GEOTECHNICAL REPORT

PROPOSED ADDITION
3805 WEST MERCER WAY
MERCER ISLAND, WASHINGTON

Project No. 25-402
December 2025

Prepared for:

Ara & Linda Bernardi

PanGEO INCORPORATED

Geotechnical & Earthquake Engineering Consultants

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PanGEO INCORPORATED
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December 29, 2025
File No. 25-402

Ara and Linda Bernardi
3805 West Mercer Way
Mercer Island, WA 98040

Subject: **Geotechnical Report**
Proposed Addition
3805 West Mercer Way, Mercer Island, Washington

Dear Ara and Linda,

As requested, PanGEO, Inc. has completed a geotechnical engineering study for the proposed addition at the above-referenced property. This study was performed in general accordance with our mutually agreed scope of work outlined in our proposal dated October 15, 2025, and was subsequently approved by you on October 27, 2025. Our service scope included reviewing readily-available geologic and geotechnical data in the project vicinity, reviewing preliminary design plans, drilling one test boring, conducting a site reconnaissance, and developing the conclusions and recommendations presented in this report.

PanGEO previously completed a test boring and geotechnical report at the site for a garage addition in 2007. The previous boring log is included as an appendix for reference.

SITE AND PROJECT DESCRIPTION

The subject site is an approximately 17,077 square foot lot located at 3805 West Mercer Way in the City of Mercer Island, Washington (see Figure 1, Vicinity Map). The subject lot is roughly rectangular in shape and is surrounded by existing single-family residences. Site access is via a shared private driveway to the west to West Mercer Way. A one-story single-family house with a daylight basement occupies the northeast portion of the site, while the southwest portion consists of a south to southwest-facing steep slope. Overall, the site grade descends from northeast to

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southwest with a total vertical relief of approximately 65 to 70 feet (see Figure 2, Site and Exploration Plan).

Based on the information provided, we understand that the proposed project consists of an addition of less than 200 square feet on the southwest side of the existing residence. The addition is expected to be constructed at the same elevation as the existing main floor and supported by column foundations extending to the basement level. We anticipate that temporary excavations for the foundation construction will extend approximately two feet below existing grade.

According to the City of Mercer Island GIS maps, the site is identified as being within areas of erosion hazard, steep slope, potential landslide, and seismic hazards. Additionally, an old landslide scarp is mapped along the north side of the property adjacent to West Mercer Way. As such, a geotechnical report is required as part of the permit application for the proposed addition.

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.

SUBSURFACE EXPLORATIONS

CURRENT TEST BORING

One test boring (PG-1) was drilled at the site on November 21, 2025, using an Acker portable drill rig owned and operated by CN Drilling of Seattle, Washington. The approximate boring location was taped in the field from on-site features and is shown on Figure 2. The boring was drilled to a depth of about 26½ feet below the existing grade.

The drill rig was equipped with 6-inch outside diameter hollow stem augers. Soil samples were obtained from the borings at 2½-foot depth intervals in general accordance with Standard Penetration Test (SPT) sampling methods (ASTM test method D-1586) in which the samples are obtained using a 2-inch outside diameter split-spoon sampler. The sampler was driven into the soil a distance of 18 inches using a 140-pound weight freely falling a distance of 30 inches. The number of blows required for each 6-inch increment of sampler penetration was recorded. The number of blows required to achieve the last 12 inches of sample penetration is defined as the SPT N-value. The N-value provides an empirical measure of the relative density of cohesionless soil, or the relative consistency of fine-grained soils.

A geologist from PanGEO was present to observe the drilling, assist in sampling, and to describe and document the soil samples obtained from the borings. The soil samples were described and field classified in general accordance with the symbols and terms outlined in Figure A-1 of Appendix A, and the summary boring log is included as Figure A-2.

PREVIOUS SUBSURFACE EXPLORATION

As part of our study, we collected and reviewed readily-available previous geotechnical explorations in the site vicinity (see Figure 2). Specifically, the following previous test boring log was reviewed:

- Summary test boring log, 3805 West Mercer Way (PanGEO, 2007); at the subject site.

The location plan and summary log for the previous test boring is included in Appendix B for reference.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

SITE GEOLOGY

Based on our review of the *Geologic Map of Mercer Island, Washington* (Troost and Wisher, 2006), the site is mapped with Pre-Olympia non-glacial deposits (Geologic Map Unit Qpon).

Pre-Olympia deposits (Qpo) consist of very dense and hard sand, silt, clay, and gravel of indeterminate age and origin, deposited prior to the Olympia non-glacial interval (i.e., at least about 60,000 years ago). Pre-Olympia non-glacial deposits (Qpon) are a subunit of pre-Olympia deposits of inferred non-glacial origin.

SUBSURFACE AND GROUNDWATER CONDITIONS

The soils encountered in the test borings consisted of up to about 5 to 10 feet of loose to medium dense fill overlying dense native silty and slightly silty sand. This soil unit extended to the maximum depth drilled at about 26½ feet. We interpret this soil unit as consistent with the mapped pre-Olympia deposits. The fill was likely placed on the native soils to create a level back yard. Please refer to the boring summary logs in Appendices A and B for a detailed description of the conditions encountered at the boring locations.

