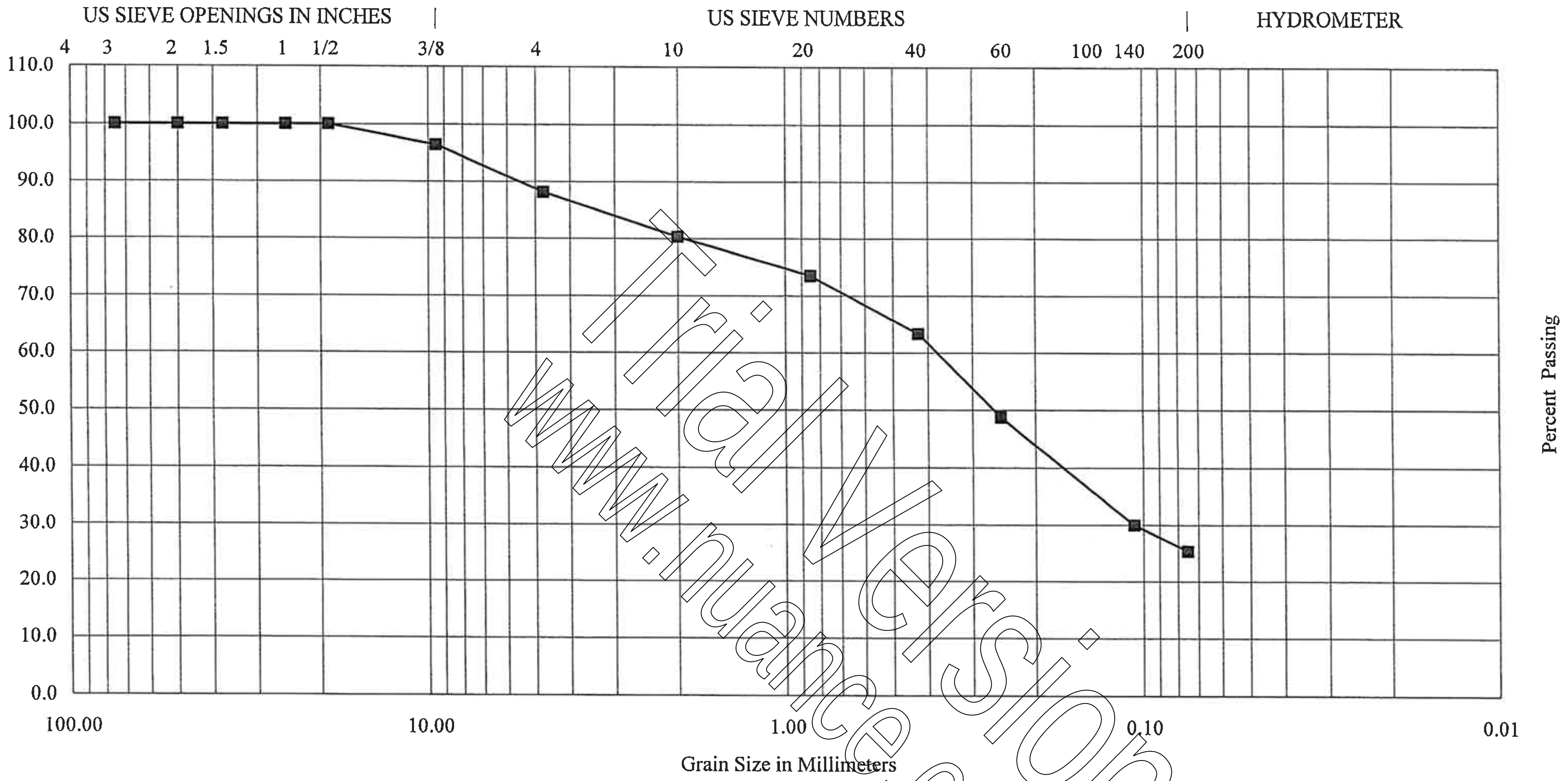
2405 140th Ave. NE
Suite A 101
Bellevue, WA 98005
(452) 562-4200

Sieve Analysis

Proposed Retail Development

L04S

Project Number	Technician	Approved	Date	Revised	Date
54568 / 3	F. Bengco	G. Hayre	5/31/2005	M. Monserud	6/7/2005



