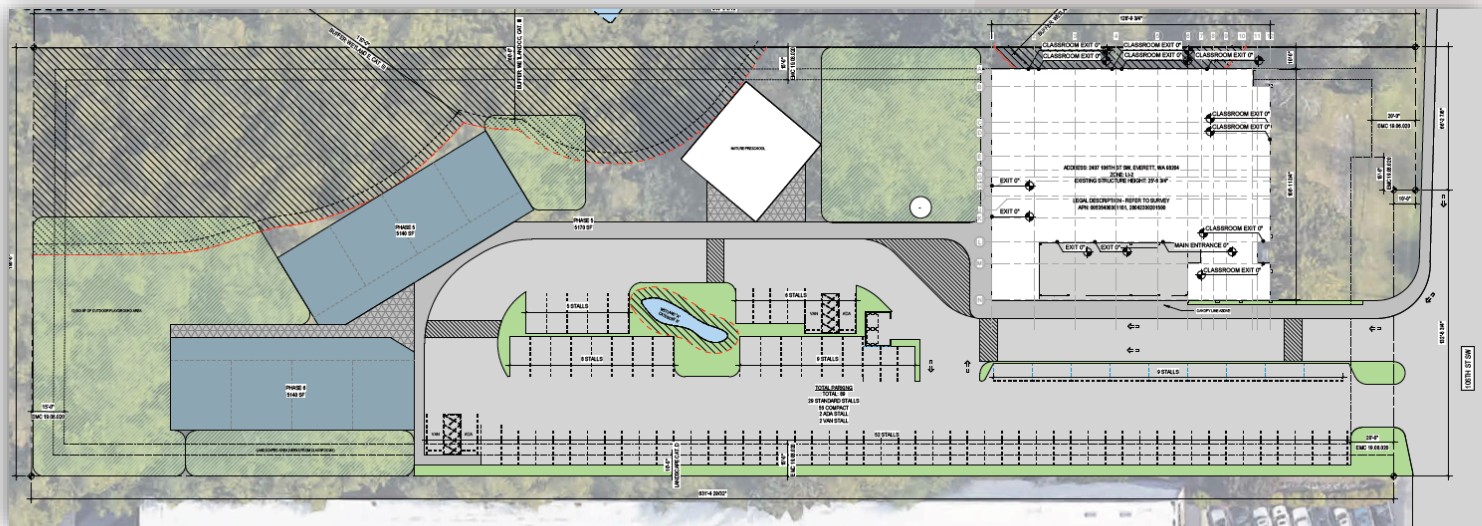
GEOTECHNICAL REPORT
PROPOSED LITTLE WINGS CHILDCARE CENTER
2407 – 106th Street SW
Everett, Washington

PROJECT NO. 24-099
April 2024



Prepared for:

IAM 751

PanGEO INCORPORATED

Geotechnical & Earthquake Engineering Consultants

PanGEO
INCORPORATED
Geotechnical & Earthquake Engineering Consultants

April 23, 2024
File No. 24-099

IAM 751
9125 – 15th Place South
Seattle, Washington 98108
Attention: Mr. Jon Holden

Subject: Geotechnical Report
Proposed Little Wings Childcare Center
2407 – 106th Street SW, Everett, Washington

Dear Mr. Holden:

As requested, PanGEO, Inc. is pleased to present this report to assist the project team with the design and construction of the proposed Little Wings Childcare Center in Everett, Washington.

In preparing this report, we completed seven test pits at the site and conducted our engineering analyses. The principal geotechnical findings are as follows:

- The test pits generally encountered competent bearing soils (glacial till) within about 2 to 4 feet of the existing grade. In our opinion, the proposed structures can be supported on conventional footings bearing on undisturbed glacial till, or on structural fill placed on the undisturbed glacial till.
- The existing backfill in the test pits excavated for this study should be completely removed and replaced with properly compacted structural fill.
- No significant groundwater was encountered in our test pits however, pockets of alluvial soils with perched groundwater may be encountered due to the mapped wetlands at the site. The proposed excavations may encounter minor perched groundwater but is not likely to significantly impact the construction of the project.
- The on-site soils are not suitable for use as wall backfill, foundation backfill, or fill below parking lot due to high risk of post-construction settlement and difficulties in achieving the proper moisture content and compaction.

- The site soils are highly moisture sensitive. Hence, it is likely more economical to perform the earthwork during the drier summer months.

We appreciate the opportunity to be of service. Should you have any questions, please do not hesitate to call.

Sincerely,

Siew L. Tan, P.E.
Principal Geotechnical Engineer
(Stan@pangeoinc.com)

Encl: Geotechnical Report

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ATTACHMENTS:

1.0 GENERAL

As requested, PanGEO is pleased to present this geotechnical report for the proposed Little Wings Childcare Center in Everett, Washington. This study was performed in general accordance with our mutually agreed scope of services outlined in our proposal dated November 9, 2023 and subsequently approved by you on March 11, 2024. Our scope of services included reviewing readily available geologic and geotechnical data, conducting a site reconnaissance, completing seven test pits at the site, and preparing this report.