Groundwater was not encountered within the drilling depths during drilling up to 26½ feet deep. We do not expect the groundwater to be encountered in the planned excavation. It should be noted 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.

GEOLOGIC HAZARDS ASSESSMENT

LANDSLIDE HAZARDS

The site grade descends from northeast to southwest with a total vertical relief of approximately 65 to 70 feet and an average gradient of about 35 percent. The northeast portion of the site is relatively flat, and the southwest portion of the site slopes to the south/southwest with gradients of up to 50 to 60 percent and a vertical relief of about 50 feet. The site is mapped as a steep slope and potential landslide hazard area according to the City of Mercer Island GIS maps.

Previous Landslide Mapping

According to the City of Mercer Island GIS Portal, the property is mapped within potential landslide hazard area due to its geologic conditions. The subject site is not indicated as a known landslide area. According to the *Geologic Map of Mercer Island, Washington* (Troost and Wisher, 2006), mass wastage deposits are indicated in the vicinity of the site. To the best of our knowledge, there are no known past slides documented on the subject property.

As part of our study, we performed a review of historical slope failure data to gain a general understanding of the past landslide activities in the project vicinity. Our review indicates that four known slides occurred in the vicinity approximately 300 to 600 feet to the northwest of the site, between 3649 West Mercer Way and 3665 West Mercer Way. The landslide records indicate that these were shallow slides, and were triggered by seasonally high groundwater levels, drainage issues, and cut/fill along West Mercer Way. In our opinion, the conditions that caused the aforementioned landslides 300 to 600 feet northwest of the subject site are not present at the subject site.

We also reviewed a LiDAR image of the site and its vicinity, and the landslide inventory map from the Washington Department of Natural Resources (DNR). To the best of our knowledge, there are no reported past known slides at the site.

Site Reconnaissance

On November 21, 2025, we conducted a reconnaissance of the site and site slopes. Based on our reconnaissance, the site does not contain indications of recent or historical slope movements, such as scarps, sloughs, tension cracks, uneven ground surfaces, jackstrawed trees, breaks in vegetation, water features, and convergent landforms. The existing house foundations are observed to be in fair condition. Additionally, we observed that the adjacent properties are covered with bushes and trees. The trunks of the mature trees are observed to be straight.

Site Stability

Based on our review of available documents, site reconnaissance, and the presence of native dense soil at the subject site, it is our opinion that the site is globally stable under existing conditions and that landslide susceptibility is low. It is further our opinion that the proposed addition, supported by pile foundations, will not reduce site stability or adversely affect the stability of the subject site or adjacent properties, provided the project is properly designed and constructed. Based on the size and location of the proposed addition, a building setback related to potential landslide hazards is not required for the proposed project.

EROSION HAZARDS

The site is also mapped as a potential erosion hazard area according to the City of Mercer Island GIS maps. Based on soil conditions encountered in the borings, the near-surface site soils are likely to exhibit moderate erosion potential. However, the site grading earthwork is expected to be minor for this project. In our opinion, the erosion hazards at the site can be effectively mitigated with the best management practice during construction and with properly designed and implemented landscaping for permanent erosion control. During construction, the temporary erosion hazard can be effectively managed with an appropriate erosion and sediment control plan, including but not limited to installing silt fence at the construction perimeter, limiting removal of vegetation to the construction area, placing rocks or hay bales at the disturbed/traffic areas and on the downhill side of the project, covering stockpile soil or cut slopes with plastic sheets, constructing a temporary drainage pond to control surface runoff and sediment trap, placing quarry spalls at the construction entrance, etc. Permanent erosion control measures should include establishing vegetation, landscape plants, and hardscape established at the end of project, and reducing surface runoff to the minimum extent possible.

SEISMIC HAZARDS

Based on review of the City of Mercer Island GIS Portal, the site is mapped within a seismic/soil liquefaction hazard area.

Liquefaction is a process that can occur when soils lose shear strength for short periods of time during a seismic event. Ground shaking of sufficient strength and duration can result 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, with a predominately silt and sand grain size, must be loose, and be below the groundwater table.

Based on our subsurface explorations, the site is underlain by medium dense to dense soils and lacks a well-defined static groundwater table. Based on these conditions, in our opinion the liquefaction potential of the soils underlying the site is negligible and design considerations related to soil liquefaction are not necessary for this project.

GEOTECHNICAL DESIGN RECOMMENDATIONS

SEISMIC SITE CLASS

We anticipate that the seismic design of the structures will be accomplished using the 2021 edition of the International Building Code (IBC). Based on the site soil conditions encountered in the test borings and the site geology, it is our opinion that Site Class D (stiff soil) should be used for the seismic design.

BUILDING FOUNDATIONS – PIN PILES

Based on the results of test boring PG-1, up to approximately 10 feet of fill was encountered within the proposed addition area. In our opinion, over-excavation to reach suitable bearing soils beneath the fill is not practical due to site access limitations and existing slope conditions. Accordingly, we recommend that the proposed addition be supported on deep foundation elements, such as pin piles.