GRAVEL		SAND			FINES (SILTS OR CLAYS)
coarse	fine	coarse	medium	fine	

Sa. No.	S9-1
Boring	B-9 / 5'
Desc.	SM

Silty Sand

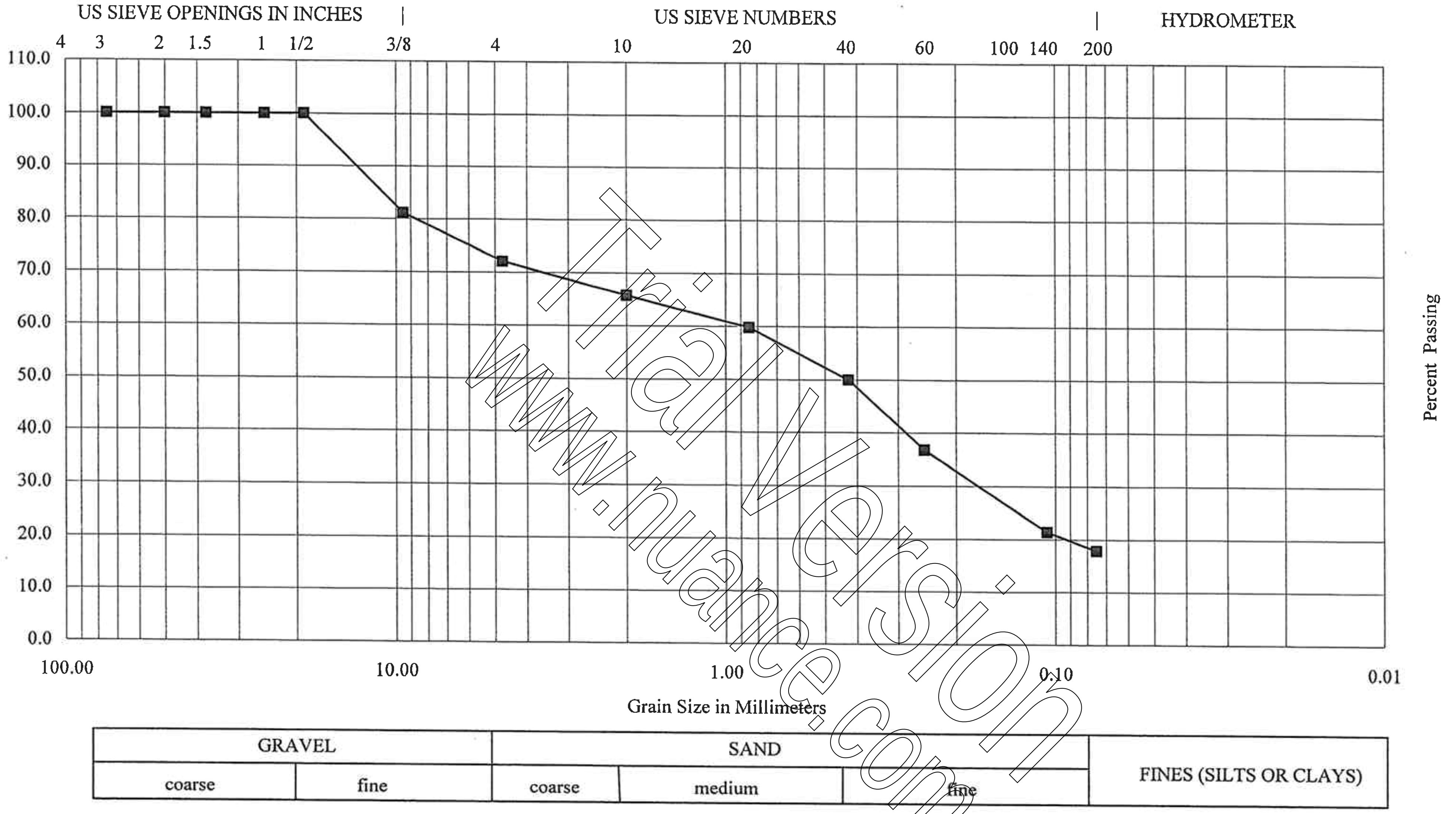
2405 140th Ave. NE
Suite A 101
Bellevue, WA 98005
(452) 562-4200

Sieve Analysis

Proposed Retail Development

L05S

Project Number	Technician	Approved	Date	Revised	Date
54568 / 3	F. Bengco	G. Hayre	5/31/2005	M. Monserud	6/7/2005



Sa. No. S12-1
Boring B-12 / 2.5'
Desc. SM
Silty Sand with Gravel

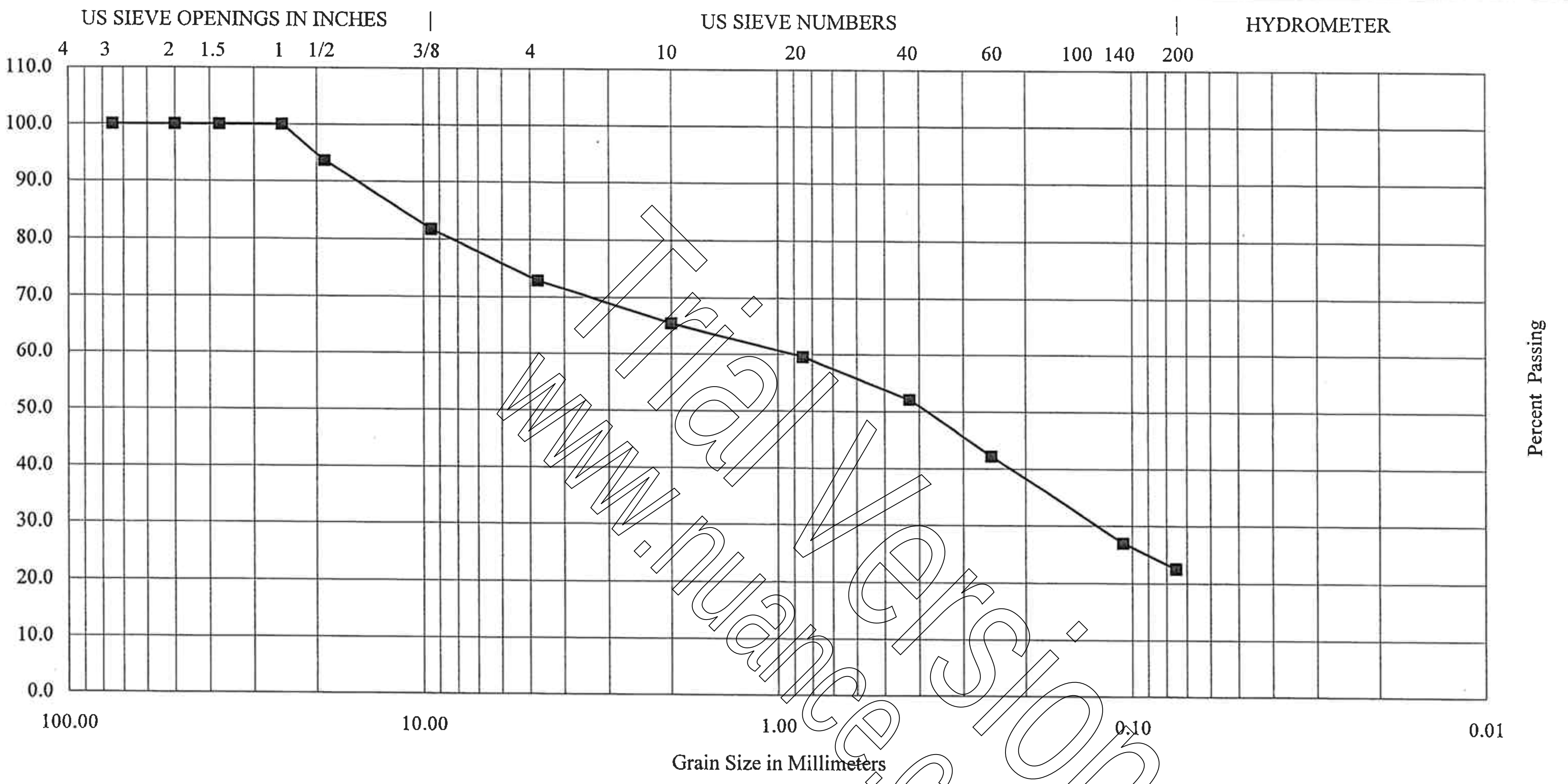
2405 140th Ave. NE
Suite A 101
Bellevue, WA 98005
(452) 562-4200