2.0 SITE AND PROJECT DESCRIPTION

We understand the proposed childcare center will be constructed at the site of the existing Machinists Union Lodge 751, located at 2407 – 106th Street Southwest in Everett, Washington. The approximate location of the site is shown in Figure 1, Vicinity Map.

The existing lodge building is located on two parcels (28042300201500 and 00535400001101). The site borders an existing warehouse building to the west, single-family residences to the north, and 106th Street Southwest right-of-way to the south. The approximately north half of the site, as well as the parcel to the east is undeveloped.

Plate 1, below, provides an aerial view of the site. Plates 2 and 3 on the following page show the site conditions from the ground level.

Plate 1:

Aerial view of the site showing the existing union building at the site.

Subject parcels are outlined in yellow.

North is located at the top of the photo.

Plate 2:

View of the existing union building

Looking from southwest to northeast at the existing driveway.

Plate 3:

View of undeveloped portion of property.

Looking north from edge of asphalt parking area.

We understand it is planned to remodel the existing lodge building and construct three new childcare buildings at the undeveloped portion of the lot. The layout of the site is shown in the attached Figure 2. We envisage the proposed buildings will be light-weight at-grade structures up to two stories in height. The planned improvements will also include changes to the access driveway and extend the asphalt parking area to the north.

The conclusions and recommendations in this report are based on our understanding of the proposed development, which is in turn based on the project information provided. If the above project description is incorrect, or the project information changes, we should be consulted to review the recommendations contained in this study and make modifications, if needed. In any case, PanGEO should be retained to provide a review of the final design to confirm that our geotechnical recommendations have been correctly interpreted and adequately implemented in the construction documents.

3.0 SUBSURFACE EXPLORATIONS

3.1 SITE GEOLOGY

Based on a review of the *Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington* (Minard, 1982), the primary geologic unit mapped in the vicinity of the site consists of Vashon glacial till (Geologic Map Unit Qvt). Glacial till generally consists of an unsorted deposit (diamict) of clay, silt, sand, gravel, and cobbles that has been glacially transported and deposited. The unit has been glacially overridden by several thousand feet of ice, and as such, is typically dense to very dense but has very poor drainage characteristics and are highly moisture sensitive.

3.2 TEST PITS

We completed seven test pits (TP-1 through TP-7) on March 22, 2024, at the approximate locations indicated on Figure 2. The test pits were excavated to approximately three to eight feet below the existing ground surface.

The relative in-situ density of cohesionless soils, or the relative consistency of fine-grained soils, was estimated from the excavating action of the excavator, probing the test pit with a ½-inch diameter T-handle probe, and the stability of the test pit sidewalls. Where soil contacts were gradual or undulating, the average depth of the contact was recorded in the log.

A geologist from our firm was present to observe the explorations, assist in sampling, and to document the soil samples obtained from the explorations and perform the infiltration tests. The soils were logged in general accordance with the system summarized in *Figure A-1, Terms and Symbols for Boring and Test Pit Logs*. The summary test pit logs are included in *Appendix A*.

The test pits were backfilled with the excavated soils. The backfill was tamped with the excavator bucket and the ground surface leveled. The backfill was not placed and compacted as a structural fill. During construction of the project, the earthwork contractor should locate the test pits, remove the loose backfill and replace it with properly compacted structural fill.

4.0 SUBSURFACE CONDITIONS

4.1 SOILS

A detailed description of the subsurface conditions encountered at each exploration location is provided in the boring logs included in Appendix A. The stratigraphic contacts indicated on the test pit logs represent the approximate depth to boundaries between soil units. Actual transitions between soil units may be more gradual or occur at different elevations. The descriptions of groundwater conditions and depths are likewise approximate. The following is a generalized description of the soils encountered in the test pits.

Fill: At the ground surface, TP-1 and TP-4 encountered a medium dense to dense silty sand with gravel to sandy angular gravels. This unit extended to approximately one foot below grade in TP-1 and about 4 feet below grade in TP-4. No significant amount of fill was encountered in the other test pits. Because the site has been previously graded, fill thickness and its composition may vary across the site.

Forest Duff: At the ground surface of TP-2, TP-3, and TP-5 to TP-7, a dark brown to orange-brown silty sand with varying amounts of wood and root debris was encountered. Where encountered, this layer was generally 2 to 3 feet thick,

Alluvium: Below the duff in test pit TP-6, a stiff clayey silt was encountered that graded to a medium dense poorly graded sand with silt. Due to the mapped wetlands at the site, we interpreted this soil as an alluvial deposit. TP-6 terminated within the alluvium unit. This soil unit was not encountered in other test pits.

Though this unit was only encountered in test pit TP-6, it is expected that pockets of alluvium may be encountered during construction, due to the mapped wetlands at the site.

Glacial Till (Qvt): Below the fill and forest duff units of TP-1 to TP-5 and TP-7, we encountered a medium dense to very dense silty sand with gravel. We interpret this soil unit as Vashon till which is mapped in this area. The upper one to two feet of the till appeared weathered and slightly reworked with the occasional roots and reworked soil structure.

Our subsurface descriptions are based on the conditions encountered at the time of our exploration. Soil conditions between our exploration locations may vary from those encountered. The nature and extent of variations between our exploratory locations may not become evident until construction. If variations do appear, PanGEO should be requested to reevaluate the recommendations in this report and to modify or verify them in writing prior to proceeding with earthwork and construction.

