GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED FOOTHILLS SUBDIVISION
PARCEL NOS. 0330301-1000
1212 S THIRD AVENUE
SEQUIM, WASHINGTON 98382

PROJECT NO. 102-19025
MARCH 9, 2020

Prepared for:

SEQUIM AVENUE, LLC
ATTN: MR. MR. STEVE SMITH
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SANTA BARBARA, CA 93101

Prepared by:

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GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

March 9, 2020 KA Project No. 102-19025

Sequim Avenue, LLC
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Reference: **Geotechnical Engineering Investigation**
Proposed Foothills Subdivision
Parcel No. 033030-1000
1212 S Third Avenue
Sequim, Washington 98382

Dear Mr. Smith,

In accordance with your request, we have completed a Geotechnical Engineering Investigation for the referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Theresa R. Nunan
Project Manager

TABLE OF CONTENTS

INTRODUCTION **1**

PURPOSE AND SCOPE **1**

PROPOSED CONSTRUCTION **2**

SITE LOCATION AND DESCRIPTION **2**

GEOLOGIC SETTING **3**

FIELD INVESTIGATION **3**

SOIL PROFILE AND SUBSURFACE CONDITIONS **4**

GROUNDWATER **4**

GEOLOGIC HAZARDS **5**

Erosion Concern/Hazard 5
Seismic Hazard 5

CONCLUSIONS AND RECOMMENDATIONS **6**

General 6
Site Preparation 7
Temporary Excavations 8
Structural Fill 8
Foundations 9
Floor Slabs and Exterior Flatwork 10
Erosion and Sediment Control 11
Groundwater Influence on Structures/Construction 12
Site Drainage 12
Utility Trench Backfill 13
Pavement Design 13
Testing and Inspection 14

LIMITATIONS **15**

VICINITY MAP ..... **Figure 1**
SITE PLAN ..... **Figure 2**
FIELD INVESTIGATION AND LABORATORY TESTING ..... **Appendix A**
EARTHWORK SPECIFICATIONS ..... **Appendix B**
PAVEMENT SPECIFICATIONS ..... **Appendix C**

March 9, 2020 KA Project No. 102-19025

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED FOOTHILLS SUBDIVISION
1212 S 3RD AVENUE
SEQUIM, WASHINGTON

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Foothills Subdivision project located at 1212 S 3rd Avenue in Sequim, Washington, as shown on the Vicinity Map in Figure 1. Discussions regarding site conditions are presented in this report, together with conclusions and recommendations pertaining to site preparation, excavations, structural fill, utility trench backfill, drainage and landscaping, erosion control, foundations, concrete floor slabs and exterior flatwork, and pavement.

A Site Plan showing the approximate exploratory test pit locations is presented following the text of this report in Figure 2. A description of the field investigation, exploratory test pit logs, and the laboratory testing results are included in Appendix A. Appendix B contains a guide to aid in the development of earthwork specifications. Pavement design guidelines are presented in Appendix C. The recommendations in the main text of this report have precedence over the more general specifications in the appendices.

PURPOSE AND SCOPE

This investigation was conducted to evaluate the subsurface soil and groundwater conditions at the site, to develop geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and earthwork construction.

Our scope of services was performed in general accordance with our proposal for this project, dated November 14, 2019 (Proposal Number G19044WAP) and included the following:

- Exploration of the subsurface soil and groundwater conditions by conducting twelve (12) test pits using a subcontracted excavator and operator under the direction of a Krazan geologist;
- A site plan showing the test pit locations;
- Comprehensive test pit logs, including soil stratification and classification, and groundwater levels where applicable;

- Recommended foundation type(s) for the proposed structures;
- Allowable foundation bearing pressure, anticipated settlements (both total and differential), coefficient of horizontal friction, passive soil pressure, and frost penetration depth for foundation design;
- Recommendations for seismic design considerations including site coefficient and ground acceleration based on the 2015 IBC;
- Recommendations for structural fill materials, placement, and compaction;
- Recommendations for suitability of onsite soils as structural fill;
- Recommendations for temporary excavations;
- Recommendations for site drainage and erosion control; and
- Recommendations for flexible and rigid pavement.

PROPOSED CONSTRUCTION

Based on the Site Plan, Sheet C002, prepared by Zenovic & Associates, Inc. and dated January 31, 2020, we understand that development of the 28.4-acre parcel of land for the proposed Foothills Subdivision will consist of 85 residential lots, 54 lots planned to the west of the existing Bell Creek ravine and 31 lots planned east of the ravine. For the purpose of our analyses, we have assumed that the residential buildings will be 1- to 2-story structures with a slab-on-grade floor system. As a grading plan was not available at the time of this report, we have also assumed only minor grading of up to 2 feet of cut or fill will be required to establish planned elevations for the building pads. Other planned site developments will include installation of site utilities and paved access drives throughout the subdivision.

Detention ponds, designated East Detention Pond and West Detention Pond, will be located on either side of the Bell Creek ravine at the north central end of the site. The East Detention Pond, which will be situated between the ravine and Lot 55, will cover an area of 16,000 square feet (sf), with a planned top Elevation at 240 feet and bottom Elevation at 232 feet. The West Detention Pond will be constructed between the ravine and the access drive. This pond will cover an area of 20,000 sf, with a planned top and bottom Elevation at 244 and 235 feet, respectively.

SITE LOCATION AND DESCRIPTION

The site consists of one undeveloped parcel (APN 0330301-1000) encompassing approximately 28.4 acres of land located at 1212 S 3rd Avenue in Sequim. The site is bordered by Brownfield Road and undeveloped land to the north, residential buildings and agricultural fields to the south, S Sequim Road

to the east, and S 3rd Avenue to the west. The site is roughly rectangular in shape and slopes down from the southwest corner of the property to the northeast corner, with the ground surface elevations ranging from 310 feet to 230 feet. These elevations generally corresponded to slopes of 10 Horizontal to 1 Vertical (10H:1V) to 20H:1V across the western and eastern portions of the parcel, and occasional steeper slopes encountered, with the ravine being the dividing line between the east and west land areas.

The Bell Creek ravine encompasses approximately 3.9 acres and passes through the property in a south-to-north direction through the central portion of the site. Based on the topographic information presented on the referenced Site Plan, the ravine bottom ranges between about Elevation 270 with an embankment slope of about 3 Horizontal to 1 Vertical (3H:1V) at the south end of the property down to about Elevation 235 feet with an embankment slope of about 5H:1V at the north end of the property. Bell Creek is a tributary of the Dungeness River and is included in the Dungeness Water Rule Code (WR_OA). A large corrugated metal culvert is situated at the creek bottom and the level of the creek was approximately 1-foot deep at the time of our field exploration. Most of the property is covered with grasses, while the ravine is heavily vegetated with grass, brambles, and mature trees.

Based on our review of historical aerial maps and parcel record data, a single-family residence and barn or outbuildings were located within the southeastern corner of the property as early as 1994, and that sometime after 2006 the structures were removed from the site. The majority of the site appears to have been actively farmed in the past.

GEOLOGIC SETTING

The site lies within the central Puget Lowland. The lowland is part of a regional north-south trending trough that extends from southwestern British Columbia to near Eugene, Oregon. North of Olympia, Washington, this lowland is glacially carved, with a depositional and erosional history including at least four separate glacial advances and retreats. The Puget Lowland is bounded to the west by the Olympic Mountains and to the east by the Cascade Range. The lowland is filled with glacial and nonglacial sediments.

The Washington Department of Natural Resources (DNR) Geologic Information Portal website indicates that the property is located in an area that is predominantly underlain by Pleistocene continental drift (Qgd) soils with the exception of a small wedge of the property in the northwestern corner that is mapped as Quaternary alluvium (Qa) soils. The Quaternary alluvium soils are described as "unconsolidated or semiconsolidated alluvial clay, silt, sand, grave, and (or) cobble deposits". The continental drift soils are described as "till and outwash clay, silt, sand, gravel, cobbles, and boulders deposited by or originating from continental glaciers".

FIELD INVESTIGATION

A field investigation consisting of twenty (20) exploratory test pits was completed to evaluate the subsurface soil and groundwater conditions at the project site. The test pits were completed on

December 9 and 10, 2019 by a subcontracted John Deere 50G excavator and operator under the direction of a Krazan field engineer or geologist. The test pits were excavated to depths ranging from 3.0 to 10 feet below the existing ground surface (bgs).