Sieve Analysis

Proposed Retail Development

L06S

Project Number	Technician	Approved	Date	Revised	Date
54568 / 3	F. Bengco	G. Hayre	5/31/2005	M. Monserud	6/7/2005



GRAVEL		SAND			FINES (SILTS OR CLAYS)
coarse	fine	coarse	medium	fine	

Sa. No.	S7-1
Boring	B-7 / 2.5'
Desc.	SM

Silty Sand with Gravel

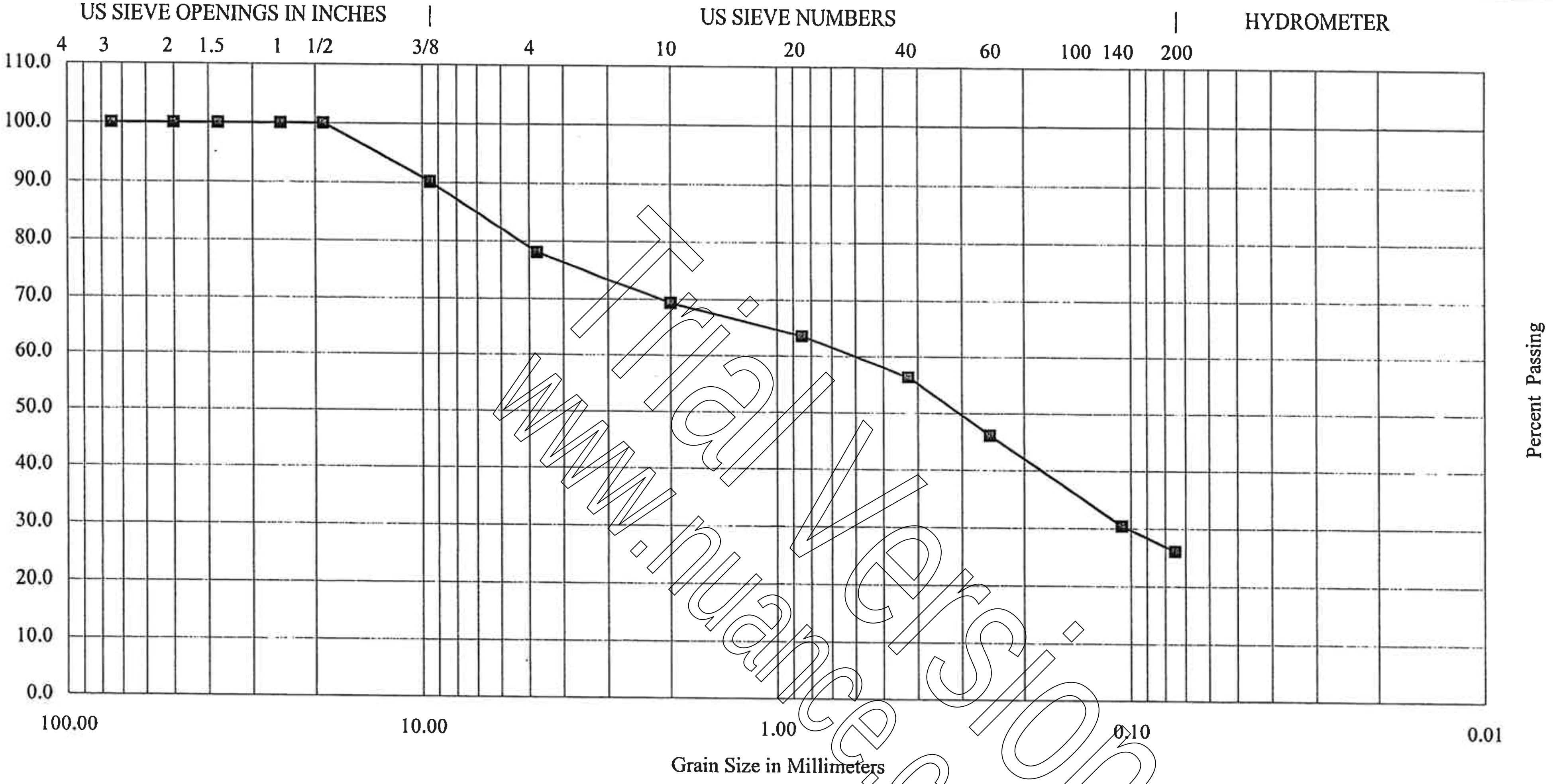
2405 140th Ave. NE
Suite A 101
Bellevue, WA 98005
(452) 562-4200

Sieve Analysis

Proposed Retail Development

L07S

Project Number	Technician	Approved	Date	Revised	Date
54568 / 3	F. Bengco	G. Hayre	5/31/2005	M. Monserud	6/7/2005



GRAVEL		SAND			FINES (SILTS OR CLAYS)
coarse	fine	coarse	medium	fine	

Sa. No.	NAT-1
Test Pit	Native 2.5'
Desc.	SM

Silty Sand with Gravel

2405 140th Ave. NE
Suite A 101
Bellevue, WA 98005
(452) 562-4200

Sieve Analysis

Architects BCRA

Proposed Retail Development

L03S

Project Number	Technician	Approved	Date	Revised	Date
54568	F. Bengco	G. Hayre	5/26/2005	M. Monserud	6/8/2005

SAMPLE DATA

Sampled Location:	NAT-1
Sample No.:	Native 2.5'
Depth:	2.5'
Soil Description	Silty Sand with Gravel
USCS	SM
Specific Gravity	N/A