4.2 GROUNDWATER

In TP-6, a minor amount of perched groundwater was encountered at approximately 6 feet deep within the alluvial deposit. Groundwater was not encountered in any other test pit during our explorations on March 22, 2024.

The design team and contractor should be aware that groundwater elevations and seepage rates are likely to vary depending on the season, local subsurface conditions, and other factors. Groundwater levels and seepage rates are normally highest during the winter and early spring (typically October through May).

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 SEISMIC DESIGN CONSIDERATIONS

5.1.1 Seismic Site Class

We anticipate the building design will conform to the 2018 or 2021 editions of International Building Code (IBC), which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years). Based on the site soil conditions, it is our opinion that Site Class C should be used.

5.1.2 Liquefaction Potential

Liquefaction is a process that can occur when soil loses shear strength for short periods of time during a seismic event. Ground shaking of sufficient strength and duration results in the loss of grain-to-grain contact and an increase in pore water pressure, causing the soil to behave as a fluid. Soils with a potential for liquefaction are typically cohesionless, predominately silt and sand sized, must be loose, and be below the groundwater table.

Because dense to very dense Vashon till was encountered in the test pits at shallow depths. the potential for liquefaction is negligible and building design considerations related to soil liquefaction are not necessary for this project.

5.2 Foundations

Based on the subsurface conditions encountered at the site and our understanding of the planned improvements, it is our opinion the proposed structures may be supported on conventional footings. The footings should be extended through the fill and duff layer and bear on the underlying Vashon till. It is anticipated that bearing soils should be encountered near the footprint of the proposed buildings approximately 2 to 4 feet below the existing grade.

Any unsuitable soils should be completely removed from within the footprint of the footings and be replaced with properly compacted structural fill.

5.2.1 Bearing Pressure

A maximum allowable soil bearing pressure of 2,500 pounds per square foot (psf) may be used to size the footings bearing on the undisturbed glacial till or structural fill placed on the undisturbed glacial till. The recommended allowable soil bearing pressure is for dead plus live loads. For allowable stress design, the recommended bearing pressure may be increased by one-third for transient loading, such as wind or seismic forces.

For frost protection, exterior foundation elements should be placed at a minimum depth of 18 inches below final exterior grade. Interior spread foundations should be placed at a minimum depth of 12 inches below the top of the concrete slab.

Footings designed and constructed in accordance with the above recommendations should experience total settlement of about one inch and differential settlement of about ½-inch. Most of the anticipated settlement should occur during construction as dead loads are applied.

5.2.2 Lateral Resistance

Lateral loads on the structures may be resisted by passive earth pressure developed against the embedded portion of the foundation system and by frictional resistance between the bottom of the foundation and the supporting subgrade soils.

- For footings bearing on the Vashon till or structural fill, a frictional coefficient of 0.45 may be used to evaluate sliding resistance between the concrete and the subgrade soil.

- The lateral soil resistance may be calculated using an equivalent fluid weight of 350 pcf, assuming foundations are backfilled with structural fill, and level ground surface. Unless covered by pavements or slabs, the passive resistance in the upper 12 inches of soil should be neglected.

The above values include a factor of safety of 1.5.

5.2.3 Foundation Subgrade Preparation

The adequacy of footing subgrade should be observed and verified by a representative of PanGEO prior to placing forms or rebar. Loose or softened soil should be removed from the footing excavations and replaced with properly compacted structural fill. If perched seepage is encountered in the foundation excavation, the excavation should be sloped to one or more sump pits and the collected water removed by pump.

Please note that the site soils (i.e., Vashin Till) are highly moisture sensitive and can be easily disturbed when exposed to moisture. It is the contractor's responsibility to protect the footing subgrade from disturbance.

5.2.4 Floors Slabs

The floor slabs may be constructed using conventional concrete slab-on-grade floor construction. The floor slab should be supported on competent native soil or on structural fill. Overexcavation of loose or soft soil, if needed, should be backfilled with structural fill.

Interior concrete slab-on-grade floors should be underlain by a capillary break consisting of at least of 4 inches of pea gravel or compacted ¾-inch, clean crushed rock (less than 3 percent fines). The capillary break material should meet the gradational requirements provided in Table 1, below.

Table 1 – Capillary Break Gradation

Sieve Size	Percent Passing
¾-inch	100
No. 4	0 – 10
No. 100	0 – 5
No. 200	0 – 3

The capillary break should be placed on the subgrade that has been compacted to a dense and unyielding condition.

A minimum 10-mil polyethylene vapor barrier should also be placed directly below the slab. Construction joints should be incorporated into the floor slab to control cracking.

5.3 Retaining Wall Design Parameters

Retaining walls should be designed to resist the lateral pressures exerted by the soil and surface surcharges (if present) behind the wall. Proper drainage provisions should also be provided behind the walls to intercept and remove groundwater that may collect behind the wall. Our geotechnical recommendations for the design and construction of retaining walls are presented below.

5.3.1 Lateral Earth Pressures

Cantilevered walls should be designed for an equivalent fluid pressure of 35 pcf for a level backfill condition behind the walls assuming the walls are free to rotate. If the walls are restrained at the top from free movement, such as basement walls with a floor diaphragm, an equivalent fluid pressure of 55 pcf should be used for a level backfill condition behind the walls.