Pile Capacity and Driving Criteria

In our opinion, given the limited access, 2-inch diameter piles are likely the most appropriate pile size because it can be installed with hand-held equipment with limited access. Two-inch piles shall be driven to refusal with a minimum 90-lb jackhammer or a 140-lb Rhino hammer. Refusal is defined as no more than 1 inch of penetration for 1 minute of continuous driving. Piles driven to refusal are adequate for supporting an allowable axial compression load of 3 tons with a factor of safety of at least 2.0.

The tensile capacity of pin piles should be ignored in design calculations.

It is our experience that the driven pipe pile foundations should provide adequate support with total settlements on the order of ½-inch or less.

Lateral Resistance

Lateral capacity of vertical pin piles should be ignored in design calculations. Some resistance to lateral loads may be accomplished by battering the piles to a slope of 1(H):4(V), or steeper. Passive soil resistance values for embedded pile caps and grade beams may be determined using an equivalent fluid weight of 300 pounds per cubic foot (pcf). This value includes a factor of safety of at least 1.5 assuming level ground surface and properly compacted structural fill will be placed adjacent to the sides of the pile caps and grade beams.

Friction resistance at the bottom of pile-supported footings should be ignored in design calculations.

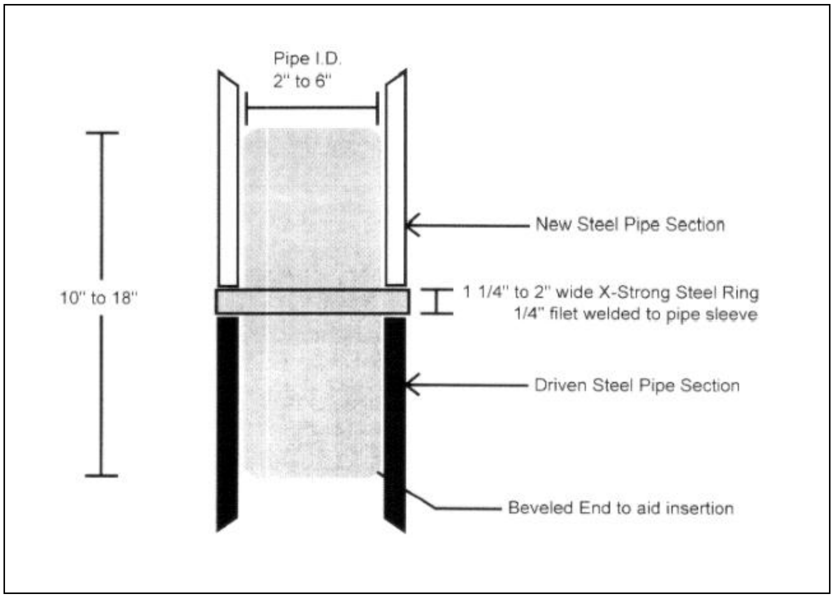
Pile Specifications

We recommend that the following specifications be included on the foundation plan:

1. 2-inch diameter piles should consist of Schedule-80, ASTM A-53 Grade “A” pipe.

2. 2-inch piles shall be driven to refusal with a minimum 90-lb jackhammer or a 140-lb Rhino hammer. Refusal is defined as no more than 1 inch of penetration for 1 minute of continuous driving. Please note that the city requires load testing if a differential driving criteria is used for a different hammer size.

3. Piles shall be driven in nominal sections and connected with compression fitted sleeve couplers (see detail on the following page – Courtesy of McDowell Pile King, Kent, WA). We discourage welding of pipe joints, particularly when galvanized pipe is used, as we have frequently observed welds broken during driving.



The quality of a pin pile foundation is dependent, in part, on the experience and professionalism of the installation company. We recommend that a company with experienced personnel be selected to install the piles.

Estimated Pile Length

The required pile length in order to develop the recommended pile capacity is expected to vary across the footprint of the structure, depending on the actual driving conditions encountered. For planning and cost estimating purposes, we estimate that the pile lengths may average about 20 feet.

Obstructions

Obstructions may be encountered within the fill. Where possible, the obstructions should be removed to facilitate the pile driving. If obstructions cannot be removed, the structural engineer of record should be notified to revise the pile layout to accommodate moving the piles.

Construction Monitoring

The geotechnical engineer of record or his/her representative shall provide full time observation of driven pin piles to verify that the piles/piers have been driven to adequate refusal within the anticipated bearing stratum.

FLOORS SLABS

We understand the current project design includes a main level addition supported by columns but does not include any basement footprint expansion. If concrete floor slabs are planned for the project, they may be constructed using conventional concrete slab-on-grade floor construction. The floor slab should be over-excavated at least 12 inches and backfilled with compacted imported structural fill. We recommend the exposed soils at the bottom of the excavation be compacted to a dense and unyielding condition before placing the new 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 6-mil polyethylene vapor barrier should also be placed directly below the slab. Construction joints should be incorporated into the floor slab to control cracking.

RETAINING WALL DESIGN PARAMETERS

Retaining walls, if needed, should be properly designed to resist the lateral earth pressures exerted by the soils behind the wall. Proper drainage provisions should also be provided behind the walls to intercept and remove groundwater that may be present behind the wall. Our geotechnical recommendations for the design and construction of the retaining wall are presented below.

