EXHIBIT I

Geotechnical Report

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED 5 R APARTMENTS
ASSESSOR PARCEL NUMBER (APN): 102601-1-042-2001
POULSBO, WASHINGTON

PROJECT NO.102-22022
OCTOBER 6, 2022

Prepared for:

LAUGHLIN DEVELOPMENT
ATTN: MR. JIM LAUGHLIN
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Prepared by:

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GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

October 6, 2022 KA Project No. 102-22022

Laughlin Development
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Reference: Geotechnical Engineering Investigation
Proposed 5 R Apartments
APN: 102601-1-042-2001
Poulsbo, WA

Dear Mr. Laughlin,

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.

Vijay Chaudhary, P.E.
Project Engineer

VC:MR

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED 5 R APARTMENTS
NORTH OF DAUNTLESS DRIVE NW
APN: 102601-1-042-2001
POULSBO, WASHINGTON

INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the proposed 5 R Apartments project on APN 102601-1-042-200, located on the north side of Dauntless Drive NW in Poulsbo, 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, foundations, lateral earth pressures for retaining walls, drainage, erosion control, and pavement design.

A site plan showing the approximate exploration locations is presented following the text of this report in Figure 2. A description of the field investigation, summary exploration logs, and the exploration log legend are presented in Appendix A along with the laboratory testing results. Appendix B contains a guide to earthwork specifications. Pavement design guidelines are presented in Appendix C. The recommendations in the main text of the 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 subject property to develop geotechnical engineering recommendations for use in the 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 June 6, 2022 (Proposal Number G22041.1WAP) and included the following:

- An exploration of the subsurface soil and groundwater conditions by excavating eleven (11) test pits. The test pits were excavated to a maximum depth of 6.0 feet below ground surface (bgs) or to refusal on sound bearing strata or limitations of excavation equipment, whichever occurred first, using a subcontracted excavator and operator provided by the client;
- Provide a site plan showing the test pit locations, and comprehensive test pit logs, including soil stratification and classification and groundwater levels where applicable;
- Provide recommended foundation type for the proposed structures;

- Provide allowable foundation bearing pressure, anticipated settlements (both total and differential), coefficient of horizontal friction, passive soil pressure and frost penetration depth for foundation design;
- Provide recommendations for seismic design considerations including site coefficient and ground acceleration based on the 2018 IBC
- Provide recommendations for structural fill materials, placement, and compaction;
- Provide recommendations regarding the suitability of on-site soils as structural fill;
- Provide lateral earth pressure recommendations for retaining walls;
- Provide recommendations for temporary excavations;
- Provide recommendations for site drainage and erosion control;
- Provide recommendations for the pavement design.

Environmental services, such as chemical analysis of soil and groundwater for possible environmental contaminants, were not included in our scope of services for this project.

PROPOSED CONSTRUCTION

Based on our review of the preliminary site plan (plan sheet A121), prepared by Shugart Wasse Workshop, dated April 27, 2022, it is our understanding that the proposed development will consist of design and construction of two three-story apartment buildings. We understand that development will also include design and construction of utilities, pavement and landscape areas. We understand the stormwater runoff from this project will be managed offsite.

SITE LOCATION AND DESCRIPTION

The site consists of a single parcel and covers an area of approximately 1.83 acres. The site is mostly cleared of vegetation with the exception of a sparse number of trees along the eastern border of the site. The majority of the site consists of a relatively level area along the top of gentle, east-descending slopes along the eastern edge of the property. Plan sheet A121 shows that the elevation ranges from 271 feet (east) to 296 feet (west). The site is bordered by a commercial property to the north, forested land and stormwater retention ponds to the east, Dauntless Drive NW to the south, and undeveloped land to the west along NW Olympic College Way. A gravel road provides access onto the property from Dauntless Drive NW. We did not observe significant erosion or accumulation of surface water at the site during our visit. There are drainage ditches lined with quarry spalls on the western and eastern portions of the parcel and these drainage ditches were dry at the time of our site visit.

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/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 Geologic Map of Kitsap County Washington, (WA DNR Open File Report 2005-3, December 2005) indicates that the site is underlain by Pleistocene continental glacial till. Glacial till is a compact deposit of clay, silt, sand, gravel, cobbles, and boulders deposited at the base of the continental glacier.

FIELD INVESTIGATION

Eleven (11) exploratory test pits were completed in order to evaluate the subsurface soil and groundwater conditions at the site. The test pits were completed on August 31, 2022 with a rubber track-mounted, mini excavator and operator from Laughlin Development. The test pits were excavated to depths ranging from approximately 1.5 feet and 6.0 feet bgs.

An Engineering Geologist from Krazan and Associates was present during the explorations, examined the soils, the geologic conditions encountered, obtained samples of the different soil types, and maintained logs of the explorations.

Representative samples of the subsurface soils encountered in the test pits were collected and sealed in plastic bags. These samples were transported to our laboratory for further examination and testing. The soils encountered in the test pits were continuously examined and visually classified in accordance with the Unified Soil Classification System (USCS).

SOIL PROFILE AND SUBSURFACE CONDITIONS

This section of the report is intended to provide a general description the subsurface soil and groundwater conditions exposed in the test pits. Detailed descriptions of the soils encountered in each of the test pits are presented in the test pit logs in Appendix A.

Organic Topsoil: Our test pits encountered roughly 6-inches of organic topsoil.

Undocumented Fill: Test pits TP-1, TP-5, and TP-8 encountered 3.5 feet to 5.5 feet of medium dense to dense, moist, brown to gray, silty sand with varying amounts of gravel and cobbles, and soft to stiff, moist, light brown to gray sandy silt. We interpreted these soils to be undocumented fill likely from previous grading utilizing the onsite native glacial soils. Organics and metal debris were noted within the undocumented fill layer in TP-5. *Deeper layers of undocumented fill maybe encountered in the unexplored areas of the site.*

Native Glacial Soils: Underlying the organic topsoil and undocumented fill, our test pits our explorations generally exposed medium dense to very dense silty sand with varying amounts of gravel and cobbles, and medium stiff to hard sandy silt extending to the maximum depth explored at about 6.0 feet bgs. We interpreted these soils to be native glacial deposits.

Groundwater Observations: Groundwater seepage was not encountered at the time of our explorations. It should be noted that groundwater elevations may fluctuate with time. The groundwater level will be dependent upon seasonal precipitation, irrigation, land use, 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.

GEOLOGIC HAZARDS

Erosion Concern/Hazard

The Natural Resources Conservation Services (NRCS) map for Kitsap County Area, Washington, classifies the site area as following:

- Poulsbo gravelly sandy loam (0 to 6 percent slopes), Hydrologic soil group B/D;
- Poulsbo gravelly sandy loam (6 to 15 percent slopes), Hydrologic soil group B/D;

These soils have moderate to high erosion potential when disturbed. It has been our experience that soil erosion potential 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, such as 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.

City of Poulsbo Critical Areas

We have reviewed the City of Poulsbo geological hazardous areas map (Figure CAO-5, June 28, 2017), and aquifer critical area map (Figure CAO-6, June 28, 2017). Our review of these maps indicates that there are no geological hazardous areas or critical aquifer areas at the site.