Permanent walls should be designed for an additional uniform lateral pressure of 9H psf for seismic loading, where H corresponds to the buried depth of the wall.

The recommended lateral pressures assume the backfill behind the walls consists of a free draining and properly compacted fill with adequate drainage provisions.

5.3.2 Surcharge Loads

Surcharge loads, where present, should also be included in the design of retaining walls. We recommend a lateral load coefficient of 0.35 be used to compute the lateral pressure on the wall face resulting from surcharge loads located within a horizontal distance of the wall height.

5.3.3 Wall Foundations

The recommendations outlined in Section 5.2 of this report are also appropriate for designing wall foundations.

5.3.4 Wall Drainage

Provisions for wall drainage should consist of a 4-inch diameter perforated drainpipe placed behind and at the base of the wall footings, embedded in 12 to 18 inches of clean crushed rock or pea gravel wrapped with a layer of filter fabric. A minimum 18-inch-wide zone of free draining granular soils (i.e., pea gravel or washed rock) is recommended to be placed adjacent to the wall for the full height of the wall. Alternatively, a composite drainage material, such as Miradrain 6000, may be used in lieu of the clean crushed rock or pea gravel. The drainpipe at the base of the wall should be graded to direct water to a suitable outlet.

For site retaining walls, in lieu of a footing drain, weep holes may be incorporated into the wall construction to relieve potential hydrostatic pressure. If used, the weep holes should be at least 1 ½ inch in diameter, spaced no more than 8 feet apart, and spaced within 6 inches of the ground surface in front of the wall.

5.3.5 Wall Backfill

In our opinion, the on-site soils are not suitable for use as wall backfill. Wall backfill should consist of imported, free draining granular material or a soil meeting the requirements of Gravel Borrow as defined in Section 9-03.14(1) of the WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction* (WSDOT, 2024). In areas where space is limited between the wall and the face of excavation, pea gravel may be used as backfill without compaction.

Wall backfill should be moisture conditioned to near its optimum moisture content, placed in loose, horizontal lifts less than 12 inches in thickness, and systematically compacted to a dense and unyielding conditions to be verified by a PanGEO personnel. If density tests will be performed, the test results should demonstrate at least 95 percent of the maximum dry density, as determined using test method ASTM D1557. Within 5 feet of the wall, the backfill should be compacted with hand-operated equipment to at least 90 percent of the maximum dry density.

5.4 Permanent Cut and Fill Slopes

Based on the anticipated soil that will be exposed at the site, we recommend permanent cut and fill slopes be constructed no steeper than 2H:1V (Horizontal:Vertical). However, for ease of future maintenance and erosion control, a 3H:1V permanent slope is preferred, if space is available to accommodate the flatter slope.

Cut slopes should be observed by PanGEO during excavation to verify that conditions are as anticipated. Supplementary recommendations can then be developed, if needed, to improve stability, including flattening of slopes or installation of surface or subsurface drains.

Permanent slopes should be seeded with an appropriate species of vegetation to reduce erosion and improve stability of the surficial layer of soil.

6.0 EARTHWORK CONSIDERATIONS

6.1 Stripping, Clearing and Subgrade Preparation

Foundation and pavement areas, and areas to receive structural fill, should be stripped and cleared of surface vegetation, organic matter, existing pavements, and other deleterious materials. In no case should stripped materials be used as structural fill nor should they be mixed with materials to be used as structural fill.

Existing underground utilities to be abandoned should be plugged or removed so they do not provide a conduit for water and cause soil saturation and stability problems.

Following the stripping operation and excavations necessary to achieve construction subgrade elevations, the ground surface where structural fill is to be placed should be observed by PanGEO. Soft or yielding areas identified in the subgrade should be moisture conditioned as needed and re-compacted in place.

If soft areas are still yielding after re-compaction, they should be over excavated and replaced with structural fill to a depth that will provide a stable subgrade. The optional use of a geotextile subgrade stabilization fabric, such as Mirafi 600X, or an equivalent product placed directly on the over-excavated surface may help to bridge excessively unstable areas. Over excavated areas should be and backfilled with WSDOT 9-03.9(3) Crushed Surfacing Base Course, or WSDOT 9-03.14 (1) Gravel Borrow (WSDOT, 2024) compacted to the requirements of structural fill.

Alternatively, soft or yielding areas can be cement-treated in design parking areas and below slab on grade.

Please note that the site soils (i.e., Vashon till) are highly moisture sensitive and can be easily disturbed when exposed to moisture. It is the contractor's responsibility to protect the subgrade from disturbance.

6.2 Removal of Existing Test Pit Backfill

The test pits excavated for the current study were backfilled with the excavated soil. The backfill was tamped with the excavator bucket and the ground surface leveled. The backfill was not compacted to the requirements of structural fill. During construction of the project, the earthwork contractor should locate the test pits. If the test pits are located within the footprint of any load-bearing areas such as buildings and driveways, the loose backfill should be removed and replaced with properly compacted structural fill.