TEST DATA

Trial	Moisture Content (%)	Dry Density (pcf)	Wet Density (pcf)	Comp. Strength (psi)
1	4.6	135.9	142.2	0
2	6.0	139.1	147.3	0
3	7.0	139.8	149.6	0
4	11.0	129.2	143.3	0
Optium	6.9	139.8		NT

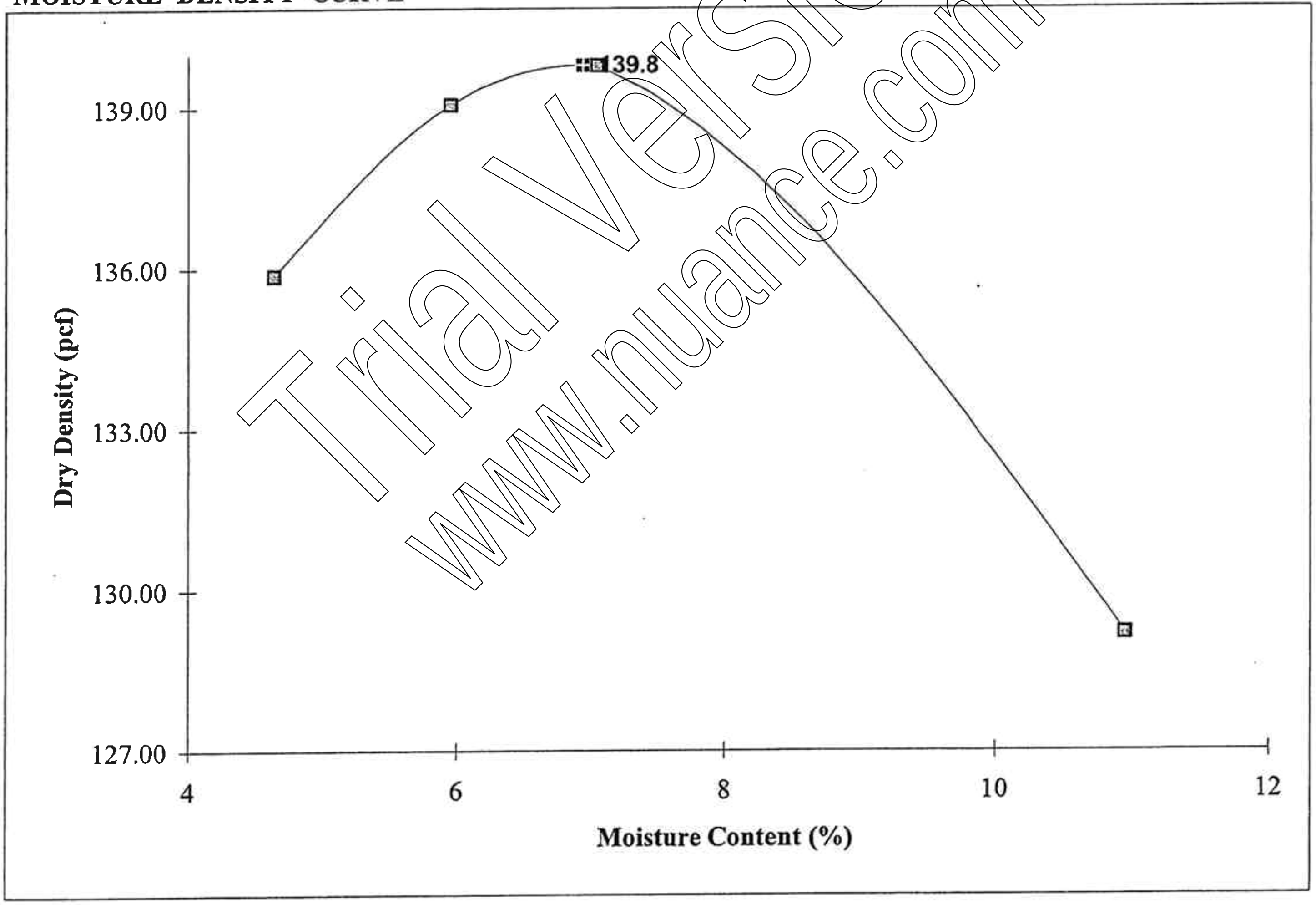
PROCEDURE

Standard	ASTM D - 1557		
Method Used	A	B	**C**
Preparation Procedure		**Wet**	Dry
Automatic Hammer			

RESULTS

Max. Dry Density:	**139.8 pcf**
Optimum Moisture:	**6.9 %**
Comp. Str. @ Max. Dens.:	NT psi
95 % of Max. Density:	132.8 pcf