Seismic Hazard

The 2018 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 D as defined by Table 20.3-1 "Site Class Definitions," according to the 2010 ASCE-7 Standard. Site Class D applies to a "Stiff Soil" profile. The seismic site class is based on a soil profile extending to a depth of 100 feet. The soil explorations on this site extended to a maximum depth of approximately 6.0 feet and this seismic site class designation is based on the assumption that dense/hard conditions continue below the depth explored.

We referred to the Applied Technology Council (ATC) website and 2018 IBC to obtain values for S_S, S_{MS}, S_{DS}, S_1, S_{M1}, S_{D1}, F_a, F_v *and* T_s. The ATC website utilizes the most updated published data on seismic conditions from the United States Geological Survey. The seismic design parameters for this site are presented in the following table:

Seismic Design Parameters*
(Reference: 2016 IBC Section 1613.2.2, ASCE 7-16, and ATC)

Seismic Item	Value
Site Coefficient F_a	1.000
S_s	1.358
S_{MS}	1.358
S_{DS}	0.905
Site Coefficient F_v	1.819
S_1	0.481
S_{M1}	0.875
S_{D1}	0.583
Ts	0.645

*Based on use of the Equivalent Lateral Force (ELF) Design Procedure.

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The native soils primarily consisting of medium dense to very dense granular soils, and stiff to hard cohesive soils interpreted to underlie the site are considered to have a low potential for liquefaction and amplification of ground motion. However, liquefaction can occur on fill soils.

The Liquefaction Susceptibility Map of Kitsap County, Washington, by Stephen Palmer, et al. (WADNR, September 2004) indicates that the site is mapped as an area of very low liquefaction susceptibility. Therefore, a site-specific liquefaction analysis was not performed.

CONCLUSIONS AND RECOMMENDATIONS

General

It is our opinion from a geotechnical standpoint that the site is compatible with the proposed development, provided that our geotechnical recommendations are incorporated into project plans and are implemented during construction.

Our test pits, TP-2, TP-4, TP-5, and TP-6 were excavated in the proposed building areas. In general, native competent glacial soils were exposed within the upper 2 feet from the existing ground surface. However, TP-5 exposed about 4 feet of undocumented fill overlying the competent native glacial soils. The undocumented fill will not be suitable to support the foundation loads and should be removed completely, if exposed during foundation excavations. This is further discussed in the Site Preparation section of this report.

Test pits TP-3 and TP-7 were excavated in the proposed pavement areas, and exposed competent native glacial soils approximately 2 feet below the existing ground surface. However, TP-1 and TP-8 exposed undocumented fill to the maximum depths explored due to the limitations of the excavator. There may be thicker layers of loose/soft soils, organic materials, or undocumented fill in unexplored areas of the site.

Based on our explorations, conventional spread footings supported on medium dense/stiff or firmer native soil, or on structural fill extending to medium dense/stiff or firmer native soil, should provide adequate support for the proposed structures. Detailed geotechnical engineering recommendations for foundation design are presented in this report.

Proper site grading and drainage should help maintain current stability conditions. A comprehensive drainage plan will be an important part of a successful development project at this site. Stormwater runoff and foundation drains should be routed to an appropriate discharge location. Based on our communication with the client, we understand that an existing off-site public stormwater system will be utilized to manage the stormwater runoff from the site development.

The soils encountered at this site are considered moisture-sensitive and will be easily disturbed and difficult to compact when wet. We recommend that construction take place during extended periods of dry weather in the 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.

The on-site granular soils may be suitable for use as structural fill material, provided the moisture content is near optimum and the soil could be suitably compacted to specifications. *This will depend on the moisture content of the soils at the time of construction.* Krazan and Associates should be retained to determine if the on-site soils can be used as structural fill material at the time of construction. The onsite cohesive soil and organics are not suitable for use as structural fill material.

Site Preparation

In general site clearing should include removal of any vegetation and associated root systems; wood; abandoned utilities; structures including foundations, rubble; and rubbish. After stripping of organic topsoil is completed, the building pad and pavement areas should be proof-rolled with a loaded tandem-axle dump truck and be visually inspected to identify any loose/soft areas.

Footing subgrade preparation: In the planned footing areas, any undocumented fill or loose/soft soils should be excavated to expose the underlying firm native soils. The resulting excavations should be filled to the planned bottom of the footing elevations with suitable soils as per the **Structural Fill** section of this report. *Based on our soil explorations, we interpreted the medium dense or firmer native load bearing soils in the proposed building areas to be about 2 feet bgs. However, thicker layers of loose/soft soils and undocumented fill may be encountered in unexplored areas of the site.*

Floor Slab and Pavement subgrade preparation: Floor slab and pavement subgrade should consist of competent native soils. However, if undocumented fill and loose/soft soils are encountered in the floor slab and pavement subgrade, then the undocumented and loose/soft soil should be removed to *at least 1-foot* below the planned subgrade elevation. We recommend that a high-strength woven geotextile separation fabric then be placed over the entire overexcavated grade, such as Miraffi 600X or equivalent. After the

fabric is placed, the area should be filled in lifts, to the planned subgrade elevation with suitable soils, and compacted as recommended in the **Structural Fill** section of this report. In the exterior flatwork (sidewalk) areas, any loose/soft soil should be removed to *at least 6-inches* below the planned subgrade. Fabric may not be needed for sidewalk areas. *Deeper excavation may be required, if yielding soil conditions or debris/organics are exposed during over-excavation. Some settlement should still be expected with the above-mentioned modification.*

During wet weather conditions, which typically occur from October through May, subgrade stability problems and grading difficulties may develop due to excess moisture, disturbance of moisture sensitive soils and/or the presence of perched groundwater. Earthwork construction during extended periods of wet weather could create the need to remove wet disturbed soils if they cannot be suitably compacted due to elevated moisture contents. The soils in our test pits are considered to be 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. Preparation of the site for wet weather conditions may consist of the placement of a layer of aggregate base for the protection of exposed soils during construction.

It should be understood that even if Best Management Practices (BMP's) for soil protection are implemented for the wet season, there is a significant chance that additional soil mitigation work will be needed.

Any buried structures encountered during construction should be completely removed and backfilled with structural fill. Excavations, depressions, or soft and pliant areas extending below the planned subgrade elevations should be excavated to expose medium dense or firmer soil, and be backfilled with structural fill. In general, any septic tanks, underground storage tanks, debris pits, cesspools, or similar structures and deleterious materials should be completely removed. Any concrete footings encountered in the planned foundation area should be removed to 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.

All fill on the sloping areas should be placed as structural fill. Where fills greater than 8 feet are to be constructed on original ground that slopes at inclinations steeper than 6:1 (horizontal to vertical), benches should be cut into the existing slope as the filling operations proceed. Each bench should consist of a level terrace, a minimum of 4 to 8 feet wide (based on the width of the equipment utilized), with the rise to the next bench held to 4 feet or less. Where fills of comparable height will be constructed on ground that slopes at an inclination steeper than 4:1 (horizontal to vertical), a keyway should be provided along the toe of the fill slope in addition to the benches. Each keyway should consist of a level trench at least 8 feet wide and at least 2 feet deep, with side slopes not exceeding 1:1 (horizontal to vertical), cut into the existing slope.

Permanent fill slopes should be no steeper than 2 to 1 (horizontal to vertical). Fill materials should not be placed in any section of the slope until the subgrade for that section has been suitably prepared and evaluated

by a representative of the geotechnical engineer. Brush, roots, sod or any other organic, perishable or unsuitable material should not be placed in the fill slope.