6.3 Temporary Excavations

We anticipate the excavation for this project will be relatively shallow for footing excavations for the at-grade portion of the building and trenching for utilities. Temporary excavations should be constructed in accordance with Part N of the WAC (Washington Administrative Code) 296-155. The contractor is responsible for maintaining safe excavation slopes and/or shoring.

Based on the soil conditions encountered at our boring locations, in our opinion temporary excavations deeper than 4 feet may be cut at a maximum 1H:1V inclination. Trench boxes may be used to support trench excavations for utilities.

Temporary excavations should be evaluated in the field during construction based on actual observed soil conditions. If seepage is encountered, excavation slope inclinations may need to be reduced. During wet weather, the cut slopes may need to be flattened to reduce potential erosion or should be covered with plastic sheeting.

6.4 Temporary Dewatering

Minor groundwater seepage may be present in the foundation excavation, especially during the wet season. If encountered, we anticipate the groundwater can be addressed with a passive dewatering system such conventional sumps and pumps. The construction subgrade should be properly graded to properly direct water flows, and to limit the extent of the groundwater impacts.

6.5 Structural Fill and Compaction

If structural fill is needed at the site, we recommend using a granular fill material such as Gravel Borrow (WSDOT 9-03.14(1)), or other approved equivalent.

Structural fill should be moisture conditioned to near optimum moisture content, placed in loose, horizontal lifts of 8 to 12 inches in thickness and compacted to the requirement of structural fill. If field density testing will be conducted on the structural fill, the material should be compacted and tested to at least 95 percent maximum density, determined using ASTM D-1557 (Modified Proctor).

The procedure to achieve proper density of a compacted fill depends on the size and type of compaction equipment, the number of passes, thickness of the lifts being compacted, and certain soil properties. If the excavation to be backfilled is constricted and limits the use of heavy equipment, smaller equipment can be used, but the lift thickness will need to be reduced to achieve the required relative compaction.

Generally, loosely compacted soils are a result of poor construction technique or improper moisture content. Soils with high fines contents are particularly susceptible to becoming too wet and coarse-grained materials easily become too dry, for proper compaction. Silty soils with a moisture content too high for adequate compaction should be aerated during dry weather or moisture conditioned by mixing with drier materials to reduce the moisture content.

6.6 Material Reuse

The site soils are highly moisture sensitive and will become disturbed and soft when exposed to inclement weather conditions and/or groundwater seepage. In addition, prior project experience has demonstrated that compacted fill derived from glacial till, even compacted to dense conditions, has settled considerably after completion of construction. Hence, the on-site soils should not be reused as structural fill below footings or in areas where post construction settlements are not acceptable.

If the existing soils will be used in non-structural areas, any excavated soil should be stockpiled and protected from precipitation with plastic sheeting.

6.7 PAVEMENT RECOMMENDATIONS

6.7.1 Minimum Pavement Layer Thickness

We understand that asphalt paved parking lots and drive lanes will be constructed around the proposed buildings.

- For pavement that will generally be used by light passenger cars and trucks, as a minimum, we recommend that the pavement section consist of 3 inches of Hot Mix Asphalt (HMA), overlying a 4-inch-thick layer of crushed surfacing base course (CSBC), overlying properly compacted structural fill.
- For pavement areas that will receive regular loading of heavy trucks, including delivery trucks or garbage trucks, we recommend a heavier pavement section consisting of a minimum of 4 inches of HMA over 6-inches of CSBC.

If ATB (Asphalt Treated Base) is to be used as a temporary pavement during construction, and then incorporated into the final pavement design, the bottom one inch of HMA may be replaced with 2 inches of ATB. Prior to final paving, any areas of ATB that have become destressed from construction traffic will need to be repaired.

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

6.7.2 Pavement Subgrade Preparation

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

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

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

6.8 Pavement Recommendations

General recommendations relative to earthwork performed in wet weather or in wet conditions are presented below. The following procedures are best management practices recommended for use in wet weather construction:

- Earthwork should be performed in small areas to minimize subgrade exposure to wet weather. Excavation or the removal of unsuitable soil should be followed promptly by the placement and compaction of clean structural fill.
- The size and type of construction equipment used may have to be limited to prevent soil disturbance.
- During wet weather, the allowable fines content of the structural fill should be reduced to no more than 5 percent by weight based on the portion passing the 0.75-inch sieve. The fines should be non-plastic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- Geotextile silt fences should be installed at strategic locations around the site to control erosion and the movement of soil.
- Excavation slopes and soils stockpiled on site should be covered with plastic sheeting.

6.9 Erosion Considerations

Surface runoff can be controlled during construction by careful grading practices. Typically, this includes the construction of shallow, upgrade perimeter ditches or low earthen berms in conjunction with silt fences to collect runoff and prevent water from entering excavations or to prevent runoff from the construction area leaving the immediate work site. Temporary erosion control may require the use of hay bales on the downhill side of the project to prevent water from leaving the site and potential storm water detention to trap sand and silt before the water is discharged to a suitable outlet. All collected water should be directed under control to a positive and permanent discharge system.

Surface gradients and drainage systems should be incorporated into the design such that surface runoff is collected and directed away from the structure to a suitable outlet. Potential issues associated with erosion may also be reduced by establishing vegetation within disturbed areas immediately following grading operations.