Lateral Earth Pressures

Concrete cantilever walls should be designed for an equivalent fluid pressure of 35 pcf for level backfills behind the walls assuming the walls are free to rotate. If walls are to be restrained at the top from free movement, such as basement walls, equivalent fluid pressures of 50 pcf should be used for level backfills behind the walls. Walls with a maximum 2H:1V backslope should be designed for an active and at rest earth pressure of 50 and 65 pcf, respectively.

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 that the backfill behind the wall consists of a free draining and properly compacted fill with adequate drainage provisions.

Surcharge

Surcharge loads, where present, should also be included in the design of retaining walls. We recommend that a lateral load coefficient of 0.3 be used to compute the lateral pressure on the wall face resulting from surcharge loads located within a horizontal distance of one-half wall height.

Wall Footings

Our recommendations for building foundations are also applicable to wall footings.

Wall Drainage

Provisions for wall drainage should consist of a 4-inch diameter perforated drainpipe 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., clean crushed rock or washed gravel) 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.

Wall Backfill

Retaining wall backfill should consist of free draining granular material. The site soils within the planned excavation depth are relatively silty and would not meet the requirements for wall backfill. We recommend importing a free draining granular material, such as Seattle Type 17 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, 2025). 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 properly moisture conditioned, placed in loose, horizontal lifts less than 12 inches in thickness, and compacted to a dense and unyielding condition. If density tests will be performed, the test results should show at least 95 percent of the maximum dry density, as determined using test method ASTM D-1557 (Modified Proctor). 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.

CONSTRUCTION CONSIDERATIONS

TEMPORARY EXCAVATIONS

We anticipate that excavations up to about 2 feet deep may be needed for the proposed improvements. All temporary excavations should be performed in accordance with Part N of WAC (Washington Administrative Code) 296-155. The contractor is responsible for maintaining safe excavation slopes and/or shoring.

All temporary excavations deeper than a total of 4 feet should be sloped or shored. Based on the soil conditions at the site, for planning purposes, it is our opinion that temporary excavations for the proposed construction may be sloped 1H:1V (Horizontal:Vertical) or flatter.

The temporary excavations and cut slopes should be re-evaluated in the field during construction based on actual observed soil conditions and may need to be flattened in the wet seasons and should be covered with plastic sheets. The cut slopes should be covered with plastic sheets in the rainy season. We also recommend that heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a distance equal to 1/3 the slope height from the top of any excavation.

MATERIAL REUSE

In the context of this report, structural fill is defined as compacted fill placed under footings, concrete stairs and landings, and slabs, or other load-bearing areas. The contractor should be aware that the site soils contain high fines content, and may be difficult to compact to the requirements of structural fill. As a result, for planning purposes, we do not recommend the on-site soils be re-used as structural backfill for the project. Structural fill should consist of a well-graded granular material, such as WSDOT Gravel Borrow or Crushed Surfacing Base Course (CSBC, Section 9-03.9(3), WSDOT, 2025), or approved equivalent. If it is planned to use the site soils in non-structural areas, the excavated soil should be stockpiled and protected with plastic sheeting to prevent it from becoming saturated by precipitation or runoff.

STRUCTURAL FILL PLACEMENT AND COMPACTION

Structural fill should be properly moisture conditioned, placed in loose, horizontal lifts less than 12 inches in thickness, and compacted to a dense and unyielding condition. The adequacy of compaction should be verified by a PanGEO representative. Alternatively, a minimum 95 percent maximum density as determined using ASTM D-1557 (Modified Proctor) may be used to determine the adequacy of the compacted fill.

Depending on the type of compaction equipment used and depending on the type of fill material, it may be necessary to decrease the thickness of each lift in order to achieve adequate compaction. PanGEO can provide additional recommendations regarding structural fill and compaction during construction.

EROSION AND DRAINAGE 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 from 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.

Permanent control of surface water should be incorporated in the final grading design. Adequate surface gradients and drainage systems should be incorporated into the design such that surface runoff is directed away from structures. Potential problems associated with erosion may also be reduced by establishing vegetation within disturbed areas immediately following grading operations.

WET EARTHWORK RECOMMENDATIONS

It is our opinion that construction of the project can be accomplished during the wet season. However, performing earthwork activities during wet season is anticipated to be more costly than during dry weather conditions. Based on the anticipated soil conditions and topography in the proposed construction area, it is our opinion that potential for erosion at the site can be adequately mitigated by employing sediment control best management practices (BMPs). Additional information and details of the BMPs discussed in this section can be found in the Washington State Department of Ecology's *Stormwater Management Manual for Western Washington, Volume II* (http://www.ecy.wa.gov/programs/wq/stormwater/manual.html). Sediment control BMPs should be installed/constructed and functional prior to land disturbing activities.

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

- All footing surfaces should be protected against inclement weather unless the footings can be poured immediately after the subgrade is exposed. It is the contractor's responsibility to protect the footing subgrade from disturbance.
- 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.
- Where practical, maintain vegetation buffers around cleared areas (BMP C101).
- During wet weather, the allowable fines content of the structural fill should be reduced to no more than 5 percent by weight based on the portion passing ¾-inch sieve. The fines should be non-plastic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- Geotextile silt fences should be strategically located to control erosion and the movement of soil. Erosion control measures should be installed along all the property boundaries.