A field engineer/geologist from Krazan was present during the explorations, continuously examined the soils and geologic conditions encountered, and maintained logs of the explorations. Representative samples of the subsurface soils encountered in the test pits were collected, sealed in plastic bags, and transported to our laboratory for further examination and testing. The soils encountered in the test pits were visually classified in accordance with the Unified Soil Classification System (USCS).

SOIL PROFILE AND SUBSURFACE CONDITIONS

The geotechnical subsurface exploration for this project consisted of twenty (20) test pits advanced to depths of approximately 3 to 10 feet bgs. The locations of the test pits are shown on the Site Plan in Figure 2.

The test pits encountered 6 to 12 inches of surficial grass and topsoil. In test pit TP-4, the topsoil was underlain by 3.5 feet of medium dense fill material consisting of silty sand, underlain by a 0.5-foot thick layer of dark brown topsoil. The test pits encountered silty sand (SM), sand with silt (SP-SM), and gravel with sand and silt (GP-GM) soils beneath the buried topsoil in test pit TP-4 and the surficial topsoil in the remaining test pits. The relative density of the natural soils was estimated to be medium dense within the upper 0.5 to 2 feet of the test pits based on the excavation efforts of the J. Deere 50 G excavator. The medium dense condition of these upper soils is likely the result of repeated tilling action during use of the site as agricultural fields. The granular soils encountered in the test pits generally increased in relative density with depth from a medium dense to dense or very dense condition, with many of the test pits terminating in the very dense layer due to the inability of the J. Deere 50G excavator to penetrate these soils.

We interpreted the silty sand (SM), sand with silt (SP-SM), and gravel with sand and silt (GP-GM) to be native glacial soils.

Gradation tests were conducted on representative samples of the soils for classification purposes and for determination of engineering properties. The gradation results are graphically depicted in Appendix A. For additional information about the soils encountered, please refer to the test pit logs included in Appendix A.

GROUNDWATER

Groundwater seepage was noted in test pit TP-1 at a depth of 9.5 feet bgs, and likely represents a localized perched water condition due to the presence of clay seams in the silty sand stratum. Perched water occurs when surface water infiltrates through less dense, more permeable soils and accumulates on top of a relatively low permeability soil layer. Perched water does not represent a regional

groundwater "table" within the upper soil horizons. Perched water tends to vary spatially and is dependent upon the amount of rainfall. We would expect the amount of perched water to decrease during drier times of the year and increase during wetter periods. Groundwater was not encountered in the remaining test pits.

It should be recognized that groundwater elevations may fluctuate with time. The groundwater level will be dependent upon seasonal precipitation, irrigation, land use, climatic conditions, water levels in Bell Creek, as well as other factors. Therefore, water levels at the time of our field exploration may be different from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

GEOLOGIC HAZARDS

Erosion Concern/Hazard

The Natural Resources Conservation Services (NRCS) soil survey map for Clallam County classifies the northern third of the site area as Clallam gravelly sandy loam 0 to 15 percent slopes, and the remainder of the property as Yearly gravelly loam 0 to 15 percent slopes. The NRCS classifies the Clallam series as till soils, and the Yearly gravelly loam soils as derived from glaciomarine or glaciolacustrine deposits over till. Both the Clallam and Yearly soils are classified in Hydrologic Soil Group C with an estimated low infiltration rate and low potential for erosion in a disturbed state.

It has been our experience that soil erosion can be minimized through landscaping and surface water runoff control. Typically, erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, i.e., silt fences, hay bales, mulching, control ditches or diversion trenching, and contour furrowing. Erosion control measures should be in place before the onset of wet weather.

Seismic Hazard

The 2015 International Building Code (IBC), Section 1613.3.2, refers to Chapter 20 of ASCE-7 for Site Class Definitions. It is our opinion that the overall soil profile corresponds to Site Class C as defined by Table 20.3-1 “Site Class Definitions,” according to the 2010 ASCE-7 Standard. Site Class applies to a “very dense soil and soft rock” profile. The seismic site class is based on a soil profile extending to a depth of 100 feet. The test pits conducted on this site extended to a maximum depth of 10 feet and this seismic site class designation is based on the assumption that similar soil conditions continue below the depth explored.

We referred to the Applied Technology Council (ATC) website and the 2015 IBC to obtain values for S_S, S_{MS}, S_{DS}, S_1, S_{M1}, S_{D1}, F_a, and F_v. The ATC website includes the most updated published data on seismic conditions. The seismic design parameters for this site are as follows:

Seismic Design Parameters
(Reference: 2015 IBC Section 1613.3.2, ASCE, and ATC)

Seismic Item	Value
Site Coefficient F_a	1.0
S_s	1.315 g
S_{MS}	1.315 g
S_{DS}	0.877 g
Site Coefficient F_v	1.3
S_1	0.542 g
S_{M1}	0.705 g
S_{D1}	0.470 g

Additional seismic considerations include liquefaction potential and amplification of ground motions by loose/soft soil deposits. We have reviewed "Liquefaction Susceptibility Map of Clallam County, Washington" by Stephen P. Palmer et al., (WA DNR, 2004). The map indicates that the site area is located in a zone of low liquefaction susceptibility.

CONCLUSIONS AND RECOMMENDATIONS

General

It is our opinion that the planned improvements at this site are feasible, provided that the geotechnical engineering recommendations presented in this report are included in the project design and construction. Based on our review of the Site Plan, Sheet C002, prepared by Zenovic & Associates, Inc. and dated January 31, 2020, and the results of our explorations and analyses, it is our opinion that conventional spread foundations supported on medium dense or firmer natural soils, or on structural fill placed on properly prepared native subgrade soils, are suitable for support of the residential buildings.

The undocumented fill and buried topsoil encountered in test pit TP-4, excavated within the northeast corner of the property, are unsuitable for support of foundations and will need to be removed where they are encountered. Test pits should be conducted prior to the construction phase to determine the aerial extent (i.e. lateral extent and depth) of the undocumented fill encountered in test pit TP-4. Deeper layers of undocumented fill may be encountered in unexplored areas of the site.

The soils encountered on this site are considered moisture-sensitive and will be easily disturbed and difficult to compact when wet. We recommend that construction take place during the drier summer months, if possible. If construction is to take place during wet weather, additional expenses and delays should be expected due to the wet conditions. Additional expenses could include the need for placing a blanket of rock spalls to protect exposed subgrades and construction traffic areas.

Site Preparation

General site clearing should include removal of any undocumented fill, organics, asphaltic concrete, abandoned utilities, structures including foundations, basement walls and floors, rubble, and rubbish. After stripping operations and removal of any loose and/or debris-laden fill, the exposed subgrade should be visually inspected and/or proof rolled to identify any soft/loose areas. Additional recommendations for preparation of specific areas are provided in the Foundations, Pavement Design and Floor Slabs and Exterior Flatwork subsections of this report.

The soils encountered in our explorations are considered moisture-sensitive due to their silt content and may disturb easily in wet conditions. The prepared subgrade should be protected from construction traffic and surface water should be diverted around prepared subgrade. We recommend that the site be developed only during extended periods of dry weather.

During wet weather conditions, subgrade stability problems and grading difficulties may develop due to excess moisture, disturbance of sensitive soils and/or the presence of perched groundwater. Construction during the extended periods of wet weather could result in the need to remove wet disturbed soils if they cannot be suitably compacted due to elevated moisture contents. The onsite soils have significant silt content in the explored areas and are considered moisture sensitive, and can be easily disturbed when wet. If over-excavation is necessary, it should be confirmed through continuous monitoring and testing by a qualified geotechnical engineer or geologist. Soils that have become unstable may require drying to near their optimal moisture content before compaction is feasible. Selective drying may be accomplished by scarifying or windrowing surficial material during extended periods of dry, warm weather (typically during the summer months). If the soils cannot be dried back to a workable moisture condition, remedial measures may be required. General project site winterization should consist of the placement of aggregate base and the protection of exposed soils during the construction phase. It should be understood that even if Best Management Practices (BMP's) for wintertime soil protection are implemented and followed there is a significant chance that moisture disturbed soil mitigation work will still be required.