7.0 ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the proposed development, PanGEO should be retained to conduct a review of the final project plans and specifications, and to monitor the construction of geotechnical elements. PanGEO can provide you with a cost estimate for construction monitoring services at a later date.

8.0 CLOSURE

We have prepared this report for IAM 751 and the project design team. Recommendations contained in this report are based on a site reconnaissance, a subsurface exploration program, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of services.

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

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

This report has been prepared for planning and design purposes for specific application to the proposed project in accordance with the generally accepted standards of local practice at the time this report was written. No warranty, express or implied, is made.

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

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

Sincerely,

PanGEO Inc.

April 23, 2024

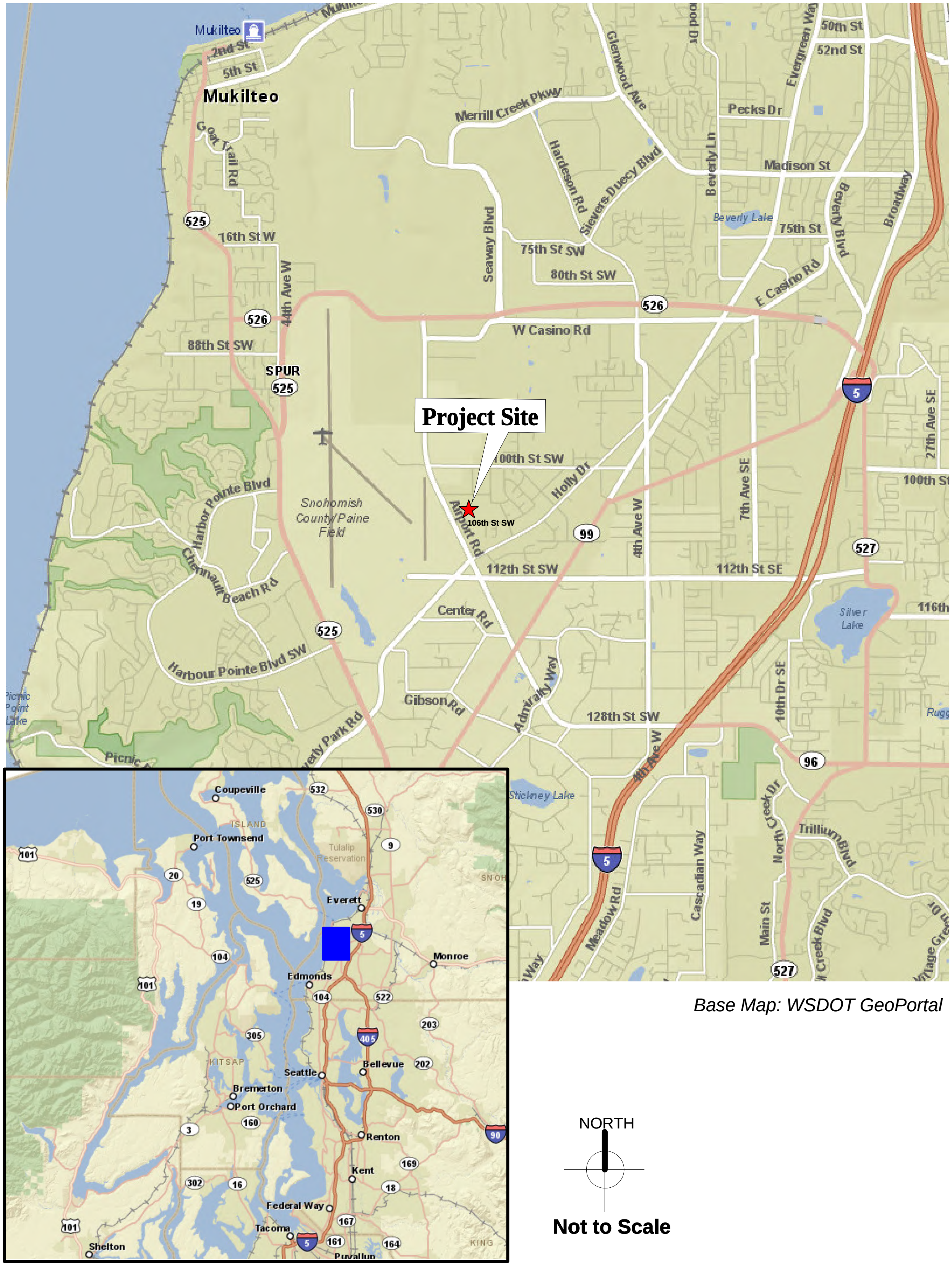
Siew L. Tan, P.E.
Principal Geotechnical Engineer

9.0 REFERENCES

International Code Council, 2018/2021, *International Building Code (IBC)*

Minard, J.P., *Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington,* U.S. Geological Survey, Miscellaneous Field Studies Map MF-1438, Scale 1:24,000.