MOISTURE DENSITY CURVE



2405 140th Ave. NE
Suite A 101
Bellevue, WA 98005
(425) 562-4200

Moisture-Density: Untreated Soil

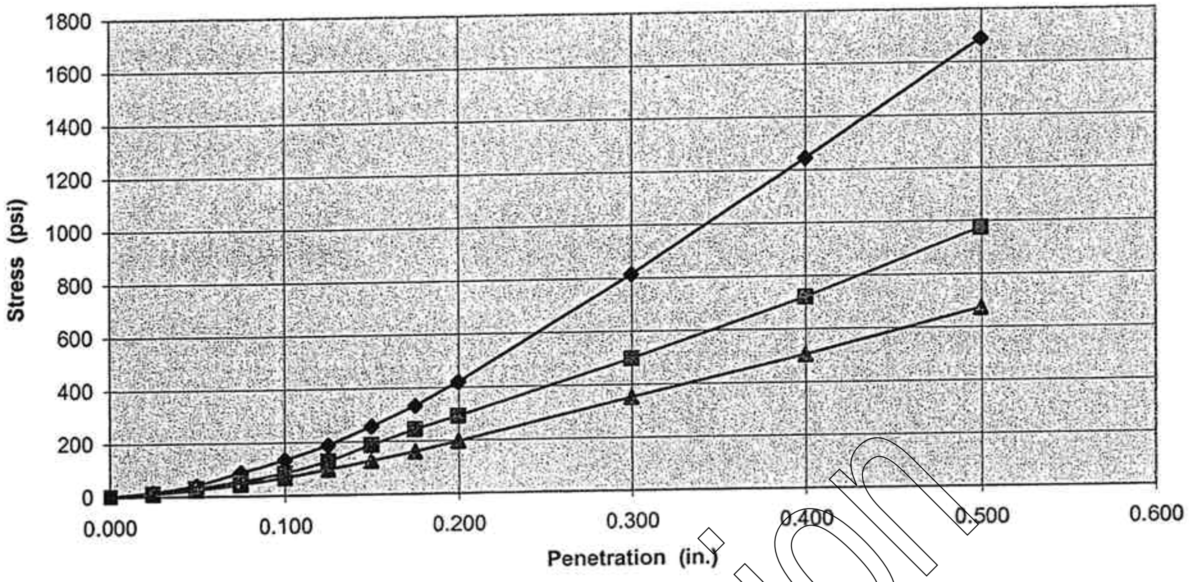
Architects BCRA

Proposed Retail Development

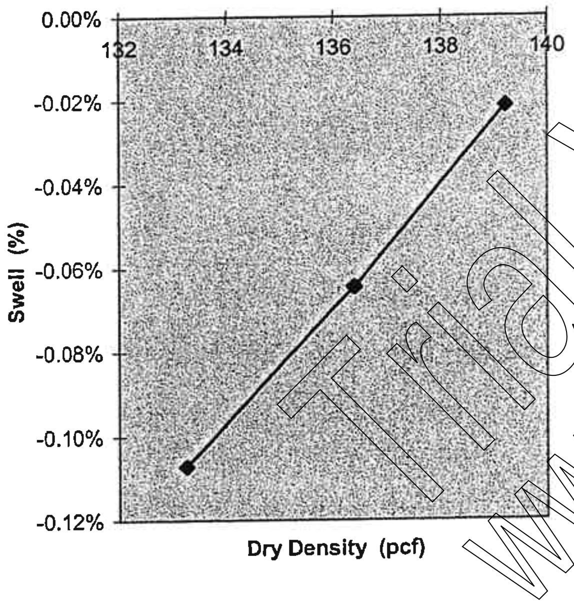
L01MD

Project Number	Technician	Approved	Date	Revised	Date
54568	F. Bengco	G. Hayre	05/25/05	M. Monserud	6/8/2005

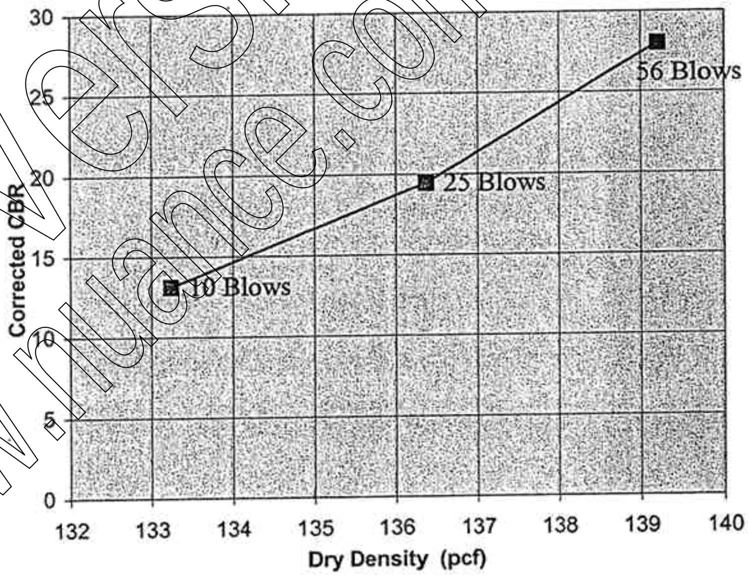
Corrected Load Penetration Curves



Swell



Dry Density vs Corr. CBR



CBR	19
100% DD	136.4 pcf

TEST PIT	SAMPLE DEPTH	USCS	SOIL DESCRIPTION
Native 2.5'		SM	Silty Sand with Gravel

ASTM D 1883 (Nat. WC)

Kleinfelder, Inc.
2405 140th Ave. NE, Ste. A-101
Bellevue, WA 98005
(425) 562-4200

California Bearing Ratio: Untreated
Architects BCRA
Proposed Retail Development

L01CBR

Project Number	Technician	Approved	Date	Revised	Date
54568	F. Bengco	C. Mlodzik	06/03/05	C. Mlodzik	6/3/2005

KLEINFELDER

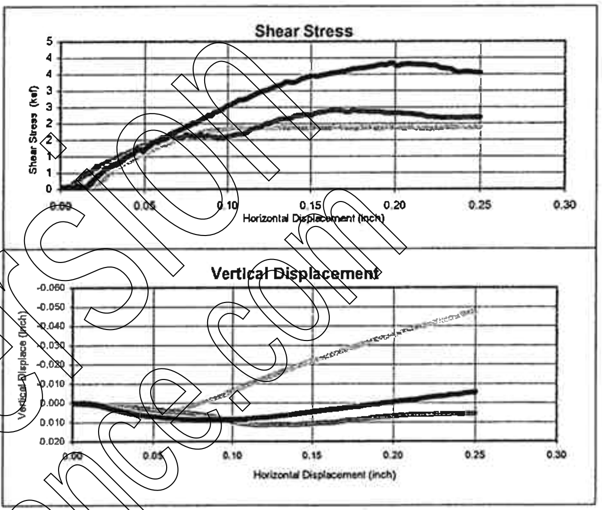
PROJECT: Fircrest Retail Development BCRA
LOCATION: Tacoma, WA
MATERIAL: SM
SAMPLE SOURCE: B-11-7.5'
SAMPLE PREP.: Remolded