Old foundations and possibly a septic tank may be encountered in the southwestern corner of the site where a residential structure, out building, and septic tank (according to past parcel records) was located. Any buried structures encountered during construction should be properly removed and backfilled. Excavations, depressions, or soft and pliant areas extending below the planned finish subgrade levels should be excavated to expose firm undisturbed soil, and backfilled with structural fill. In general, any septic tanks, underground storage tanks, debris pits, cesspools, or similar structures should be completely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the geotechnical engineer. The resulting excavations should be backfilled with structural fill.

A representative of our firm should be present during all site clearing and grading operations to observe, test, and evaluate earthwork construction. This testing and observation is an integral part of our service,

as acceptance of earthwork construction is dependent upon compaction and stability of the material. The geotechnical engineer may reject any material that does not meet compaction and stability requirements. Further recommendations, contained in this report, are predicated upon the assumption that earthwork construction will conform to the recommendations set forth in this section and in the Structural Fill section of this report.

Temporary Excavations

The onsite soils have variable cohesion and/or frictional strengths, therefore the safe angles to which these materials may be cut for temporary excavations is limited. Although the sidewalls remained vertical during excavations for the test pits, the excavations remained open for a very short duration before being immediately backfilled. The soils encountered in temporary excavations of a longer duration may be prone to caving and slope failures. Temporary excavations in the medium dense to very dense native soils should be sloped no steeper than 1H:1V (horizontal to vertical) where room permits.

All temporary cuts should be in accordance with Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. The temporary slope cuts should be visually inspected daily by a qualified person during construction work activities and the results of the inspections should be included in daily reports. The contractor is responsible for maintaining the stability of temporary cut slopes and minimizing slope erosion during construction. The temporary cut slopes should be covered with plastic sheeting to help minimize erosion during wet weather and the slopes should be closely monitored until the permanent retaining systems are complete or the area is backfilled. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

A Krazan & Associates geologist or geotechnical engineer should observe, at least periodically, the temporary cut slopes during the excavation work. The reasoning for this is that all soil conditions may not be fully delineated by the limited sampling of the site from the geotechnical explorations. In the case of temporary slope cuts, the existing soil conditions may not be fully revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of the temporary slope will need to be evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed smoothly and required deadlines can be met. If any variations or undesirable conditions are encountered during construction, Krazan & Associates should be notified so that supplemental recommendations can be made.

Structural Fill

Fill placed beneath foundations, pavement, or other settlement-sensitive structures should be placed as structural fill. Structural fill, by definition, is placed in accordance with prescribed methods and standards, and is monitored by an experienced geotechnical professional. Field monitoring procedures

would include the performance of a representative number of in-place density tests to document the attainment of the desired degree of relative compaction. The area to receive the fill should be suitably prepared as described in the Site Preparation subsection of this report prior to beginning fill placement.

Best Management Practices (BMPs) should be followed when considering the suitability of the existing materials for use as structural fill. The onsite soils are generally considered suitable for re-use as structural fill, provided the soil is free of organic material and debris, and it is within ± 2 percent of the optimum moisture content. If the native soils are stockpiled for later use as structural fill, the stockpiles should be covered to protect the soil from wet weather conditions. We recommend that a representative of Krazan & Associates be onsite during the excavation work to determine which soils are suitable for use as structural fill.

Imported, all weather structural fill material should consist of well-graded gravel or a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). All structural fill material should be submitted for approval to the geotechnical engineer at least 48 hours prior to delivery to the site.

Fill soils should be placed in horizontal lifts not exceeding 8 inches in loose thickness prior to compaction, moisture-conditioned as necessary (moisture content of soil shall not vary by more than ±2 percent of optimum moisture), and the material should be compacted to at least 95 percent of the maximum dry density based on ASTM D1557 Test Method. In-place density tests should be performed on all structural fill to document proper moisture content and adequate compaction. Additional lifts should not be placed if the previous lift did not meet the compaction requirements or if soil conditions are not considered stable. Jetting and ponding are not acceptable methods of compacting the fill lifts.

Foundations

With the exception of the undocumented fill and buried topsoil encountered in test pit TP-4, our exploratory test pits encountered medium dense to very dense granular soils to the explored depths of 3 to 10 feet bgs. The medium dense to very dense granular soils were interpreted to be native glacial soils, and are considered suitable for support of shallow foundations.

The undocumented fill and buried topsoil encountered in test pit TP-4 to a depth of 4.5 feet bgs is not considered suitable to support foundations and will need to be removed where it is encountered. Further exploration of this area should be conducted during the construction phase to determine the aerial extent (i.e. lateral extent and depth) of this fill and buried topsoil layer. The over-excavation of the undocumented fill and buried topsoil should be backfilled with properly placed and compacted structural fill or the footings extended to bear on the natural medium dense or firmer soils. Deeper layers of undocumented fill may be encountered in unexplored areas of the site. The over-excavations should be evaluated by Krazan & Associates prior to structural fill placement to verify that the foundations will bear on suitable material.

Building foundations should extend at least 18 inches below the lowest adjacent finished ground surface for frost protection and bearing capacity considerations. Footing widths should be based on the anticipated loads and allowable soil bearing pressure, and should conform to current International Building Code (IBC) guidelines. Water should not be allowed to accumulate in foundation excavations. All loose or disturbed soil should be removed from the foundation excavation prior to placing concrete.

For foundations constructed as outlined above, we recommend an allowable bearing capacity of 3,000 pounds per square foot (psf) may be used for foundation design for this project. A representative of Krazan and Associates should evaluate the foundation bearing soil prior to footing form construction.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.35 acting between the bases of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 150 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglecting the upper 12 inches). The allowable friction factor and allowable equivalent fluid passive pressure values include a factor of safety of 1.5. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A 1/3 increase in the above values may be used for short duration wind and seismic loads.

For foundations constructed as recommended, the total static settlement is not expected to exceed 1-inch. Differential settlement, along a 20-foot exterior wall footing, or between adjoining column footings should be less than ½ inch. Most settlement is expected to occur during construction, as the loads are applied.

Seasonal rainfall, water run-off, and the normal practice of watering trees and landscaping areas around the proposed structures, should not be permitted to flood and/or saturate foundation subgrade soils. To prevent the buildup of water within the footing areas, continuous footing drains (with cleanouts) should be provided at the bases of the footings. The footing drains should consist of a minimum 4-inch diameter rigid perforated PVC pipe, sloped to drain, with perforations placed near the bottom and enveloped in all directions by washed rock and wrapped with filter fabric to limit the migration of silt and clay into the drain.

Floor Slabs and Exterior Flatwork

Prior to the placement of concrete floors or pavements on the site, or before any floor supporting fill is placed, any loose or undocumented fill must be removed to expose medium dense or firmer undisturbed native soils. The subgrade should then be proof-rolled to confirm that the subgrade contains no soft or deflecting areas. Areas of yielding soils should be excavated and backfilled with structural fill.

Any additional fill used to increase the elevation of the floor slab should meet the requirements of structural fill. Fill soils should be placed in horizontal lifts not exceeding 8 inches loose thickness, moisture-conditioned as necessary, (moisture content of soil shall not vary by more than ±2 percent of

optimum moisture) and the material should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557.

Floor slabs may be designed using a modulus of subgrade reaction value of k = 200 pounds per cubic inch (pci) for slabs supported on medium dense or firmer native soils or on structural fill extending to medium dense or firmer native soil.

In areas where it is desired to reduce floor dampness, such as areas covered with moisture sensitive floor coverings, we recommend that concrete slab-on-grade floors be underlain by a water vapor retarder system. According to ASTM guidelines, the water vapor retarder should consist of a vapor retarder sheeting underlain by a minimum of 4-inches of compacted clean (less than 5 percent passing the U.S. Standard No. 200 Sieve), open-graded angular rock of ¾-inch maximum size. The vapor retarder sheeting should be protected from puncture damage.

It is recommended that the utility trenches within the building pads be compacted, as specified in our report, to minimize the transmission of moisture through the utility trench backfill. Special attention to the drainage and irrigation adjacent to the buildings is recommended. Grading should establish drainage away from the structures and this drainage pattern should be maintained. Water should not be allowed to collect adjacent to the structures. Excessive irrigation within landscaped areas adjacent to the structure should not be allowed to occur. In addition, ventilation of the structure may be prudent to reduce the accumulation of interior moisture.