- Excavation slopes and soils stockpiled on site should also be covered with plastic sheets.

STATEMENT OF MINIMUM RISK

We understand that the portion of the site is mapped as geologic hazard areas, specifically as potential landslide and erosion hazard areas. Per Mercer Island City Code Section 19.07.060.D.2, development within geologic hazard areas and critical slopes may occur if the geotechnical engineer provides a statement of risk with supporting documentation indicating that one of the following conditions can be met:

a. The geologic hazard area will be modified, or the development has been designed so that the risk to the lot and adjacent property is eliminated or mitigated such that the site is determined to be safe; or

b. An evaluation of site specific subsurface conditions demonstrates that the proposed development is not located in a geologic hazard area; or

c. Development practices are proposed for the alteration that would render the development as safe as if it were not located in a geologic hazard area; or

d. The alteration is so minor as not to pose a threat to the public health, safety, and welfare.

Based on the surface conditions at the site and results of our geotechnical study, it is also our opinion that the proposed development meets the criteria (a), (c), and (d) above. Best management practices should be implemented during construction, including the proper use of silt fence, minimize earthwork activities during periods heavy precipitations, minimized exposed areas in wet season, etc. Permanent erosion control measures including landscape and hardscape installations will effectively mitigate the risk of erosion in the long term.

ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the proposed residence, PanGEO should be retained to conduct a review of the final project plans and specifications, and to monitor the construction of geotechnical elements. The City of Mercer Island, as part of the permitting process, will also require geotechnical construction inspection services. PanGEO can provide you with a cost estimate for construction monitoring services at a later date.

We anticipate that the following additional services will be required:

- Review final project plans and specifications;
- Verify implementation of erosion control measures;
- Observe the installation of pin piles;
- Monitor temporary excavation;
- Confirm the adequacy of the compaction of structural backfill; and
- Other consultation as may be required during construction

Modifications to our recommendations presented in this report may be necessary, based on the actual conditions encountered during construction.

CLOSURE

We have prepared this report for Ara and Linda Bernardi 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 work.

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 work specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

This report 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.

We appreciate the opportunity to be of service.

Sincerely,

PanGEO, Inc.

12/29/2025

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Chien-Lin (Johnny) Chen, P.E.
Senior Geotechnical Engineer
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Enclosures:

REFERENCES

ASTM D1557-12e1, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))*, ASTM International, West Conshohocken, PA, 2012, www.astm.org

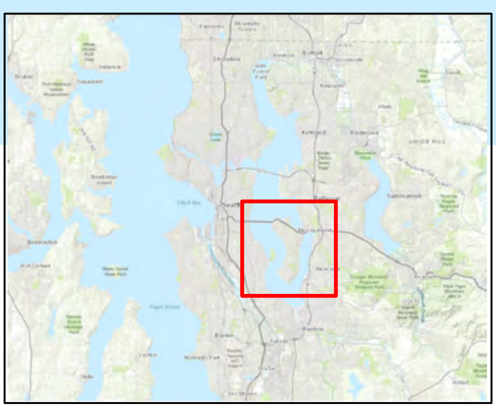
ASTM D1586-11, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*, ASTM International, West Conshohocken, PA, 2011, www.astm.org.

International Code Council (IBC), 2021, *International Building Code 2021*. Country Club Hills, IL: International Code Council, Inc.

Troost, K.G., and Wisher, A. P, 2006. *Geologic Map of Mercer Island, Washington, scale 1:24,000*.

Washington Administration Code (WAC), 2025, *Chapter 296-155. Safety Standards for Construction Work, Part N – Excavation, Trenching, and Shoring.*

WSDOT, 2025, *Standard Specifications for Road, Bridge and Municipal Construction*, M 41-10, Washington State Department of Transportation.