Site grading near the crowns of the reconstructed slopes should be accomplished, such that, excessive sheet run-off is prevented. The completed slopes should be seeded or otherwise vegetated to protect from future erosion. Well vegetated slopes at the recommended configuration should be reasonably protected from typical erosional effects. However, vegetation on the slopes may not provide protection from unusual flow conditions, such as flood events or concentrations of stormwater runoff occurring on the slopes.

A representative of our firm should be available on request during all grading operations to observe, test and evaluate earthwork construction. This testing and observation are integral parts 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.

Structural Fill

Fill placed beneath foundations 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. A representative of the geotechnical engineer should evaluate the subgrade prior to structural fill placement.

BMP's should be followed when considering the suitability of the existing materials for use as structural fill. The granular on-site soils may be suitable for reuse as structural fill, provided the soil is free of organic material and debris, and it is within ± 2 percent of the optimum moisture content. The onsite cohesive soil and organics are not suitable for use as structural fill material.

Laboratory testing of some of the on-site soils indicated percentage of silt and clay (passing no. 200 sieve) to be greater than 5. It should be noted that the on-site soils with percentage of silt and clay greater than 5 will be difficult to compact during the wet weather. Cobbles were noted in our explorations. C*obbles and boulders should be screened from the soil prior to use as structural fill. The structural fill should consist of materials with 100 percent passing no. 6 sieve.* If the on-site 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 on site during the excavation work to determine which soils are suitable for placement as structural fill.

Imported, all weather granular 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). Structural fill can also consist crushed rock, rock spalls and controlled density fill (CDF). All structural fill material should be submitted for approval to the geotechnical engineer at least 48 hours prior to delivery to the site.

Structural fill soils should be placed in horizontal lifts not exceeding 8 inches in 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.

Temporary Excavations

The on-site soils have variable cohesion strengths, therefore the safe angles to which these materials may be cut for temporary excavations is limited, as the soils may be prone to caving and slope failures in temporary excavations deeper than 4 feet. We did not observe caving in our test pits. Temporary excavations in the undocumented fill soils should be sloped no steeper than 2H:1V (horizontal to vertical) where room permits. Temporary excavations in the native glacial soils should be sloped no steeper than 1H:1V 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 the temporary cut slopes and minimizing slope erosion during construction. The temporary cut slopes should be covered with plastic sheeting or other erosion control materials to help minimize erosion during wet weather and the slopes should be closely monitored until the permanent retaining systems and erosion control measures are complete. Materials should not be stored and equipment should not be 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 reason 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.

Shallow Foundations

General: The proposed structures may be supported on a conventional spread foundation. Foundation subgrade should be prepared as per the Site Preparation section of this report. We have assumed isolated column loads of 50,000 pounds and wall loads of 1,000 to 2,000 pounds per lineal foot (plf) for our foundation and settlement analyses. *We should be contacted to re-evaluate the allowable soil bearing pressure, if the design loads changes significantly than the afore-mentioned assumed values.*

Soil Bearing: Conventional shallow spread footings supported on medium dense of firmer native soils, or on structural fill extending to the medium dense or firmer native soils, may be designed using an allowable soil bearing pressure of **2,500 pounds per square foot (psf)** for dead plus live loads. This value may be increased by 1/3 for short duration loads such as wind or seismic loading. A representative of Krazan and Associates should evaluate the foundation bearing soil and observe structural fill placement, where utilized.

For frost protection and bearing capacity considerations, footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footing widths should be based on the anticipated loads and allowable soil bearing pressure. Footings should have a minimum width of at least 12 inches regardless of load. Water should not be allowed to accumulate in footing trenches. All undocumented fill and loose or disturbed soils should be removed from the foundation excavations prior to placing concrete.

Structural Fill in Footing Areas: Structural fill placed for foundation support should follow these recommendations. If structural fill consisting of granular soils or rock spalls are used, then the foundation excavations would need to be widened on both sides of the footing a distance equal to one-half of the depth of the over-excavation below the bottom of the footing. Structural fill consisting of granular soils should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. To reduce the volume of extra excavation needed for the footing trenches and to simplify structural fill placement, it may be practical to place CDF to fill the deeper footing trenches to the planned footing subgrade elevations. If CDF is used, the trench may be excavated only slightly wider (6 inches wider on each side) than the footing.

Potential Foundation Settlement: For foundations constructed as recommended, the total settlement is not expected to exceed 1-inch. Differential settlement should be less than ½-inch. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. It should be noted that the risk of liquefaction is considered low, given the composition and density of the native, on-site soils.

Design Parameters – Lateral Resistance: Resistance to lateral displacement can be computed using an allowable friction factor of 0.40 acting between the bases of foundations and the supporting subgrade soil. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 300 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.

Foundation Drainage: 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 reduce 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

The floor slab and exterior flatwork subgrade should be prepared in accordance with the recommendations presented in the **Site Preparation** section of this report, and may be designed using a modulus of subgrade reaction value of k = 200 pounds per cubic inch (pci).

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 retardant system. The system should consist of a vapor retardant sheeting underlain by a capillary break consisting of a minimum of 4-inches of compacted clean (less than 5 percent passing the U.S. Standard No. 200 Sieve), open-graded coarse rock of ¾-inch maximum size. The vapor retardant sheeting should be protected from puncture damage. In addition, ventilation of the structure may be prudent to reduce the accumulation of interior moisture.

The exterior flatwork should be placed separately in order to act independently of the walls and foundation system.

Lateral Earth Pressures and Retaining Walls

We have developed criteria for the design of retaining or below grade walls. Our design parameters are based on retention of the native soils or structural fill. The wall design criteria are based on the total unit weight of backfill of 130 pounds per cubic foot (pcf) and friction angle of 34 degrees. The parameters are also based on level, well-drained wall backfill conditions. Walls may be designed as "restrained" retaining walls based on "at-rest" earth pressures, plus any surcharge on top of the walls as described below, if the walls are braced to restrain movement and/or movement is not acceptable. Unrestrained walls may be designed based on "active" earth pressure, if the walls are not part of the buildings and some movement of the retaining walls is acceptable. Acceptable lateral movement equal to at least 0.2 percent of the wall height would warrant the use of "active" earth pressure values for design. The following table, titled **Wall Design Criteria**, presents the recommended soil related design parameters for retaining walls with well-drained level backfill.

Wall Design Criteria	
"At-rest" Conditions (Lateral Earth Pressure)	55 pcf (Equivalent Fluid Density) (Triangular Distribution)
"Active" Conditions (Lateral Earth Pressure)	35 pcf (Equivalent Fluid Density) (Triangular Distribution)
Seismic Increase for "Active" Conditions (Lateral Earth Pressure)	7 psf x H (Uniform Distribution) Where H is the height of the wall in feet
Passive Earth Pressure on Low Side of Wall (includes factor of safety of 1.5)	Neglect upper 1-foot, then 300 pcf (Equivalent Fluid Density)
Soil-Footing Coefficient of Sliding Friction (includes factor of safety of 1.5)	0.4

If vehicular loads are expected to act behind the wall within a horizontal distance of less than or equal to one-half of the wall height, then a live load surcharge should be applied for the design. In this case, we recommend the addition of vehicle surcharges of 70 psf and 100 psf to the active and at-rest earth pressures, respectively.