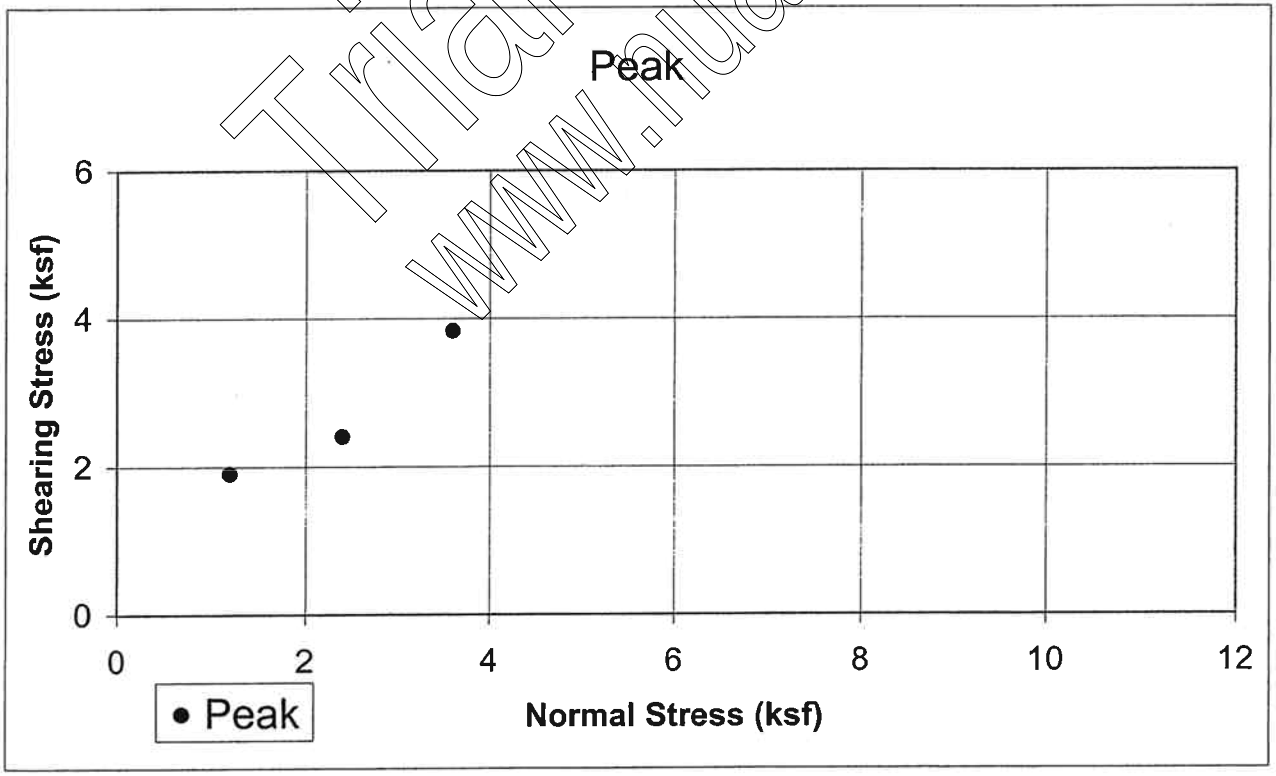
JOB NO: 54568
W.O. NUMBER:
LAB NO: L01DS
DATE SAMPLED:

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS(ASTM D3080)

Initial thickness of specimen (in.):	1.00		
Initial diameter of specimen (in.):	2.50		
Rate of deformation (in/min):	0.016		
Direct shear point:	1	2	3
Dry mass of specimen (g):	11.9	8.3	12.9
Initial Moisture Content:	5.4%	4.8%	6.3%
Initial Wet Density (lb per cu.ft):	Recompacted Material		
Initial Dry Density (lb per cu.ft):	Recompacted Material		
Final Moisture Content:	5.4%	4.8%	6.3%
Final Wet Density (lb per cu.ft):	Recompacted Material		
Final Dry Density (lb per cu.ft):	Recompacted Material		
Normal Stress (kips per sq. ft):	1.20	2.40	3.60
Max Shearing Stress (kips / sq. ft):	1.90	2.40	3.83
Vert Deformation @ Max Shear (in):	-0.045	0.010	0.000
Horiz Deformation @ Max Shear (in):	0.240	0.166	0.198
Shearing device used:			

Created by DigiShear Version 3.1.3; Copyright 2004, GEOTAC





NOTE: Soil that was used for point 1 was reused for points 2 and 3 also soil that was used for points 1 and 2 was reused for point 3.

APPENDIX B

EXISTING SUBSURFACE EXPLORATIONS

(Terracon, 2008)

LOG OF BORING NO. B-1

Page 1 of 1

CLIENT **WinCo Foods, Inc.**

SITE **2119 Mildred Street West**
Fircrest, Washington

PROJECT **WinCo Fircrest**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
0.5	**SANDY GRAVEL** Gray, Medium Dense, Dry (Fill)									
	SILTY SAND Brown, Very Loose, Moist (Probable Fill)			S1	SS	3	2			
7.5	Medium Dense, Organics	5		S2	SS	6	17			
10	**SILTY SAND, WITH GRAVEL** Gray, Very Dense, Moist (Possible Glacial Till)			S3	SS	9	50/6			
15	**GRAVELLY SILTY SAND** Gray, Very Dense, Moist (Glacial Till)	10		S4	SS	12	50/5			
20.5	**SILTY SAND, WITH GRAVEL** Gray, Very Dense, Moist (Glacial Till)	15		S5	SS	18	50/4			
		20		S6	SS	6	50/4			
	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	∇	▼
WL	▼	∇
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

LOG OF BORING NO. B-2

Page 1 of 1

CLIENT **WinCo Foods, Inc.**	
SITE **2119 Mildred Street West Fircrest, Washington**	PROJECT **WinCo Fircrest**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
0.2	**Approximately 2 Inches of Asphalt**									
1	**GRAVEL, WITH SAND** Gray, Medium Dense, Dry (Fill)									
	SILTY SAND, WITH GRAVEL Orangish Brown, Loose, Moist (Fill)			S1	SS	6	9			
5	**SILTY SAND, WITH GRAVEL** Gray, Dense, Moist (Glacial Till)	5		S2	SS	3	40			
7.5	**SAND, WITH GRAVEL** Brown, Very Dense, Moist			S3	SS	12	51			
8	**GRAVELLY SILTY SAND** Gray, Very Dense, Moist to Wet (Glacial Till)									
8.5	**SAND, WITH GRAVEL** Brown, Very Dense, Moist									
9	**GRAVELLY SILTY SAND** Gray, Very Dense, Moist (Glacial Till)	10		S4	SS	6	50/5			
15	**SILTY SAND, WITH GRAVEL** Light Gray, Very Dense, Dry, Cobbles (Glacial Till)	15		S5	SS	3	50/3			
	Gray, Moist	20		S6	SS	15	67			
21.5	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