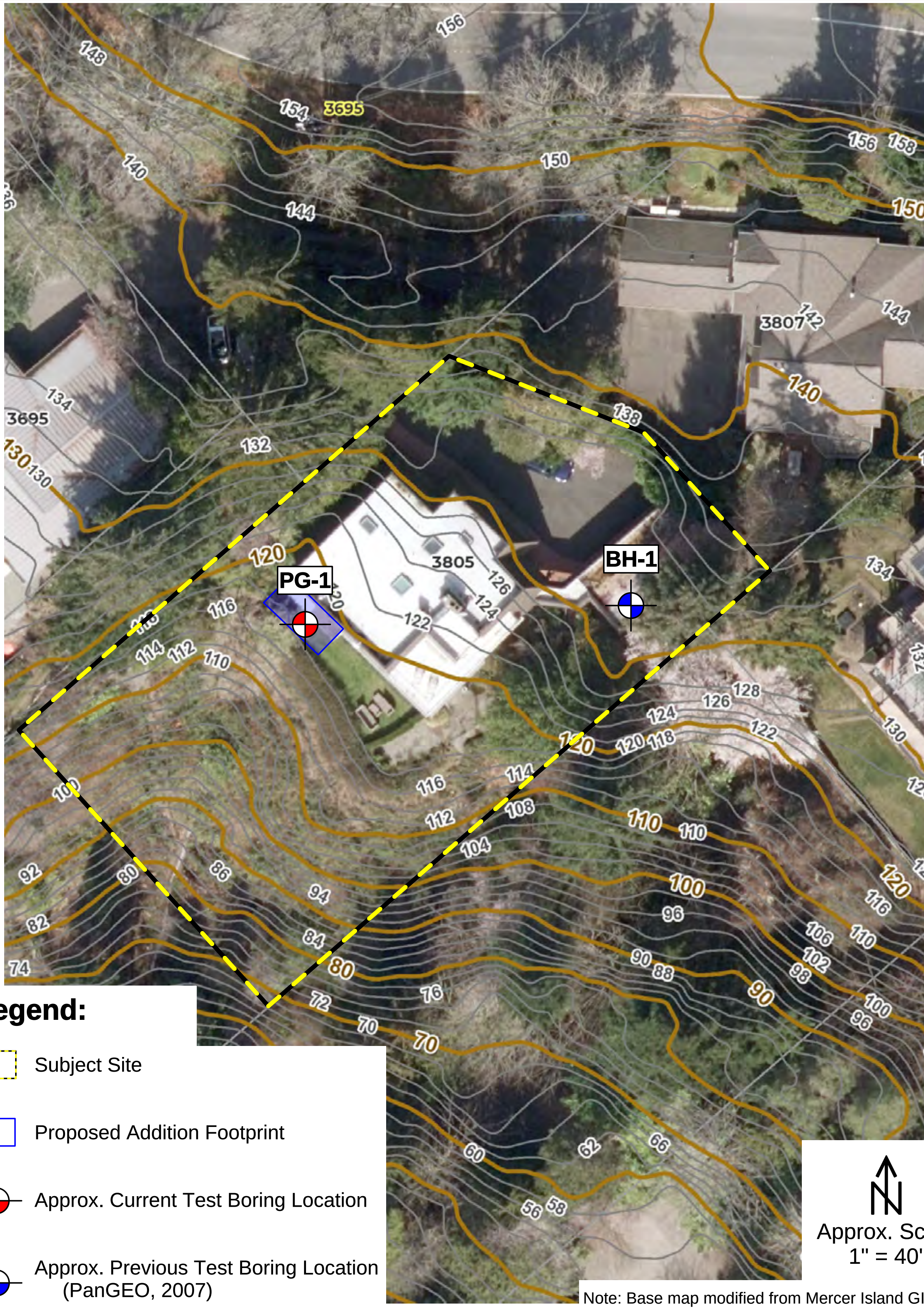


Base Map: ESRI GIS

NORTH

Not-To-Scale

PanGEO INCORPORATED	**Proposed Addition** **3805 West Mercer Way** **Mercer Island, Washington**	**VICINITY MAP**	
		Project No. **25-402**	Figure No. **1**



Legend:

- Subject Site
- Proposed Addition Footprint
- Approx. Current Test Boring Location
- Approx. Previous Test Boring Location (PanGEO, 2007)

Note: Base map modified from Mercer Island GIS Map

PanGEO INCORPORATED	**Proposed Addition** **3805 West Mercer Way** **Mercer Island, Washington**	**SITE AND EXPLORATION PLAN** Project No. **25-402** Figure No. **2**