The stated lateral earth pressures **do not** include the effects of hydrostatic pressure generated by water accumulation behind the retaining walls or loads imposed by construction equipment, foundations or roadways adjacent to the wall (surcharge loads). To minimize the lateral earth pressure and reduce the buildup of water pressure against the walls, continuous footing drains (with cleanouts) should be provided at the bases of the walls. The footing drains should consist of a minimum 4-inch diameter rigid PVC perforated pipe, sloped to drain, with perforations placed near the bottom. The drainpipe should be enveloped by 6 inches of washed gravel in all directions wrapped in filter fabric to prevent the migration of silt and clay into the drain.

The wall fills adjacent to and extending a lateral distance of at least 2 feet behind the walls should consist of free-draining granular material. All free-draining backfill should contain less than 3 percent fines (passing the U.S. Standard No. 200 Sieve) based upon the fraction passing the U.S. Standard No. 4 Sieve with at least 30 percent of the material being retained on the U.S. Standard No. 4 Sieve. **Alternatively,** a drainage composite may be used. It should be realized that the primary purpose of the free-draining material is the reduction of hydrostatic pressure. Some potential for the moisture to contact the back face of the wall may exist, even with treatment, which may require that more extensive waterproofing be specified for walls, which require interior moisture sensitive finishes.

We recommend that the wall fill 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 to verify adequate compaction. Soil compactors place transient surcharges on the backfill. Consequently, only light hand operated equipment is recommended for fill compaction within 3 feet of walls so that excessive stress is not imposed on the walls.

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 (BMPs), 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.

Pavement Design

Pavement subgrade should be prepared in accordance with the recommendations presented in the **Site Preparation** and **Structural Fill** sections of this report. Based on the recommended subgrade preparation and protection from moisture, pavements may be designed using a modulus of subgrade reaction value of k = 150 pci.

Traffic loads were not provided, however, based on our knowledge of the proposed project, we expect the traffic to range from light duty (passenger automobiles) to heavy duty (firetrucks). The following tables show the minimum recommended pavement sections for both light duty and heavy-duty traffic loads.

ASPHALTIC CONCRETE (FLEXIBLE) PAVEMENT
LIGHT DUTY

Asphaltic Concrete	Aggregate Base*
3.0 in.	6.0 in.

ASPHALTIC CONCRETE (FLEXIBLE) PAVEMENT
HEAVY DUTY

Asphaltic Concrete	Aggregate Base*
4.0 in.	6.0 in.

PORTLAND CEMENT CONCRETE (RIGID) PAVEMENT

Min. PCC Depth	Aggregate Base*
6.0 in.	6.0 in.

** 95% compaction based on ASTM Test Method D1557*

The pavement specification in Appendix C provides additional recommendations. The asphaltic concrete depth in the flexible pavement tables should be a surface course type asphalt, such as Washington Department of Transportation (WSDOT) ½ inch HMA. The rigid pavement design is based on a Portland Cement Concrete (PCC) mix that has a 28-day compressive strength of 4,000 pounds per square inch (psi) with a fiber mesh. The design is also based on a concrete flexural strength or modulus of rupture of 575 psi.

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 off-site 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.

This letter has been prepared for the exclusive use of the Laughlin Development and their assigns, for the specific application to the subject site. Foundation and earthwork construction are 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, natural events such as earthquakes, slope instability, flooding, or groundwater fluctuations. If any variations or undesirable conditions are encountered during construction, the 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. The geotechnical engineer should be notified of any changes so that the recommendations can be reviewed and reevaluated.

Misinterpretations of this report by other design team members can result in project delays and cost overruns. These risks can be reduced by having Krazan & Associates, Inc. involved with the design team's

meetings and discussions after submitting the report. 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 & Associates. Inc. should participate in pre-bid and preconstruction meetings, and provide construction observations during the site work.

This report is a geotechnical engineering investigation with the purpose of evaluating the soil 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 soils log 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.

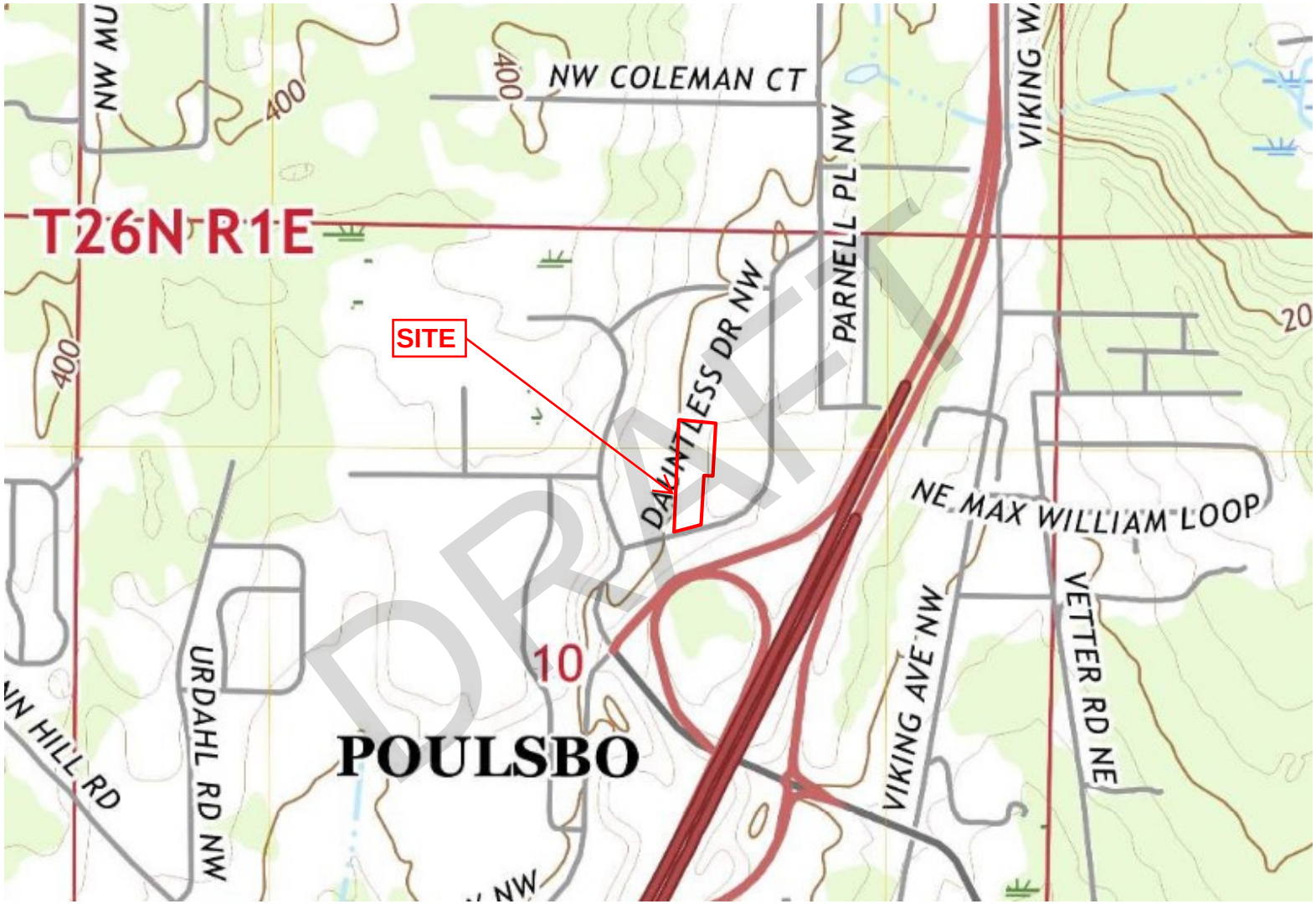
Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