BOREHOLE 99 WINCO FIRCREST BORING LOGS.GPJ TERRACON.GDT 5/27/08

LOG OF BORING NO. B-3

Page 1 of 1

CLIENT **WinCo Foods, Inc.**	
SITE **2119 Mildred Street West** **Fircrest, Washington**	PROJECT **WinCo Fircrest**

GRAPHIC LOG		DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
					NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
▨	0.2	**Approximately 2 Inches of Asphalt**									
▨	0.5	**GRAVEL, WITH SAND** Gray, Medium Dense, Dry (Fill)									
▨		**SILTY GRAVELLY SAND** Gray, Very Dense, Moist (Glacial Till)			S1	SS	12	71			
▨	5	**GRAVELLY SAND, WITH SILT** Gray, Very Dense, Moist, Cobbles (Glacial Till)	5		S2	SS	3	50/3			
▨					S3	SS	NR	50/4			
▨	10	**GRAVELLY SILTY SAND** Gray, Very Dense, Moist (Glacial Till)	10		S4	SS	18	96/11			
▨	15	**SILTY GRAVELLY SAND** Gray, Very Dense, Moist (Glacial Till)	15		S5	SS	9	50/6			
▨	20	**SILTY SAND, WITH GRAVEL** Gray, Very Dense, Moist (Glacial Till)	20		S6	SS	6	50/5			
	20.5	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

LOG OF BORING NO. B-4

Page 1 of 2

CLIENT WinCo Foods, Inc.	
SITE 2119 Mildred Street West Fircrest, Washington	PROJECT WinCo Fircrest

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
	Approximately 3 Inches of Topsoil 0.3									
	SILTY SAND, TRACE GRAVEL Brownish Gray, Medium Dense, Moist (Fill)			S1	SS	12	16			
	5									
	GRAVELLY SAND, WITH SILT Dark Gray, Medium Dense, Moist (Fill)	5		S2	SS	3	16			
	7.5									
	SILT, WITH SAND Black, Loose, Moist, Organics (Fill)			S3	SS	9	4			
	10									
	SILTY SAND, WITH GRAVEL Gray, Loose, Wet (Fill)	10		S4	SS	6	4			
	15									
	SILTY SAND, TRACE CLAY AND GRAVEL Dark Brown, Medium Dense, Moist (Fill)	15		S5	SS	3	17			
	20									
	SILTY SAND, TRACE GRAVEL Dark Brown, Medium Dense, Moist, Trace Organics (Probable Fill)	20		S6	SS	9	16			
	25	25								
	Continued Next Page									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▼
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

LOG OF BORING NO. B-4

Page 2 of 2

CLIENT **WinCo Foods, Inc.**	
SITE **2119 Mildred Street West** **Fircrest, Washington**	PROJECT **WinCo Fircrest**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
▨	**GRAVELLY SILTY SAND** Gray, Very Dense, Moist (Glacial Till)			S7	SS	9	50/4				
▨ 30	**SILTY SAND, WITH GRAVEL** Gray, Very Dense, Moist (Glacial Till)	30		S8	SS	12	50/6				
▨		35		S9	SS	NR	50/4				
35.5	Bottom of Boring										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	∇	▼
WL	▼	▼
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

BOREHOLE 99 WINCO FIRCREST BORING LOGS.GPJ TERRACON.GDT 5/27/08

LOG OF BORING NO. B-5

Page 1 of 2

CLIENT
WinCo Foods, Inc.

SITE **2119 Mildred Street West**
Fircrest, Washington

PROJECT
WinCo Fircrest

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
0.3	**Approximately 3 Inches of Topsoil**									
	SILTY SAND, WITH GRAVEL Gray, Medium Dense, Moist (Fill)			S1	SS	6	10			
	Grayish Brown, Wet	5		S2	SS	3	11			
7.5	**SANDY SILT, WITH GRAVEL** Dark Brown, Medium Dense, Wet to Saturated, Organics (Fill)			S3	SS	12	11			
10	**SILTY SAND, TRACE GRAVEL** Dark Brown, Loose, Wet, Organics (Fill)	10		S4	SS	12	7			
15	**SAND, WITH SILT, TRACE GRAVEL** Gray, Loose, Wet to Saturated, Asphalt (Fill)	15		S5	SS	9	7			
20	**SILTY SAND, TRACE GRAVEL** Dark Brown, Loose, Wet, Organics (Fill)	20		S6	SS	12	8			
25		25								

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	∇	▼
WL	∇	∇
WL		

Terracon

BORING STARTED	5-19-08
BORING COMPLETED	5-19-08
RIG Track Rig	DRILLER Boretec
LOGGED AJD	JOB # B2085019

LOG OF BORING NO. B-5

Page 2 of 2

CLIENT **WinCo Foods, Inc.**	
SITE **2119 Mildred Street West** **Fircrest, Washington**	PROJECT **WinCo Fircrest**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	GRAVELLY SILTY SAND Gray, Very Dense, Moist (Glacial Till)			S7	SS	9	50/5				
30	**SILTY GRAVELLY SAND** Gray, Very Dense, Moist (Glacial Till)	30		S8	SS	3	50/6				
35	**SILTY SAND, TRACE GRAVEL** Gray, Very Dense, Moist (Glacial Till)	35		S9	SS	9	73				
	Brownish Gray, Wet	40		S10	SS	18	73/11				
41.5	Bottom of Boring										

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft	
WL ∇	▼
WL ▼	∇
WL	

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

BOREHOLE 99 WINCO FIRCREST BORING LOGS.GPJ TERRACON.GDT 5/27/08

LOG OF BORING NO. B-6

Page 1 of 1

CLIENT **WinCo Foods, Inc.**	
SITE **2119 Mildred Street West** **Fircrest, Washington**	PROJECT **WinCo Fircrest**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
				NUMBER	TYPE	RECOVERY, in.	SPT - N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
0.3	Approximately 3 Inches of Topsoil									
▨	**SILTY SAND, WITH GRAVEL** Brown, Medium Dense, Moist (Fill)									
▨				S1	SS	6	12			
▨		5		S2	SS	6	8			
▨	Asphalt Debris			S3	SS	6	6			
▨		10		S4	SS	6	6			
15	**SILTY SAND, TRACE GRAVEL** Brown, Loose, Moist, Organics (Fill)	15		S5	SS	3	4			
16.5	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▼
WL		

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

LOG OF BORING NO. B-7

Page 1 of 1

CLIENT
WinCo Foods, Inc.