APPENDIX A

SUMMARY CURRENT BORING LOG

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	**Fissured:**	Breaks along defined planes
Laminated:	Layers of soil typically 0.05 to 1mm thick, max. 1 cm	**Slickensided:**	Fracture planes that are polished or glossy
Lens:	Layer of soil that pinches out laterally	**Blocky:**	Angular soil lumps that resist breakdown
Interlayered:	Alternating layers of differing soil material	**Disrupted:**	Soil that is broken and mixed
Pocket:	Erratic, discontinuous deposit of limited extent	**Scattered:**	Less than one per foot
Homogeneous:	Soil with uniform color and composition throughout	**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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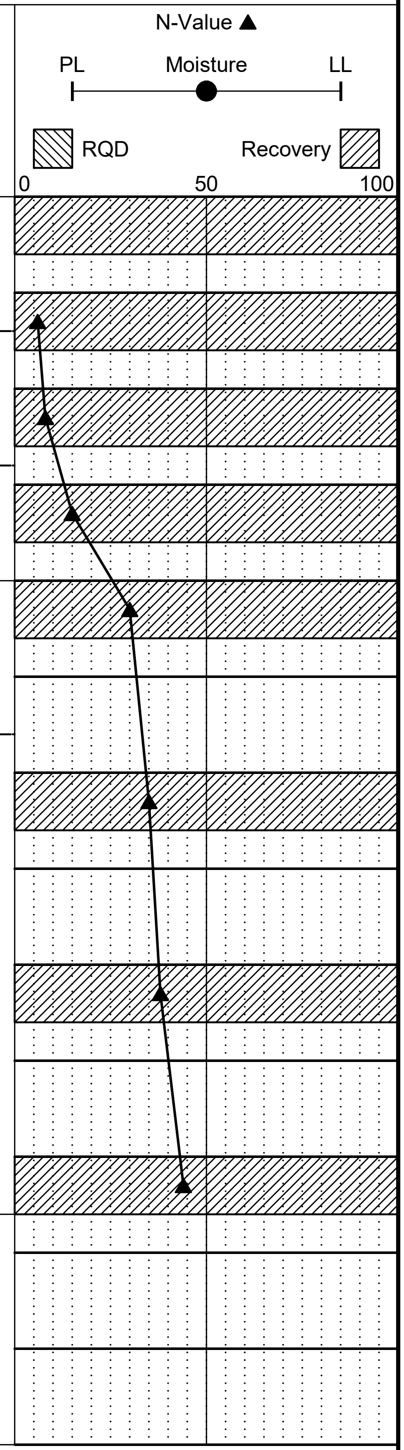
Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Project:	Proposed Addition	Surface Elevation:	118.0ft
Job Number:	25-402	Top of Casing Elev.:	N/A
Location:	3805 W Mercer Way, Mercer Island, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.57582, Easting: -122.24323	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0.0	S-0					**FILL** Grass and sod over loose, brown, slightly gravelly, silty SAND; moist; poorly graded, organics.
2.5	S-1		2 3 3			Loose, gray, silty SAND to sandy SILT; moist; poorly graded, wood debris, disturbed appearance.
5.0	S-2		1 3 5			
7.5	S-3		5 6 9			Medium dense, dark brown to black, silty SAND; moist; poorly graded, trace wood debris, disturbed appearance.
10.0	S-4		7 14 16			**PRE-OLYMPIA DEPOSITS [Qpo]** Dense, gray-brown, silty SAND; moist; poorly graded. *-- Driller added water at 12 feet to assist drilling.*
12.5						
						Dense, gray-brown, slightly silty SAND; moist; poorly graded.
15.0	S-6		9 16 19			
17.5						
20.0	S-7		7 13 25			
22.5						
25.0	S-8		13 19 25			
						Boring terminated at about 26.5 feet below grade. Groundwater was not observed at the time of drilling.
27.5						
30.0						
32.5						



Completion Depth:	26.5ft
Date Borehole Started:	11/21/25
Date Borehole Completed:	11/21/25
Logged By:	S. Paquet
Drilling Company:	CN Drilling

Remarks: Boring drilled using an Acker portable drill rig. Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Surface elevations estimated from Mercer Island GIS Map .
Horizontal/Vertical Datum: WGS84/NAVD 88

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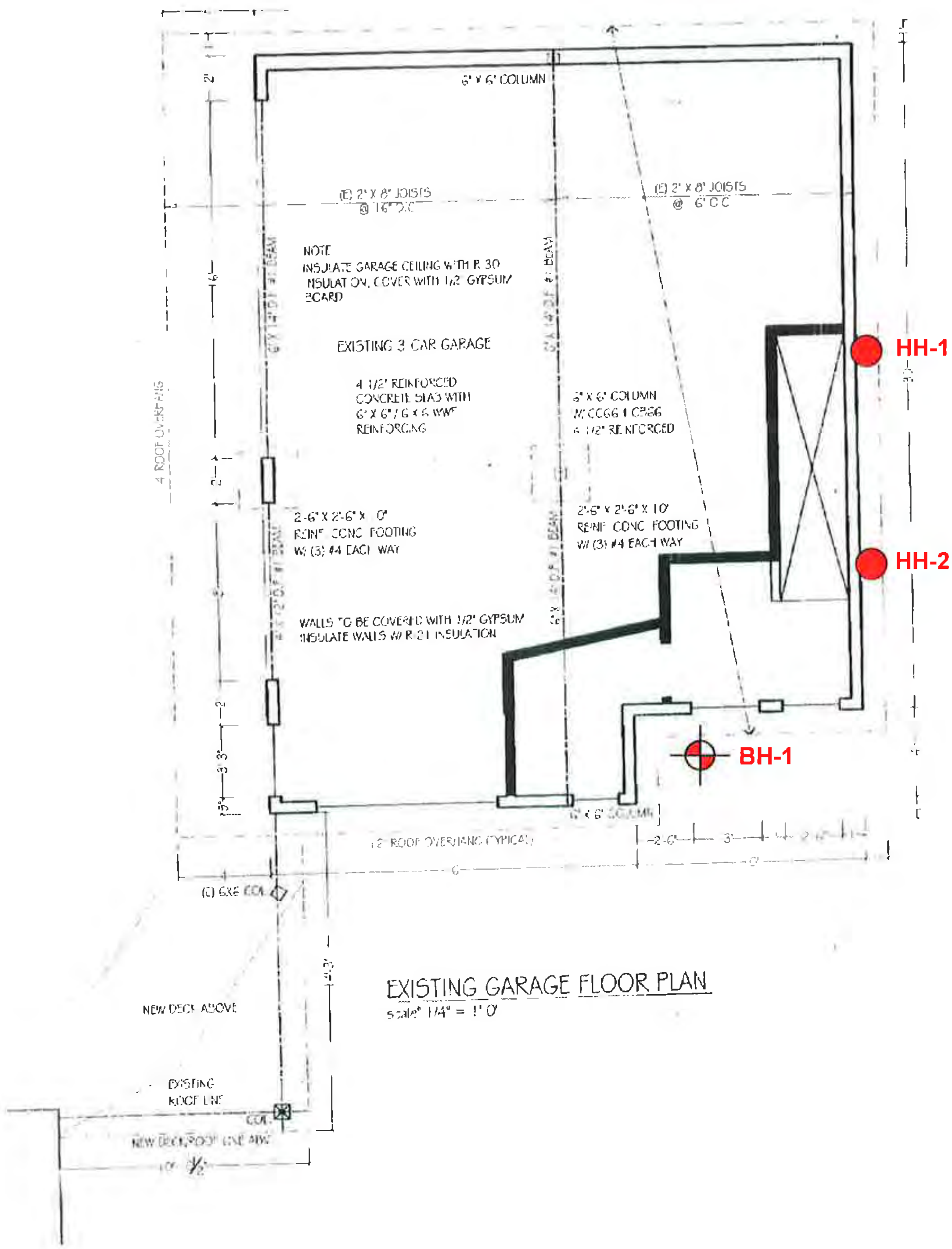
LOG OF TEST BORING PG-1