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to minimize the transportation of sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented and these measures should be in general accordance with local regulations. As a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features of the site:

1) Phase the soil, foundation, utility and other work, requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be undertaken during the wet season (generally October through April), but it should also be known that this may increase the overall cost of the project.

2) All site work should be completed and stabilized as quickly as possible.

3) Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.

4) Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited, other filtration methods will need to be incorporated.

Groundwater Influence on Structures and Earthwork Construction

The test pits were checked for the presence of groundwater during exploratory operations. With the exception of groundwater seepage noted in test pit TP-4 at a depth of 9.5 feet bgs, groundwater was not encountered in the remaining test pits. It should be recognized that groundwater elevations may fluctuate with time. The groundwater level will be dependent upon seasonal precipitation, irrigation, land use, the level of Bell Creek, and climatic conditions, as well as other factors. Therefore, groundwater levels at the time of the field investigation may be different from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

If groundwater is encountered during construction, we should observe the conditions to determine if dewatering will be needed. Design of temporary dewatering systems to remove groundwater should be the responsibility of the contractor. If earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated. These soils may "pump," and the materials may not respond to densification techniques. Typical remedial measures include: disking and aerating the soil during dry weather; mixing the soil with drier materials; removing and replacing the soil with an approved fill material. A qualified geotechnical engineering firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Site Drainage

A comprehensive drainage plan will be an important part of successful project development at this site. In our opinion, the underlying dense to very dense glacial soils are not conducive to onsite stormwater infiltration. Specific recommendations for and design of storm water disposal systems or septic disposal systems are beyond the scope of our services and should be prepared by other consultants that are familiar with design and discharge requirements.

The ground surface should slope away from building pads and pavement areas, toward appropriate drop inlets or other surface drainage devices. It is recommended that adjacent exterior grades be sloped a minimum of 2 percent for a minimum distance of 5 feet away from structures. Roof drains should be tightlined away from foundations. Roof drains should not be connected to the footing drains.

Pavement areas should be inclined at a minimum of 1 percent and drainage gradients should be maintained to carry all surface water to collection facilities and suitable outlets. These grades should be maintained for the life of the project.

Utility Trench Backfill

We recommend that utility trench backfill be placed in general accordance with typical recommendations for structural fill placement. A firm and unyielding subgrade should allow for the proper placement of subsurface utilities. This could include the placement of geotextile and quarry rock in the bottom of utility trenches prior to placement of pipe bedding, utilities and trench backfill.

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the contractor. Traffic and vibration adjacent to trench walls should be minimized; cyclic wetting and drying of excavation side slopes should be avoided.

All utility trench backfill should consist of suitable onsite material or imported granular material. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with the pipe manufacturer's recommendations.

The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Pavement Design

Based on our explorations, the near surface soils at the site are interpreted as medium dense to very dense silty sand and sand or gravel soils to depths of approximately 3 to 10 feet bgs. The medium dense condition of the upper soils is likely the result of tilling operations while the site was actively farmed. Test pit TP-4 encountered undocumented fill and buried topsoil to a depth of 4.5 feet bgs.

If soft/loose or undocumented fill soils are encountered in the pavement subgrade, we recommend that subgrade modification techniques be considered. Subgrade modification typically includes the overexcavation of unsuitable materials, the placement of a high-strength geotextile fabric at the bottom of the over-excavated area, and then the placement of structural fill. Subgrade modification such as this is intended to disperse surcharge loads and therefore aid in pavement performance.

We recommend the pavement subgrade soils be proof-rolled to identify any loose or soft areas and to increase the medium dense condition of the soils encountered in the upper depths of the test pits. Where loose soils or undocumented fill are encountered in the pavement subgrade, we recommend over-

excavation of the loose soil and/or undocumented fill to at least 12 inches below the planned pavement subgrade elevation. The exposed grade after over-excavation should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557. The over-excavation should then be backfilled with structural fill compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557. In-place density tests should be performed to verify proper moisture content and adequate compaction.

It should be noted that subgrade soils that have relatively high silt contents may be highly sensitive to moisture conditions. The subgrade strength and performance characteristics of a silty subgrade material may be dramatically reduced if this material becomes wet (i.e. significantly above its optimum moisture content).

Traffic loads were not provided, however, based on our understanding of the proposed project, we expect the traffic to range from light duty (passenger automobiles) to heavy duty (fire trucks). Pavement design life of 20 years was assumed for our analysis. Recommendations for an asphaltic concrete flexible pavement section and Portland Cement Concrete (PCC) rigid pavement section are provided in Tables 1 and 2 below.

Table 1: ASPHALTIC CONCRETE (FLEXIBLE) PAVEMENT

Asphaltic Concrete	Aggregate Base	Compacted Subgrade**
3.0 in.	6.0 in.	12.0 in.

Table 2: PORTLAND CEMENT CONCRETE (RIGID) PAVEMENT
4000 psi with FIBER MESH

Min. PCC Depth	Aggregate Base	Compacted Subgrade**
6.0 in.	4.0 in.	12.0 in.

** *A proof roll may be performed in lieu of in-place density tests*

The asphaltic concrete depth listed in Table 1 for the flexible pavement section should be a surface course type asphalt, such as Washington Department of Transportation (WSDOT) ½-inch Hot Mix Asphalt (HMA). The pavement specification in Appendix C provides additional recommendations, including aggregate base material.

Testing and Inspection

A representative of Krazan & Associates, Inc. should be present at the site during the earthwork activities to confirm that actual subsurface conditions are consistent with the exploratory fieldwork. This activity is an integral part of our services as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent

of these recommendations is incorporated into the project design and construction. We should also be present during the construction of stormwater management system to evaluate the soils. Krazan & Associates, Inc. will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor. Furthermore, Krazan & Associates is not responsible for the contractor's procedures, methods, scheduling, or management of the work site.

LIMITATIONS

Geotechnical engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences improves. Although your site was analyzed using the most appropriate current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to improvements in the field of geotechnical engineering, physical changes in the site either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the time of completion of the soils report may require the soils report to be professionally reviewed. In light of this, the owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that two years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. Our report, design conclusions, and interpretations should not be construed as a warranty of the subsurface conditions. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. The findings and conclusions of this report can be affected by the passage of time, such as seasonal weather conditions, manmade influences, such as construction on or adjacent to the site, and natural events such as earthquakes, slope instability, flooding, or groundwater fluctuations. If any variations or undesirable conditions are encountered during construction, the Krazan's geotechnical engineer should be notified so that supplemental recommendations can be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. Krazan should be notified of any changes so that our geotechnical engineer can be review and re-evaluate the report recommendations with respect to the changes.

Misinterpretations of this report by other design team members can result in project delays and cost over-runs. These risks can be reduced by having Krazan & Associates, Inc. involved with the design team's meetings and discussions throughout the project design and construction phase. Krazan & Associates, Inc. should also be retained for reviewing pertinent elements of the design team's plans and specifications. Contractors can also misinterpret this report. To reduce this risk, Krazan should

participate in pre-bid and preconstruction meetings, and provide construction observation and testing services during the construction.

This report is a geotechnical engineering investigation with the purpose of evaluating the soil and groundwater conditions in terms of foundation design. The scope of our services did not include any environmental site assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater or atmosphere, or the presence of wetlands. Any statements or absence of statements, in this report or on any soil logs regarding odors, unusual or suspicious items, or conditions observed are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessments.