WSDOT, 2024, *Standard Specifications for Road, Bridge and Municipal Construction, M 41-10.*

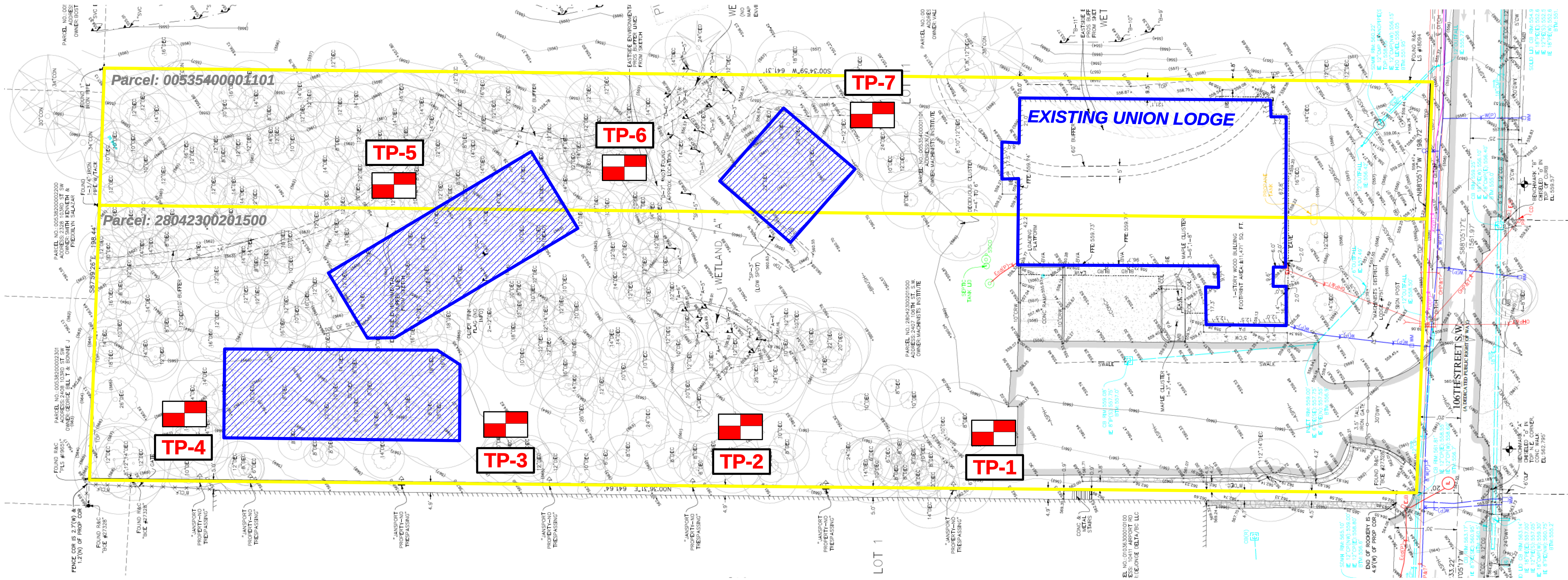


Base Map: WSDOT GeoPortal

NORTH

Not to Scale

PanGEO INCORPORATED	Proposed Little Wings Childcare Center 2407 - 106th Street SW Everett, Washington	VICINITY MAP
		Project No. 24-099
		Figure No. 1



Legend:

- Approximate Test Pit Locations *PanGEO, Inc., March 2023*
- Approximate Parcel Boundaries
- Approximate Existing Building
- Approximate Proposed Buildings

Approx. Scale:
1 inch = 50 feet

Base map modified from Boundary and Topographic Survey by BRH, dated February 26, 2024

PanGEO INCORPORATED	Proposed Little Wings Childcare Center 2407 - 106th Street SW Everett, Washington	SITE AND EXPLORATION PLAN
		Project No. 24-099 Figure No. 2

24-099 Fig 2 Site and Exploration Plan.grf 4/12/24 (4:19:07) SPS

APPENDIX A

SUMMARY TEST PIT LOGS

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes:

1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

- **Layered:** Units of material distinguished by color and/or composition from material units above and below
- **Laminated:** Layers of soil typically 0.05 to 1mm thick, max. 1 cm
- **Lens:** Layer of soil that pinches out laterally
- **Interlayered:** Alternating layers of differing soil material
- **Pocket:** Erratic, discontinuous deposit of limited extent
- **Homogeneous:** Soil with uniform color and composition throughout
- **Fissured:** Breaks along defined planes
- **Slickensided:** Fracture planes that are polished or glossy
- **Blocky:** Angular soil lumps that resist breakdown
- **Disrupted:** Soil that is broken and mixed
- **Scattered:** Less than one per foot
- **Numerous:** More than one per foot
- **BCN:** Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

ATT	Atterberg Limit Test
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-value
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Spilt Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

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Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Test Pit Logs

Project No: 24-099
Project Name: Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated: 3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by: S. Scott

Test Pit No. TP-1

Location: 332529, 1288920 (WA State Plane - North)

Approximate ground surface elevation: 561 feet (NAVD88)

Depth (ft)	Material Description
0 – 1	**[Fill]** Dense, grey-brown, sandy GRAVEL; 1- to 2-inch ballast, light vegetation; moist
1 – 2	**[Weathered Till]** Medium dense, orangish-brown, silty SAND; trace wood debris, iron-oxide staining; disturbed texture, non-plastic, moist
2 – 3	**[Vashon Till - Qvt]** Dense to very dense, light grey, silty SAND, trace gravel, trace clays; diamict texture, non-plastic, moist

Image of TP-1 excavated to 3 feet below ground surface (bgs).