Figure A-2

The stratification lines represent approximate boundaries. The transition may be gradual.

APPENDIX B

SUMMARY PREVIOUS BORING LOG



Legend:

BH-1 Approx. Boring Location

HH-1 Approx. Hand Hole Location

NTS

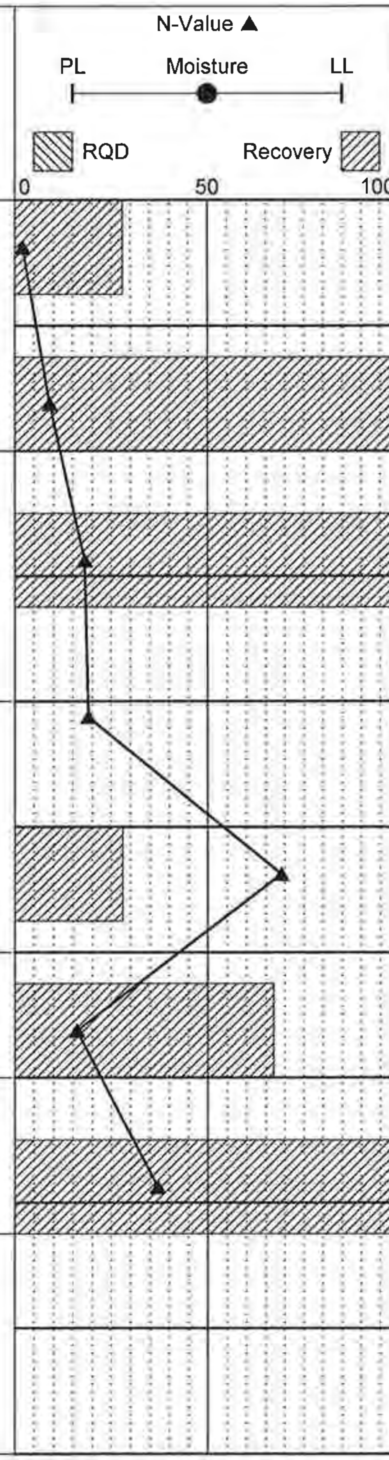
Note: Base map modified from Site Plan provided by Jeri Bernardi.

PanGEO INCORPORATED	Proposed Garage Addition 3805 West Mercer Way Mercer Island, Washington	SITE AND EXPLORATION MAP Project No. 07-088 Figure No. 2

06-120_Site Plan.grf 7/17/07 (8:49) JCR

Project:	Proposed Garage Addition	Surface Elevation:	N/A
Job Number:	07-088	Top of Casing Elev.:	N/A
Location:	Mercer Island, Washington	Drilling Method:	Hollow Stem Auger
Coordinates:	Northing: , Easting:	Sampling Method:	SPT

Depth, (ft)	Sample No.	Sample Type	Blows / 6 in.	Other Tests	Symbol	MATERIAL DESCRIPTION
0	S-1	X	1 1 1			Very loose, dark brown, silty SAND, some roots and organics, and little gravel, moist (Fill).
2	S-2	X	4 4 5			Loose to medium dense, brown-gray, silty SAND, some gravel, moist.
4	S-3	X	4 8 10			Medium dense, gray-brown, slightly silty SAND, little gravel, moist (Glacial Drift).
8	S-4	X	23 9 10			Medium dense to very dense, gray-brown, gravelly SAND, little silt, very moist.
10	S-5	X	19 34 35			
12	S-6	X	4 5 11			Medium dense, gray, slightly silty SAND/sandy SILT, trace of gravel, very moist.
14	S-7	X	12 17 20			Dense, gray-brown, medium to coarse SAND, moist.
16						Bottom of Boring at about 16.5 ft. Groundwater not encountered during drilling.
18						
20						



Completion Depth:	16.5ft
Date Borehole Started:	6/22/07
Date Borehole Completed:	6/22/07
Logged By:	MHX
Drilling Company:	CN Drilling

Remarks: Standard Penetration Test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with an rope and cathead mechanism.

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LOG OF TEST BORING BH-1

Figure 4

The stratification lines represent approximate boundaries The transition may be gradual.