SITE **2119 Mildred Street West**
Fircrest, Washington

PROJECT
WinCo Fircrest

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
0.5	**Appoximately 6 Inches of Topsoil**									
	SILTY SAND Brown, Loose, Moist, Organics (Fill)			S1	SS	3	5			
5	**SILTY SAND, TRACE GRAVEL** Dark Brown, Loose to Medium Dense, Moist (Fill)	5		S2	SS	3	16			
				S3	SS	3	5			
10	**SAND, WITH SILT** Gray, Loose, Moist (Fill)	10		S4	SS	3	7			
	Trace Gravel	15		S5	SS	3	9			
16.5	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	∇	▼
WL	▼	▼
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

BOREHOLE 99 WINCO FIRCREST BORING LOGS.GPJ TERRACON.GDT 5/27/08

LOG OF BORING NO. B-8

Page 1 of 1

CLIENT
WinCo Foods, Inc.

SITE **2119 Mildred Street West**
Fircrest, Washington

PROJECT
WinCo Fircrest

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - N BLOWS / ft.	TESTS: WATER CONTENT, %	TESTS: DRY UNIT WT pcf	TESTS: UNCONFINED STRENGTH, psf
0.5	Approximately 6 Inches of Topsoil									
	SAND, WITH SILT AND GRAVEL Brown, Moist, Medium Dense			S1	SS	6	11			
5	SILTY SAND, TRACE GRAVEL Gray, Dense, Moist (Possible Glacial Till)	5		S2	SS	9	36			
7.5	GRAVELLY SILTY SAND Gray, Very Dense, Moist (Glacial Till)			S3	SS	9	50/4			
		10		S4	SS	6	50/6			
15.5		15		S5	SS	3	50/5			
	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	∇	▼
WL	▼	▼
WL		

Terracon

BORING STARTED			5-19-08
BORING COMPLETED			5-19-08
RIG	Track Rig	DRILLER	Boretec
LOGGED	AJD	JOB #	B2085019

LOG OF BORING NO. B-9

Page 1 of 1

CLIENT
WinCo Foods, Inc.

SITE **2119 Mildred Street West**
Fircrest, Washington

PROJECT
WinCo Fircrest

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - N BLOWS / ft.	TESTS WATER CONTENT, %	TESTS DRY UNIT WT pcf	TESTS UNCONFINED STRENGTH, psf
0.6	**GRAVEL, WITH SAND** Gray, Medium Dense, Dry (Fill)									
	SAND, WITH SILT AND GRAVEL Brown, Dense, Moist			S1	SS	3	40			
5	**GRAVELLY SILTY SAND** Gray, Very Dense, Moist (Glacial Till)	5		S2	SS	9	78			
	Approximately 3 Inch Lense of Sand			S3	SS	12	66			
		10		S4	SS	15	73			
		15		S5	SS	18	44			
16.5	Bottom of Boring									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*CME 140H SPT hammer

WATER LEVEL OBSERVATIONS, ft		
WL	∇	▼
WL	▼	▼
WL		

Terracon

BORING STARTED	5-19-08
BORING COMPLETED	5-19-08
RIG Track Rig	DRILLER Boretec
LOGGED AJD	JOB # B2085019

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-^{3}/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	0 - 1	Very Soft
500 – 1,000	2 - 4	Soft
1,000 – 2,000	4 - 8	Medium Stiff
2,000 – 4,000	8 - 15	Stiff
4,000 – 8,000	15 - 30	Very Stiff
8,000+	> 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 49	Dense
> 50	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifiers	> 12

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	> 30

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]		GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]		GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]		SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried	< 0.75	OL	Organic clay[K,L,M,N]
			Liquid limit - not dried			Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay[K,L,M]
			PI plots below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried	< 0.75	OH	Organic clay[K,L,M,P]
			Liquid limit - not dried			Organic silt[K,L,M,O]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10} \qquad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

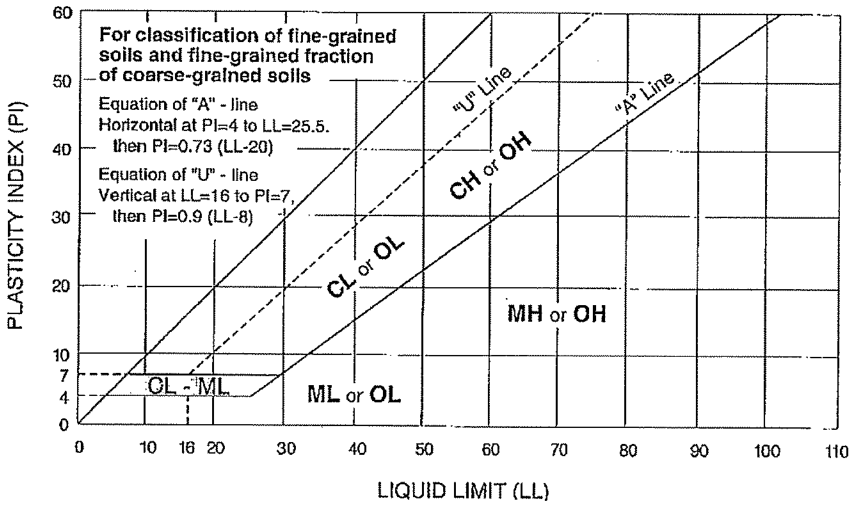
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Form 111—6/98