10/6/2020

Vijay Chaudhary, P.E.
Project Engineer

VC:MR

Vicinity Map

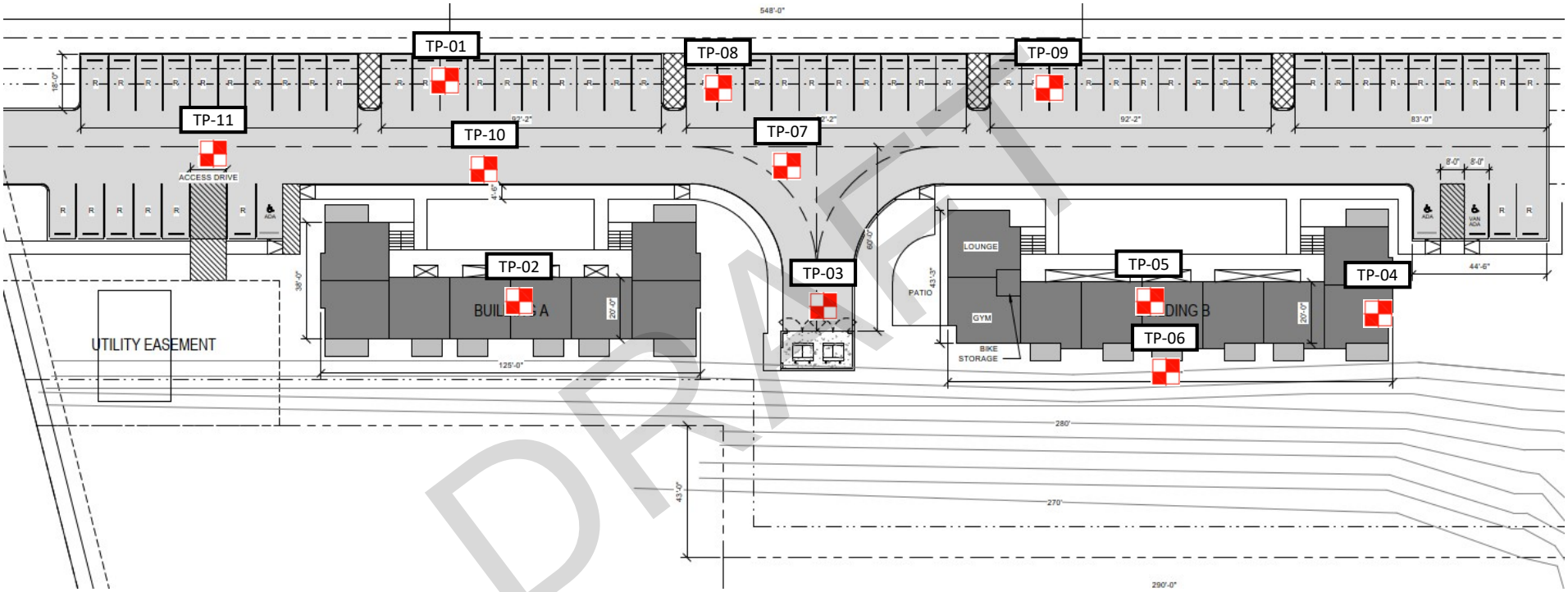


Reference: USGS topographic map titled "Lofall Quadrangle, Washington 7.5-Minute Series", dated 2020

Krazan		
5 R Apartments		
Date: September 2022	Project Number: 102-22022	
Drawn By: EA	Figure: 1	NTS

Site Plan

N



TP-01 Number and Approximate Location of Test Pit

Reference: Shugart Wasse Workshop's Site Plan, dated 2022

Krazan

5 R Apartments		
Date: September 2022	Project Number: 102-22022	
Drawn By: EA	Figure: 2	NTS

APPENDIX A

FIELD INVESTIGATION – LABORATORY TESTING

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploration program. Eleven (11) exploratory test pits were excavated and sampled for subsurface exploration at this site. The test pits were completed on August 31, 2022 with an excavator and operator from Laughlin Development. The test pits were excavated to depths ranging from 1.5 feet to 6.0 feet BGS. The approximate exploratory test pit locations are shown on the Site Plan (Figure 2). The depths shown on the attached test pit logs are from the existing ground surface at the time of our exploration.

The soils encountered were logged in the field during the exploration and are described in accordance with the Unified Soil Classification System (USCS). All samples were returned to a Krazan laboratory for further evaluation. The logs of the soil exploration are presented in this appendix.

Laboratory Testing

The laboratory testing program was developed primarily to determine the index properties of the soils. Test results were used for soil classification and as criteria for determining the engineering suitability of the surface and subsurface materials encountered. Our laboratory tests indicated that the percentage of gravel ranged from 0 to 26, sand ranged from 23 to 62, and silt and clay (passing no. 200 sieve) ranged from 17 to 77. The moisture content on one selected sample was 17.2 percent. The laboratory test results are included in this appendix.

Soil Classification

USCS Soil Classification				
Major Division			Group Description	
Coarse-Grained Soils < 50% passes #200 sieve	Gravel and Gravelly Soils < 50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well-Graded Gravel
			GP	Poorly Graded Gravel
		Gravel (with > 12% fines)	GM	Silty Gravel
			GC	Clayey Gravel
	Sand and Sandy Soils > 50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well-Graded Sand
			SP	Poorly Graded Sand
		Sand (with > 12% fines)	SM	Silty Sand
			SC	Clayey Sand
Fine-Grained Soils > 50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt
			CL	Lean Clay
			OL	Organic Silt and Clay (Low Plasticity)
	Silt and Clay Liquid Limit > 50		MH	Inorganic Silt
			CH	Inorganic Clay
			OH	Organic Clay and Silt (Med. to High Plasticity)
Highly Organic Soils			PT	Peat

Relative Density with Respect to SPT N-Value			
Coarse-Grained Soils		Fine-Grained Soils	
Density	N-Value (Blows/Ft)	Density	N-Value (Blows/Ft)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	5 -10	Soft	2 - 4
Medium Dense	11 - 30	Medium Stiff	5 - 8
Dense	31 - 50	Stiff	9 - 15
Very Dense	> 50	Very Stiff	16 - 30
		Hard	> 30

Krazan & ASSOCIATES, INC.