The geotechnical information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical developments. We emphasize that this report is valid for this project as outlined above, and should not be used for any other site. Our report is prepared for the exclusive use of our client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (360) 598-2126.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

03/9/20



Theresa R. Nunan
Project Manager

Vijay Chaudhary, P.E.
Assistant Regional Engineering Manager

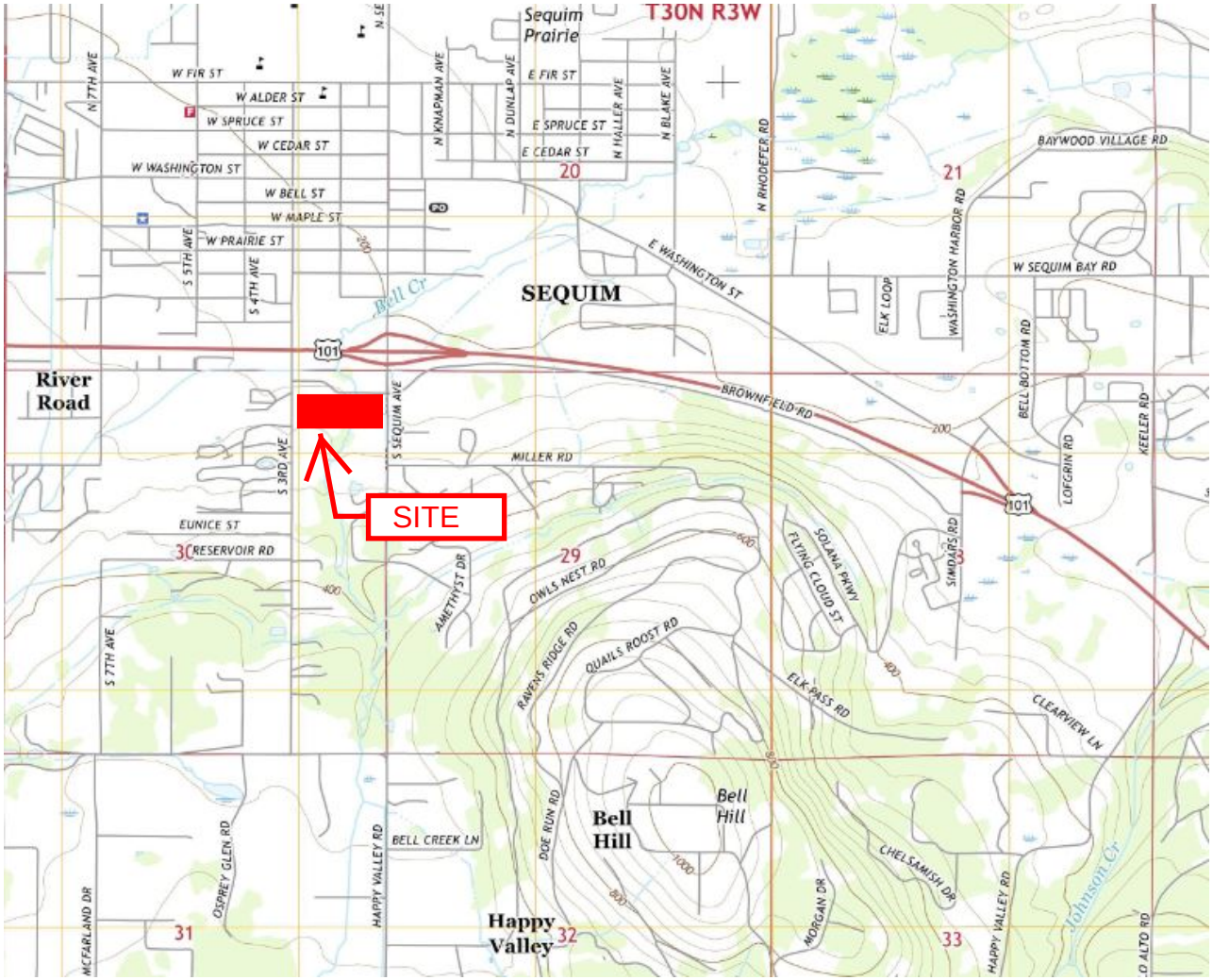


Figure 1: Vicinity Map

Reference: USGS TopoView, Sequim Quadrangle, Washington-Clallam County, 7.5-minute Series, 1:24000 Scale, 2017

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1212 S 3rd Avenue, Sequim, WA		
Date: March 2020	Project Number: 102-19025	
Drawn By: TRN	Figure: 1	Not to scale

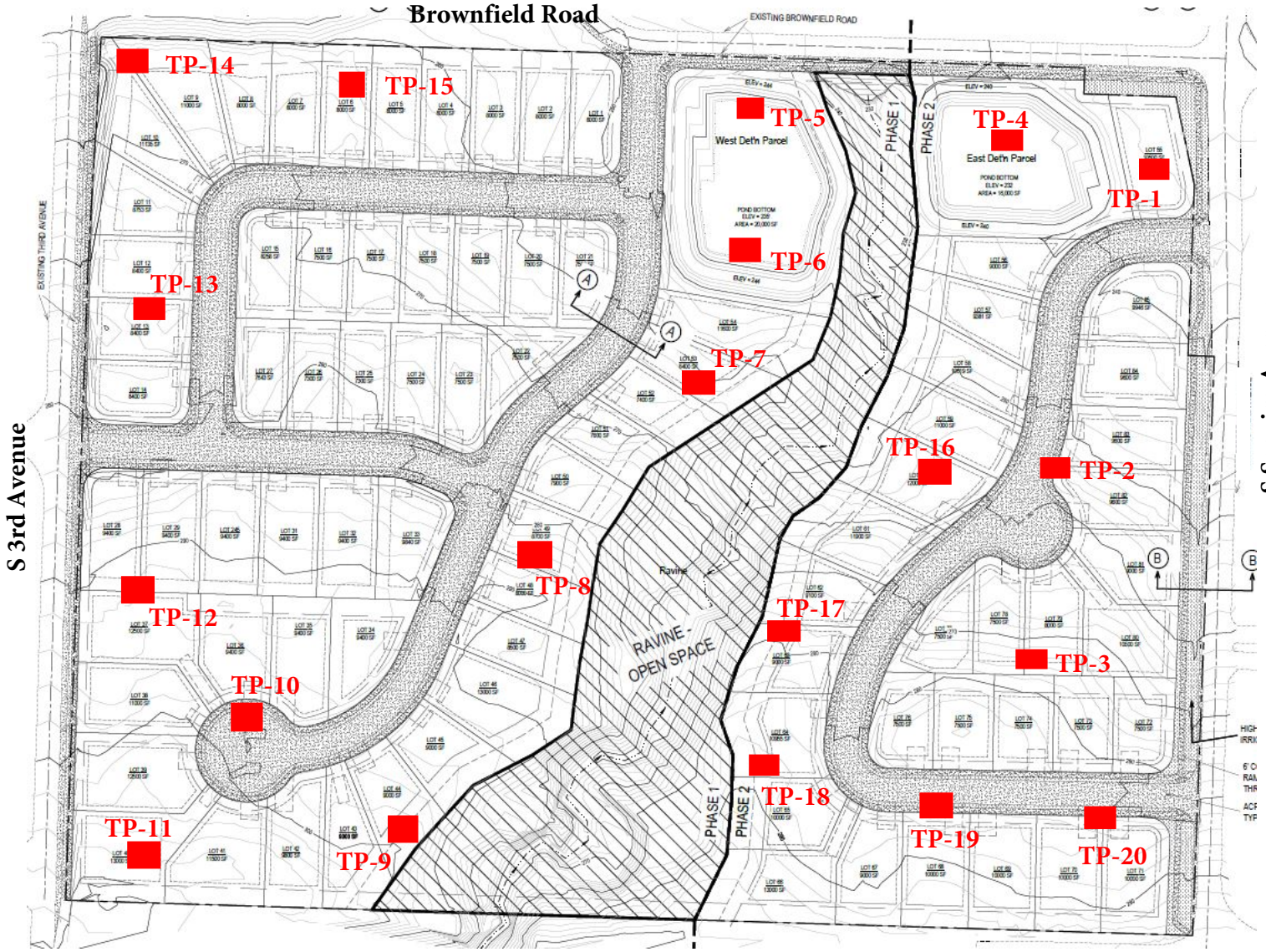


Figure 2: Site Plan

Legend

Test Pit Location

Reference: Site Plan, Sheet C002, prepared by Zenovic & Associates, Inc., dated January 31, 2020.