Groundwater was not encountered at time of exploration.

Test Pit Logs

Project No: 24-099
Project Name: Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated: 3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by: S. Scott

Test Pit No. TP-2

Location: 332688, 1288920 (WA State Plane - North)

Approximate ground surface elevation: 561 feet (NAVD88)

Depth (ft)	Material Description
0 – 2½	**[Forest Duff]** Loose, dark brown to brown, silty SAND; abundant roots and rootlets; non-plastic, moist
2½ – 3	**[Vashon Till - Qvt]** Dense to very dense, grey, silty SAND, trace gravel; diamict texture, non-plastic, moist

Image of TP-2 excavated to 3 feet below ground surface (bgs).

Groundwater was not encountered at time of exploration.

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Figure A-3

Test Pit Logs

Project No: 24-099
Project Name: Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated: 3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by: S. Scott

Test Pit No. TP-3

Location: 332830, 1288920 (WA State Plane - North)

Approximate ground surface elevation: 566 feet (NAVD88)

Depth (ft)	Material Description
0 – 3	**[Forest Duff]** Loose, dark brown to orange-brown, silty SAND; burnt wood fragments, rootlets, non-plastic, moist • *east-west trending, 4-inch PVC pipe encountered at about 3 feet below grade*
3 – 4	**[Weathered Till]** Medium dense, orangish-brown, silty SAND; trace wood debris, iron-oxide staining; slightly disturbed texture, non-plastic, moist • *becomes very dense and unweathered at about 4 feet below grade*

Image of TP-3 excavated to 4 feet below ground surface (bgs).

Groundwater was not encountered at time of exploration.

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Figure A-4

Test Pit Logs

Project No: 24-099
Project Name: Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated: 3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by: S. Scott

Test Pit No. TP-4

Location: 332933, 1288932 (WA State Plane - North)

Approximate ground surface elevation: 568 feet (NAVD88)

Depth (ft)	Material Description
0 – 4	**[Fill]** Medium dense, grey-brown to brown, silty SAND, trace gravel; interbedded, abundant roots and rootlets; non-plastic, moist
4 – 5	**[Vashon Till - Qvt]** Dense to very dense, grey, silty SAND, trace gravel; diamict texture, non-plastic, moist

Image of TP-4 excavated to 5 feet below ground surface (bgs).

Groundwater was not encountered at time of exploration.

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Figure A-5

Test Pit Logs

Project No: 24-099
Project Name: Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated: 3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by: S. Scott

Test Pit No. TP-5

Location: 332899, 1289050 (WA State Plane - North)

Approximate ground surface elevation: 564 feet (NAVD88)

Depth (ft)	Material Description
0 – 2½	**[Weathered Till]** Thin layer of forest duff above: medium dense, grey-brown, silty SAND, trace gravel, trace rootlets, slightly reworked texture; non-plastic, moist
2½ – 3	**[Vashon Till - Qvt]** Dense to very dense, grey, silty SAND, trace gravel; diamict texture, non-plastic, moist

Image of TP-5 excavated to 3 feet below ground surface (bgs).

Groundwater was not encountered at time of exploration.

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Figure A-6

Test Pit Logs

Project No:	24-099
Project Name:	Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated:	3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by:	S. Scott

Test Pit No. TP-6

Location: 332788, 1289062 (WA State Plane - North)

Approximate ground surface elevation: 559 feet (NAVD88)

Depth (ft)	Material Description
0 – 2	**[Forest Duff]** Loose, dark brown to orange-brown, silty SAND; roots and rootlets, iron-oxide staining, non-plastic, moist
2 – 4	**[Alluvium]** Stiff, orange-brown to grey, clayey SILT, trace sand, trace rootlets, trace iron-oxide staining, low-plasticity, moist
4 – 8	Medium dense, grey, poorly-graded SAND with SILT; non-plastic, moist to wet

Image of TP-6 excavated to 8 feet below ground surface (bgs).

Groundwater seepage at east side of test pit beginning at approximately 6 feet bgs.

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Figure A-7

Test Pit Logs

Project No: 24-099
Project Name: Proposed Little Wings Childcare Center, 2407 – 106th Street SW, Everett, WA
Excavated: 3/22/2024 with Rubber-Tracked CAT 305.5 Excavator by Hoke Excavation
Logged by: S. Scott

Test Pit No. TP-7

Location: 332607, 1289095 (WA State Plane - North)

Approximate ground surface elevation: 558 feet (NAVD88)

Depth (ft)	Material Description
0 – 1	**[Forest Duff]** Loose, dark brown to orange-brown, silty SAND; roots and rootlets, iron-oxide staining, non-plastic, moist
1 – 2	**[Weathered Till]** Medium dense, orangish-brown, silty SAND; trace clays, trace wood debris, iron-oxide staining; disturbed texture, non-plastic, moist
2 – 3	**[Vashon Till - Qvt]** Dense to very dense, light grey, silty SAND, trace gravel; diamict texture, non-plastic, moist

Image of TP-7 excavated to 3 feet below ground surface (bgs).

Groundwater was not encountered at time of exploration.

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Figure A-8