Proposed 5 R Apartments

Date: Sep. 2022 | References: USCS

Drawn By: VC | | Project Number: 102-22022

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-1

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~287 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits (10 20 30 40 50 60 70 80)
0			Organic topsoil			
			Light brown to gray, sandy silt (undocumented fill) (moist, soft to stiff)			
3				S1		
4			-Becomes hard and gray			
				S2		
5						
				S3		
6			-Terminated as it reached the maximum extent of the excavator.			
			End of Exploratory Test Pit			
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered. Little to no penetration with T-probe at 4.0 ft.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-2

PROJECT: 5 R Apartments
PROJECT NO.: 102-22022
CONTRACTOR:
SAMPLE METHOD: Grab

DATE: 8/31/22
PAGE: 1 of 1
SURFACE ELEV.: ~280 ft.
LOCATION: Poulsbo, WA

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
			Organic topsoil			
			Light brown to gray, silty sand with gravel and cobbles (SM) (moist, medium dense)			
1				S1	G	
2			-Becomes gray and very dense.			
			-Refusal			
			End of Exploratory Test Pit			
3						
4						
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-3

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~274 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits (10 20 30 40 50 60 70 80)
0			Organic topsoil			
			Light brown to gray, silty sand with gravel and cobbles (SM) (moist, medium dense to very dense)			
1				S1	G	
			-Becomes gray and very dense.			
2			-Refusal			
			End of Exploratory Test Pit			
3						
4						
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-4

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~270 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
0			Organic topsoil			
	SM		Brown, silty sand with gravel and cobbles (SM) (moist, medium dense)			
3			-Becomes very dense.	S1	G	
4			-Refusal			
			End of Exploratory Test Pit			

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-5

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~271 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits (10 20 30 40 50 60 70 80)
0			Organic topsoil			
			Light brown and gray, silty sand with gravel and cobbles (undocumented fill) (moist, medium dense)			
1						
2						
3				S1		
4			Gray, silty sand with gravel and cobbles (SM) (moist, very dense)			
			-Refusal			
			End of Exploratory Test Pit			
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-6

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~271 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
0			Organic topsoil			
			Gray, silty sand with gravel and cobbles (SM) (moist, very dense)			
1			-Refusal			
			End of Exploratory Test Pit			
2						
3						
4						
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-7

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~271 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
			Organic topsoil			
1			Light brown to gray, silty sand with gravel and cobbles (SM) (moist, medium dense to very dense)			
			-Becomes gray and very dense.			
2			-Refusal			
			End of Exploratory Test Pit			
3						
4						
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-8

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~276 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits (10 20 30 40 50 60 70 80)
			Organic topsoil			
			Brown to bluish gray, silty sand with gravel and cobbles (undocumented fill) (moist, dense to medium dense)			
1			-Becomes medium dense			
2						
3				S1	G	
			-Becomes bluish gray			
4						
5				S2	G	
			-Terminated as it reached the maximum extent of the excavator.			
6			End of Exploratory Test Pit			
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-9

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~280 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
0			Organic topsoil			
	SM		Light brown to brown, silty sand with gravel and cobbles (SM) (moist, medium dense to very)			
1						
2						
3			-Becomes gray and very dense.	S1	G	
			-Refusal			
4			End of Exploratory Test Pit			
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-10

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~282 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
0			Organic topsoil			
	SM		Light brown to gray, silty sand with gravel and cobbles (SM) (moist, medium dense to very dense)			
1			-Becomes brown.			
2						
3			-Becomes gray and very dense.			
			-Refusal			
			End of Exploratory Test Pit			
4						
5						
6						
7						

Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

KRAZAN AND ASSOCIATES, INC.

LOG OF EXPLORATORY TEST PIT TP-11

PROJECT: 5 R Apartments | **DATE: 8/31/22**
PROJECT NO.: 102-22022 | **PAGE: 1 of 1**
CONTRACTOR: | **SURFACE ELEV.: ~292 ft.**
SAMPLE METHOD: Grab | **LOCATION: Poulsbo, WA**

DEPTH (ft)	USC SYMBOL	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE No.	SAMPLE TYPE	Moisture Content and Atterberg Limits 10 20 30 40 50 60 70 80
			Organic topsoil			
			Light brown sandy silt with gravel and cobbles (SM) (moist, medium dense)			
			Brown to gray, sandy silt (ML) (moist, very stiff to hard)			
1				S1		
			-Becomes gray and hard.			
2						
3						
				S2		
			-Refusal			
4			End of Exploratory Test Pit			
5						
6						
7						

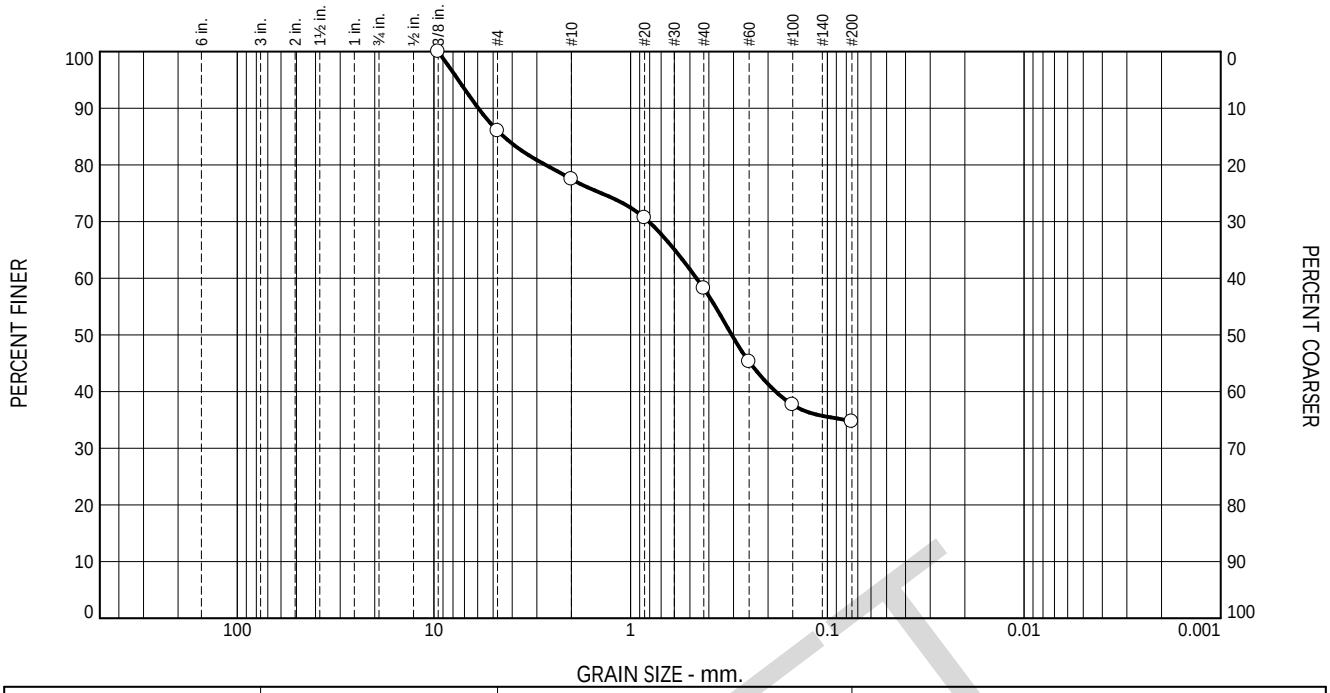
Water Level Initial: ▽ Final: ▼

Water Observations: No groundwater seepage was encountered.

Notes: No sloughing was encountered.