Krazan

1212 S 3rd Avenue, Sequim, WA		
Date: March 2020	Project Number: 102-19025	
Drawn By: TRN	Figure: 2	Not to scale

APPENDIX A

FIELD INVESTIGATION AND LABORATORY TESTING

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploration program. Twenty (20) exploratory test pits were excavated and sampled for subsurface investigation at this site. The test pits were conducted on December 9 and 10, 2019 utilizing a subcontracted J. Deere 50G excavator and operator under the direction of a Krazan field engineer and geologist. The test pits were excavated to depths of approximately 3 to 10 feet below the existing ground surface. The approximate exploratory test pit locations are shown on the Site Plan (Figure 2). The logs of the soil explorations are presented in this appendix. The depths shown on the attached logs are from the existing ground surface at the time of our exploration.

The soils encountered in the test pits were logged in the field during the exploration and described in general accordance with the Unified Soil Classification System (USCS). All samples were returned to our laboratory for evaluation and testing.

Laboratory Testing

The laboratory testing program was developed primarily to determine the index properties of the soils. Gradation tests were conducted on select samples, and were used for soil classification and as criteria for determining the engineering suitability of the surface and subsurface materials encountered.

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-1**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Seepage noted at 9.5 feet		**Ground Elevation:** 234 +/- feet	**Total Depth of Test Pit:** 10 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						12 Inches of Grass and **TOPSOIL**	
	1							
	2						Grey-Tan **Silty SAND (SM)** with Gravel and Cobbles, medium dense to dense, moist	
	3						- - - At 3 feet, becomes Brown Grey, dense	
	4							
	5	BULK	S-1					
	6							
	7							% Gr = 25 % Sa = 33 % Si/Cl = 37 MC = 13.0% LL = 22 PI = 8
	8							
	9	BULK	S-2				- - - At 9 feet, becomes very dense, occassional clay seams	
	10							
	11						**Test Pit Terminated at 10 Feet**	
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-2**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 258 +/- feet	**Total Depth of Test Pit:** 8 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches of Grass and **TOPSOIL**	
	1						Grey-Tan **Silty SAND (SM)**, medium dense to dense, moist	
	2							
	3						- - - At 3 feet, becomes Brown-Tan, dense to very dense	
	4							
	5	BULK	S-1					
	6						- - - At 6 feet, becomes very dense	
	7	BULK	S-2					
	8						**Test Pit Terminated at 8 Feet**	
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-3**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 274 +/- feet	**Total Depth of Test Pit:** 6 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey **Silty SAND (SM)** with Gravel, trace Cobbles, medium dense to dense, moist	
	2						- - - At 2 feet, becomes with Gravel and Cobbles, very dense	
	3							
	4							
	5	BULK	S-1					
	6						**Test Pit Terminated at 6 Feet**	
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-4**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 238 +/- feet	**Total Depth of Test Pit:** 9 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1–4						Grey **Silty SAND (SM)**, medium dense, moist **(FILL)**	
	4						Dark Brown **Silty SAND (SM)** **(BURIED TOPSOIL)**	
	5–8						Brown **Silty SAND (SM)** with Gravel and Cobbles, dense to very dense, moist	
	9	BULK	S-1				Brown **SAND (SP)** w/ Gravel & Cobbles, occ. CL seams, dense	
	10–16						**Test Pit Terminated at 9 Feet**	

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-5**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 243 +/- feet	**Total Depth of Test Pit:** 7.5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						12 Inches Grass and **TOPSOIL**	
	1						Brown-Grey **Silty SAND (SM)** with Gravel and Cobbles, medium dense to dense, moist	
	2							
	3							
	4							
	5						- - - At 5 feet, becomes Brown-Grey with Gravel, very dense	
	6							
	7						- - - Refusal of excavator at 7.5 feet	
	8						**Test Pit Terminated at 7.5 Feet**	
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-6**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 247 +/- feet	**Total Depth of Test Pit:** 6 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey-Tan **Silty SAND (SM)** with Gravel, dense to very dense, moist	
	2							
	3							
	4							
	5							
	6						- - - At 6 feet becomes grey, very dense	
	7						**Test Pit Terminated at 6 Feet**	
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-7**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 263 +/- feet	**Total Depth of Test Pit:** 5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Lt. Grey **Silty SAND (SM)** with Gravel and Cobbles, medium dense to dense, moist	
	2	BULK	S-1				- - - At 1.5 feet, becomes Grey-Tan with Gravel, very dense	
	3							
	4							
	5						**Test Pit Terminated at 5 Feet**	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-8**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 286 +/- feet	**Total Depth of Test Pit:** 4 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Lt. Grey **Silty SAND (SM)**, medium dense, moist	
	2						- - - At 1.5 feet, becomes Grey-Tan, dense	
	3							
	4						- - - At 4 ft, becomes very dense	
	5						**Test Pit Terminated at 4 Feet**	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-9**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 299 +/- feet	**Total Depth of Test Pit:** 8 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey **Silty SAND (SM)** with Gravel, medium dense, mosit	
	2							
	3	BULK	S-1				**Poorly Graded SAND (SP-SM)** with Gravel and Silt, dense, moist	% Gr = 29 % Sa = 60 % Si/Cl = 11 MC = 7.7%
	4							
	5							
	6							
	7							
	8						**Silty SAND (SM)** w/ Gravel & Cobbles, very dense, moist	
	9						**Test Pit Terminated at 8 Feet**	
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-10**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 296 +/- feet	**Total Depth of Test Pit:** 5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey **Silty SAND (SM)** with Gravel, medium dense to dense, moist	
	2							
	3						- - - At 2.5 feet, becomes Brown-Grey with Gravel and Cobbles, dense, moist	
	4							
	5							
	6						**Test Pit Terminated at 5 Feet**	
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-11**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 308 +/- feet	**Total Depth of Test Pit:** 6.5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						12 Inches Grass and **TOPSOIL**	
	1							
	2						Brown **Poorly Graded GRAVEL (GP-GM)** with Sand and Silt, dense to very dense, moist	% Gr = 51 % Sa = 42 % Si/Cl = 7 MC = 4.3 %
	3	BULK	S-1					
	4							
	5							
	6						Br. Grey **Silty SAND (SM)** with Gravel, very dense, moist	
	7						**Test Pit Terminated at 6.5 Feet**	
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-12**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 292 +/- feet	**Total Depth of Test Pit:** 5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches of Grass; Brick & Asphalt pieces **(FILL);** and **TOPSOIL**	
	1						Grey **Silty SAND (SM)**, medium dense to dense, moist	
	2							
	3							
	4							
	5						- - - At 4.5 feet, becomesvery dense	
	6						**Test Pit Terminated at 5 Feet**	
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-13**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 275 +/- feet	**Total Depth of Test Pit:** 4 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey **Silty SAND (SM)**, medium dense to dense, moist	
	2							
	3						- - - At 3 feet, becomes very dense	
	4							
	5						**Test Pit Terminated at 4 Feet**	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

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Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-14**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Shawn Williams	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 267 +/-	**Total Depth of Test Pit:** 3 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey **Silty SAND (SM)**, medium dense to dense, moist	
	2						- - - At 2 feet, becomes very dense	
	3							
	4						**Test Pit Terminated at 3 Feet**	
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Krazan & ASSOCIATES, INC.

Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-15**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.10.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.10.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 263 +/- feet	**Total Depth of Test Pit:** 3.5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey **Silty SAND (SM)** with Gravel and Cobbles, very dense, moist	
	2							
	3							
	4						**Test Pit Terminated at 3.5 Feet**	
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Krazan & ASSOCIATES, INC.

Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-16**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.10.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.10.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 257 +/- feet	**Total Depth of Test Pit:** 5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey-Brown **Silty SAND (SM)** with Gravel and cobbles, dense to very dense, moist	
	2							
	3							
	4							
	5							
	6						**Test Pit Terminated at 5 Feet**	
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Krazan & ASSOCIATES, INC.

Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-17**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.10.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.10.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 278 +/- feet	**Total Depth of Test Pit:** 6.5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches of Grass and **TOPSOIL**	
	1						Brown **Poorly Graded SAND (SP-SM)** with Gravel and Silt, medium dense to dense, moist	
	2							
	3							
	4	BULK	S-1					% Gr = 44 % Sa = 49 % Si/Cl = 7 MC = 7.6%
	5							
	6						- - - At 6 feet, becomes Grey, with Clay seams, dense	
	7						**Test Pit Terminated at 6.5 Feet**	
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Krazan & ASSOCIATES, INC.

Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-18**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseve Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 289 +/- feet	**Total Depth of Test Pit:** 5 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches **TOPSOIL**	
	1						Brown **Silty SAND (SM)** with Gravel and Cobbles, medium dense to dense, moist	
	2							
	3							
	4	BULK	S-1				- - - At 4 feet, becomes Brown-Grey, with Gravel, very dense	
	5						**Test Pit Terminated at 5 Feet**	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Krazan & ASSOCIATES, INC.

Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-19**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 285 +/- feet	**Total Depth of Test Pit:** 6 feet	

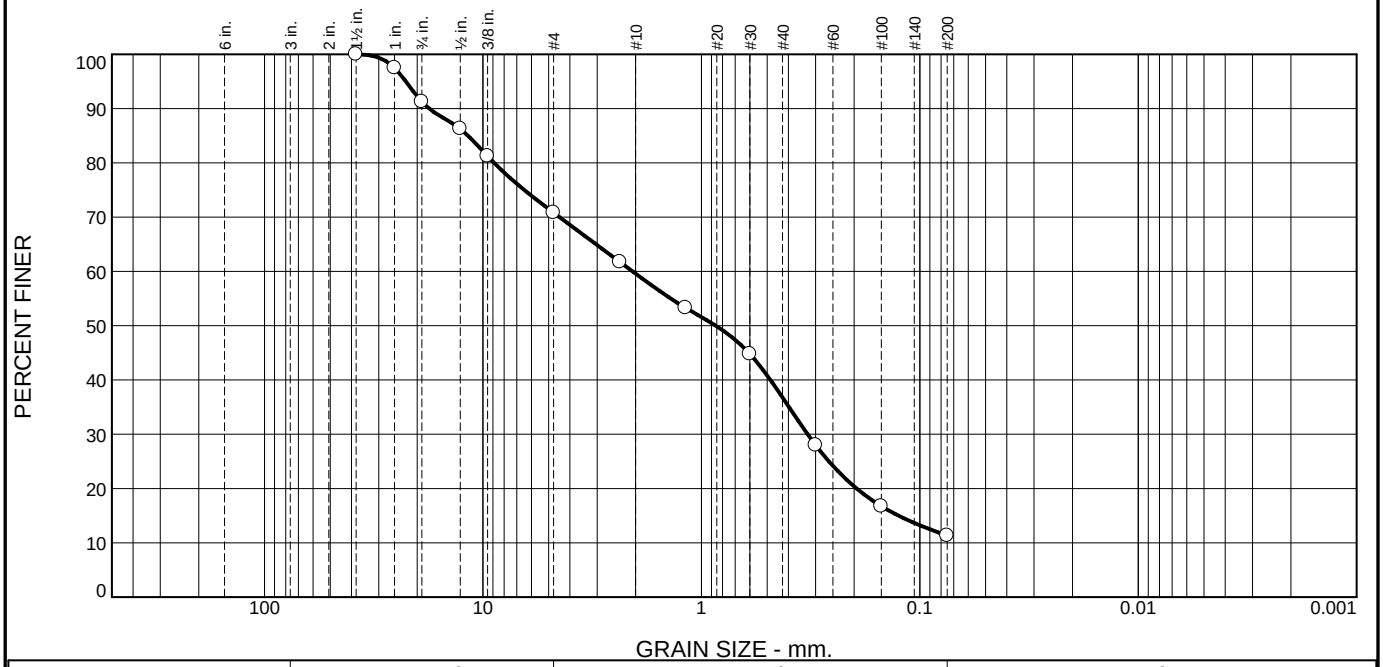
Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Grey-Tan **Silty SAND (SM)** with Gravel and Cobbles, dense to very dense, moist	
	2	BULK	S-1					
	3							
	4						- - - At 3.5 feet, becomes Brown-Grey, very dense	
	5	BULK	S-2					
	6						**Test Pit Terminated at 6 Feet**	
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Krazan & ASSOCIATES, INC.

Project: Foothills Subdivision	**Project Number:** 102-19025	**Client:** Sequim Avenue, LLC	**Test Pit No.:**	**TP-20**
Location: 1212 S 3rd Avenue, Sequim, WA			**Contractor:** Bullseye Excavation	
Project Manager: Shawn Williams	**Date** **Started:** 12.9.2019		**Equipment:** J. Deere 50G Excavator	
Field Engineer: Chloe Bartlett	**Completed:** 12.9.2019			
Groundwater Depth: Not Encountered		**Ground Elevation:** 282 +/- feet	**Total Depth of Test Pit:** 3 feet	

Elev. (feet)	Depth (feet)	Sample Type	Sample ID	Blow Counts	N-Value (blows/ft)	Graphic Log	Soil Classification	Notes
	0						6 Inches Grass and **TOPSOIL**	
	1						Brown-Grey **Silty SAND (SM)** with Gravel and Cobbles, very dense, moist	
	2	BULK	S-1					
	3						**Test Pit Terminated at 3 Feet**	
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	20	11	23	26	11	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1	97		
3/4	91		
1/2	86		
3/8	81		
#4	71		
#8	62		
#16	53		
#30	45		
#50	28		
#100	17		
#200	11		

* (no specification provided)

Material Description

Poorly graded sand w/ silt and gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 17.6453 D_{85}= 11.6990 D_{60}= 2.0664
D_{50}= 0.8593 D_{30}= 0.3265 D_{15}= 0.1253
D_{10}= C_u= C_c=

Remarks

Moisture Content: 7.7%

Date Received: 1/8/20 **Date Tested:** 1/10/20

Tested By: Gustavo Jaramillo

Checked By: Elizabeth Basler

Title: Staff Engineer

Location: TP-9
Sample Number: S0362 **Depth:** 3.0'

Date Sampled: 12/9/19

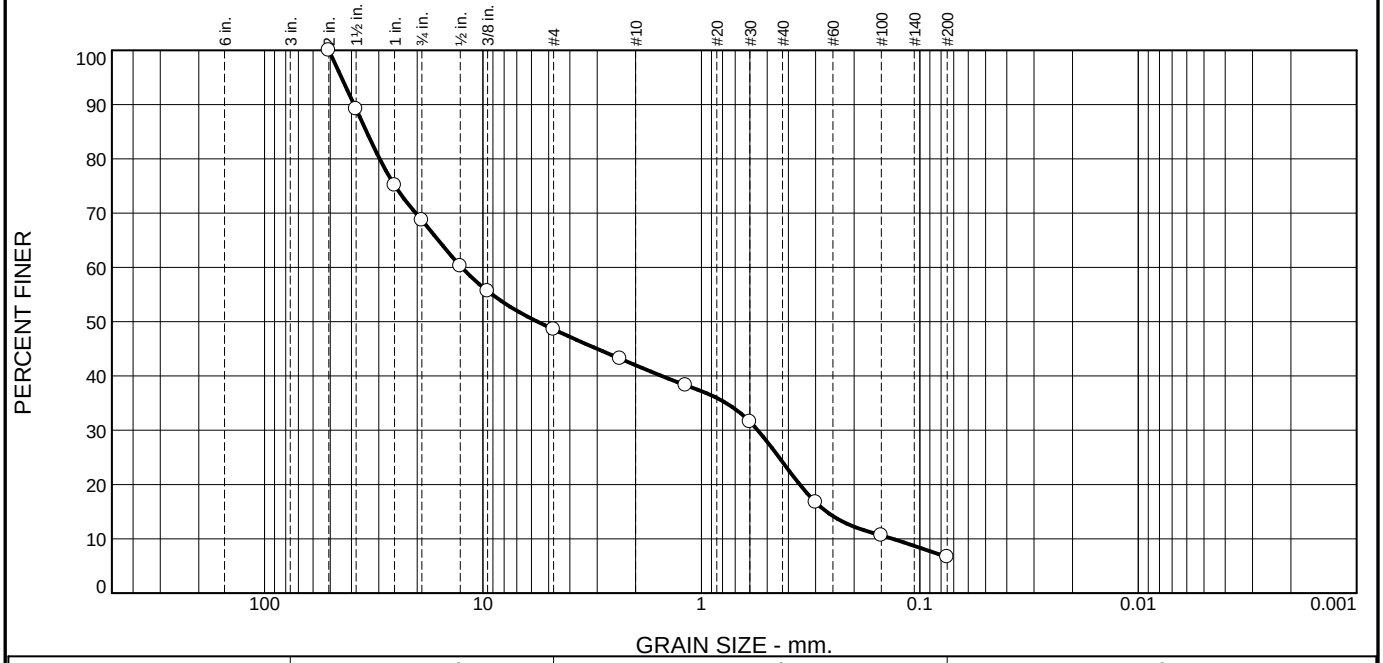
Krazan

Client: Sequim Ave, LLC
Project: Foot Hills Subdivision

Project No: 10219025 **Figure**

Checked By: _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	31	20	7	18	17	7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2	100		
1.5	89		
1	75		
3/4	69		
1/2	60		
3/8	56		
#4	49		
#8	43		
#16	38		
#30	32		
#50	17		
#100	11		
#200	6.6		