Logged By: EA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	14	9	19	23	35	

Test Results (ASTM D6913 & D1140)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
0.375	100		
#4	86		
#10	77		
#20	71		
#40	58		
#60	45		
#100	38		
#200	35		

* (no specification provided)

Source of Sample: TP3- S1 Depth: 1.0'
Sample Number: 633

Material Description
Light brown Silty Sand

Atterberg (ASTM D4318)
PL= NP LL= NV PI= NP

Coefficients
D_{90}= 5.9444 D_{85}= 4.4214
D_{60}= 0.4629 D_{50}= 0.3062
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

Sieve Test (ASTM D6913 & D1140)
Test Date: 9/6/22 Technician: L. Finney
Test Notes

Hydrometer Test
Test Date: _____ Technician: _____
Test Notes

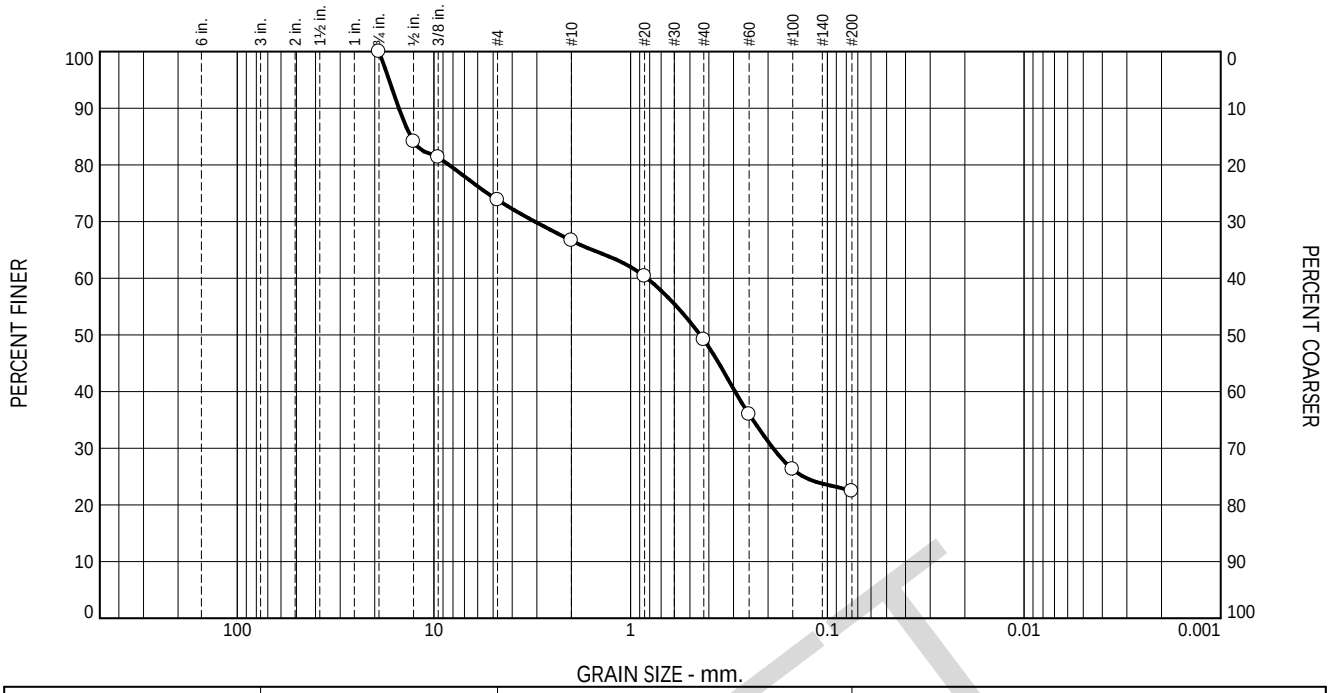
USCS (ASTM D2487)
SM

Date Sampled: 8/31/22
Date Received: 9/1/22
Checked By: K. O'Connell
Title: Lab Supervisor

Krazan

Client: Laughlin Development
Project: Proposed 5R Apartments
Project No: 10222022 Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	26	7	18	27	22	

Test Results (ASTM D6913 & D1140)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
.75	100		
.5	84		
.375	81		
#4	74		
#10	67		
#20	60		
#40	49		
#60	36		
#100	26		
#200	22		

· (no specification provided)

Source of Sample: TP4- S1 Depth: 4.0'
Sample Number: 634

Material Description
Brown Silty Sand with Gravel

Sieve Test (ASTM D6913 & D1140)

Test Date: 9/6/22 Technician: L. Finney

Test Notes

Hydrometer Test

Test Date: _____ Technician: _____

Test Notes

Atterberg (ASTM D4318)
PL= NP LL= NV PI= NP

Coefficients
D_{90}= 15.0765 D_{85}= 13.1227
D_{60}= 0.8261 D_{50}= 0.4430
D_{30}= 0.1887 D_{15}=
D_{10}=
C_u= C_c=

USCS (ASTM D2487)
SM

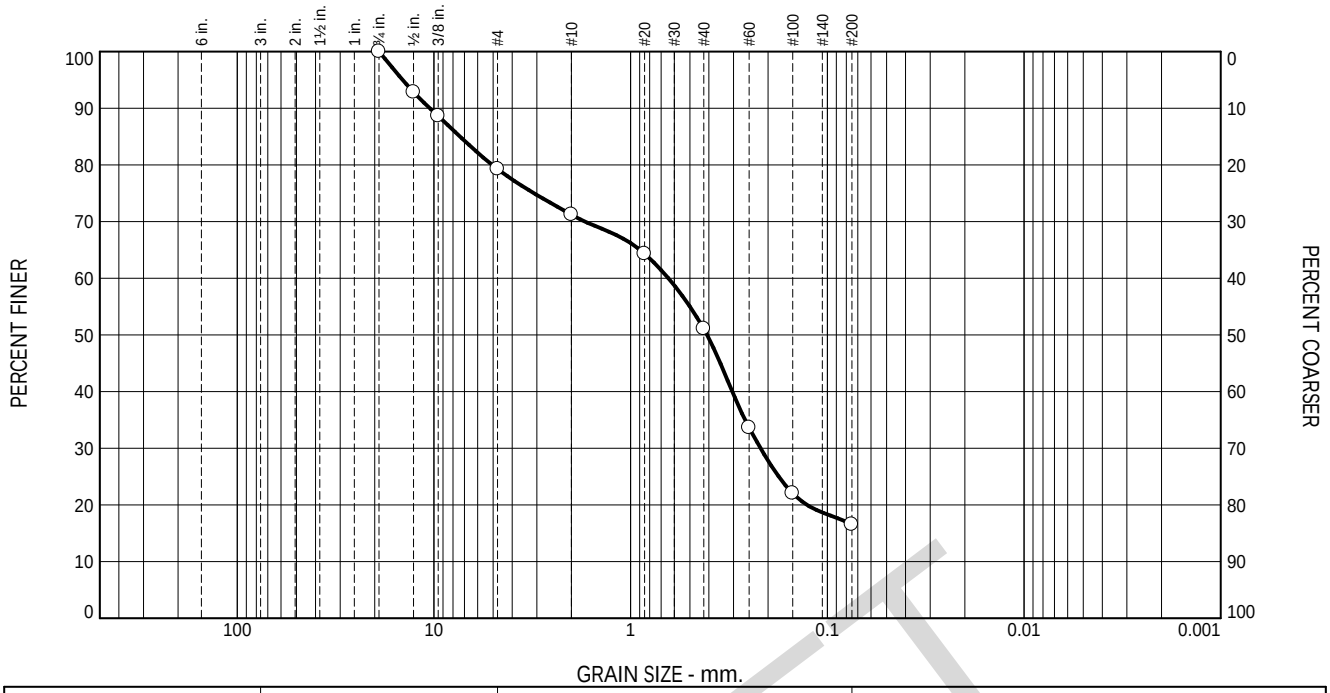
Date Sampled: 8/31/22
Date Received: 9/1/22
Checked By: K. O'Connell
Title: Lab Supervisor

Krazan

Client: Laughlin Development
Project: Proposed 5R Apartments

Project No: 10222022 Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	21	8	20	34	17	

Test Results (ASTM D6913 & D1140)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
.75	100		
.5	93		
.375	89		
#4	79		
#10	71		
#20	64		
#40	51		
#60	34		
#100	22		
#200	17		

· (no specification provided)

Source of Sample: TP9- S2 Depth: 3.0'
Sample Number: 635

Material Description
Brown Silty Sand with Gravel

Sieve Test (ASTM D6913 & D1140)

Test Date: 9/6/22 Technician: L. Finney

Test Notes

Hydrometer Test

Test Date: _____ Technician: _____

Test Notes

Atterberg (ASTM D4318)

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 10.4975 D_{85}= 7.3696
D_{60}= 0.6427 D_{50}= 0.4084
D_{30}= 0.2185 D_{15}=
D_{10}=
C_u= C_c=

USCS (ASTM D2487)

SM

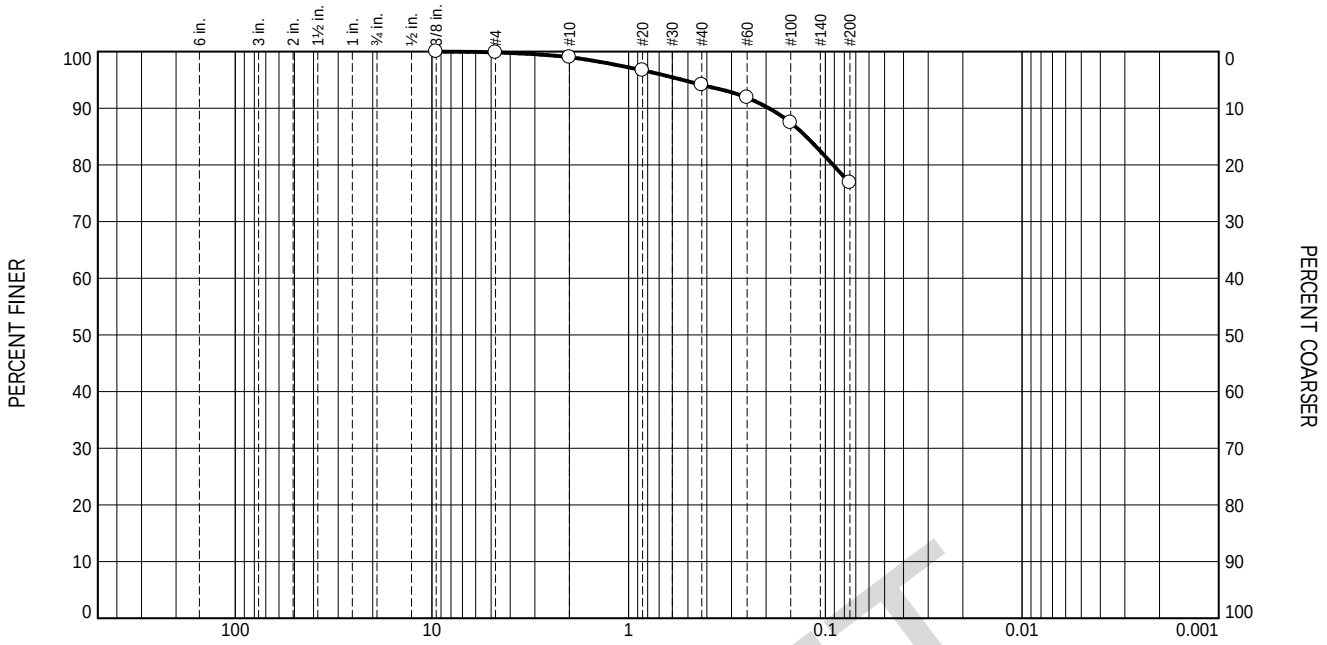
Date Sampled: 8/31/22
Date Received: 9/1/22
Checked By: K. O'Connell
Title: Lab Supervisor

Krazan

Client: Laughlin Development
Project: Proposed 5R Apartments

Project No: 10222022 Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	5	17	77	

Test Results (ASTM D6913 & D1140)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
.375	100		
#4	100		
#10	99		
#20	97		
#40	94		
#60	92		
#100	87		
#200	77		

· (no specification provided)

Material Description
Brown Silt

Atterberg (ASTM D4318)
PL= NP LL= NV PI= NP

Coefficients
D_{90}= 0.1934 D_{85}= 0.1251
D_{60}= D_{50}=
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

Sieve Test (ASTM D6913 & D1140)
Test Date: 9/6/22 Technician: L. Finney
Test Notes

Hydrometer Test
Test Date: _____ Technician: _____
Test Notes

USCS (ASTM D2487)
ML

Date Sampled: 8/31/22
Date Received: 9/1/22
Checked By: K. O'Connell
Title: Lab Supervisor

Source of Sample: TP11- S1 Depth: 1.5'
Sample Number: 636

Krazan

Client: Laughlin Development
Project: Proposed 5R Apartments
Project No: 10222022 Figure

Krazan and Associates
1230 Finn Hill Rd NW STE A
Poulsbo, WA 98370
Phone: (360) 598-2126

September 9, 2022 KA Project No.: 10222022

Jim Laughlin
Laughlin Dvelopment
P.O Box 10607
Bainbridge Island, WA 98110

Project Information

Project Name:	Proposed 5R Aparments		
Address	APN 10261-1-042-2001 Dauntless Driv	City, St., Zip:	Poulsbo, WA 98370
Jurisdiction			
Building Permit No.:	N/A		

Sample Information

KA Sample No.:	**632**		
Date Sampled:	August 31, 2022	Sampled By:	E. Acob
Date Received:	September 1, 2022	Proposed Use:	
Sample Description:	Brown Sandy Silt		
Sample Location:	TP1-S2		
Sample Source:	Native	Elev./Depth:	5.0'
Project Specification:		Client Notes:	
Date Tested:	September 6, 2022	Tested By:	L. Finney

ASTM D2216-19

Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Water Content %	**17.2**	**%**
Test Specimen contained more than one material type	Single	
Drying Temperature Used (C°)	110	
Material Size Excluded from Test Specimen	N/A	
Material Amount Excluded from Test Specimen	None	

Data not meeting ASTM Requirements of this test method

Total Mass of Sample	Conforms
Temperature Used	Conforms
Balance/Scale	Conforms

AASHTO ACCREDITED

Reviewed By: Kate Ronnell

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 to 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 of the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be densified to a density 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

Site preparation shall consist of site clearing and grubbing and preparations of foundation materials for receiving fill.

CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Geotechnical Engineer to be deleterious. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree root removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill or tree root excavation should not be permitted until all exposed surfaces have been inspected and the Geotechnical Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

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 reasonable incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included."

3. PREPARATION OF THE SUBGRADE – The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans and as per the pavement design section of this report. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum compaction of 95% of maximum dry density as determined by test method ASTM D1557. The finished subgrades shall be tested and approved by the Geotechnical Engineer prior to the placement of additional pavement of additional pavement courses.

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 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 compacting equipment, and 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.