* (no specification provided)

Material Description

Poorly graded gravel w/ silt and sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 38.9338 D_{85}= 34.1268 D_{60}= 12.5197
D_{50}= 5.6313 D_{30}= 0.5521 D_{15}= 0.2675
D_{10}= 0.1335 C_u= 93.81 C_c= 0.18

Remarks

Moisture Content: 4.3%

Date Received: 1/8/20 **Date Tested:** 1/10/20

Tested By: Gustavo Jaramillo

Checked By: Elizabeth Basler

Title: Staff Engineer

Location: TP-11
Sample Number: S0363 **Depth:** 3.0'

Date Sampled: 12/9/19

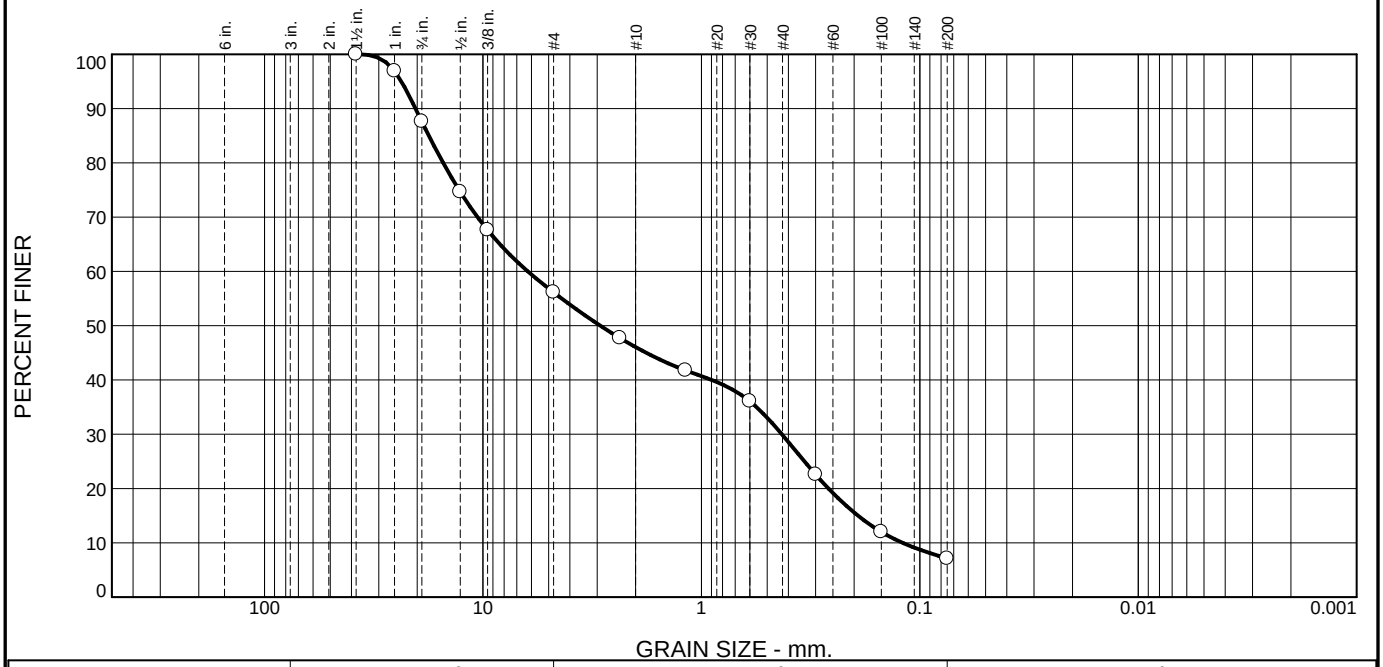
Krazan

Client: Sequim Ave, LLC
Project: Foot Hills Subdivision

Project No: 10219025 **Figure**

Checked By: _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	12	32	10	16	23	7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1	97		
3/4	88		
1/2	75		
3/8	68		
#4	56		
#8	48		
#16	42		
#30	36		
#50	23		
#100	12		
#200	7.1		

* (no specification provided)

Material Description

Poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 20.3590 D_{85}= 17.6975 D_{60}= 6.2349
D_{50}= 2.9037 D_{30}= 0.4282 D_{15}= 0.1919
D_{10}= 0.1202 C_u= 51.89 C_c= 0.24

Remarks

Moisture Content: 7.6%

Date Received: 1/8/20 **Date Tested:** 1/10/20

Tested By: Gustavo Jaramillo

Checked By: Elizabeth Basler

Title: Staff Engineer

Location: TP-17
Sample Number: S0364 **Depth:** 4.0'

Date Sampled: 12/10/19

Krazan

Client: Sequim Ave, LLC
Project: Foot Hills Subdivision

Project No: 10219025 **Figure**

Checked By: _____

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, **the recommendations in the report have precedence**.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Geotechnical Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified by the project Civil Engineer. Both the Geotechnical Engineer and Civil Engineer are the Owner's representatives. If the contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Geotechnical Engineer and Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Geotechnical Engineer, Civil Engineer, or project Architect.

No earthwork shall be performed without the physical presence or approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be densified to a density of not less than 95 percent of maximum dry density as determined by ASTM Test Method D1557 as specified in the technical portion of the Geotechnical Engineering Report. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Geotechnical Engineer.

SOIL AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report.

The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the contractor for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including Court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

SITE PREPARATION

General site clearing should include removal of any organics, asphaltic concrete, abandoned utilities, structures including foundations, basement walls and floors, rubble, and rubbish. After stripping operations and removal of any loose and/or debris-laden fill, the exposed subgrade should be visually inspected and/or proof rolled to identify any soft/loose areas.

SUBGRADE PREPARATION: Subgrade should be prepared as described in our site preparation section of this report.

EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Geotechnical Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Geotechnical Engineer. All materials utilized for constructing site fills shall be free from vegetable or other deleterious matter as determined by the Geotechnical Engineer.

PLACEMENT, SPREADING, AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Geotechnical Engineer.

Both cut and fill shall be surface compacted to the satisfaction of the Geotechnical Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Geotechnical Engineer indicates that the moisture content and density of previously placed fill are as specified.

APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS – The term "pavement" shall include asphalt concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

2. SCOPE OF WORK – This portion of the work shall include all labor, materials, tools, and equipment necessary for and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically notes as "Work Not Included."

3. PREPARATION OF THE SUBGRADE – Subgrade should be prepared as described in our site preparation and pavement design sections of this report.

4. AGGREGATE BASE – The aggregate base shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base should conform to WSDOT Standard Specification for Crushed Surfacing Base Course or Top Course (Item 9-03.9(3)). The base material shall be compacted to a minimum compaction of 95% as determined by ASTM D1557. Each layer of subbase shall be tested and approved by the Geotechnical Engineer prior to the placement of successive layers.

5. ASPHALTIC CONCRETE SURFACING – Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades, and dimensions shown on the plans. The drying, proportioning, and mixing of the materials shall conform to WSDOT Specifications.

The prime coat, spreading and compaction equipment, as well as the process of spreading and compacting the mixture, shall conform to WSDOT Specifications, with the exception that no surface course shall be placed when the atmospheric temperature is below 50 degrees F. The surfacing shall be rolled with combination steel-wheel and pneumatic rollers, as described in WSDOT Specifications. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

6. TACK COAT – The tack (mixing type asphaltic emulsion) shall conform to and be applied in accordance with the requirements of WSDOT Specifications.