PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

September 4, 2025
Project No. 25-270

Matt and Linnea Augustine
3860 W Mercer Way
Mercer Island, Washington 98040

Subject: **Geotechnical Engineering Report**
Proposed SFR Addition
3860 West Mercer Way, Mercer Island, WA

Dear Matt and Linnea,

As requested, PanGEO Inc. completed a geotechnical engineering evaluation to assist you and the design team with the proposed addition project located at 3860 West Mercer Way in the City of Mercer Island, Washington. This study was performed in general accordance with our mutually agreed scope of work outlined in our proposal dated July 17, 2025, and subsequently approved on July 18, 2025. Our service scope included reviewing readily available geologic and geotechnical data in the vicinity of the site, performing two dynamic cone penetrometer tests, excavating two hand borings at the location of the proposed addition, conducting a site reconnaissance, performing engineering analyses, and developing the conclusions and recommendations presented in this report.

SITE AND PROJECT DESCRIPTION

The project site is an approximately 0.26 acre lot located at 3860 West Mercer Way in Mercer Island, Washington (See Vicinity Map. Figure 1). The site is roughly rectangular-shaped, and borders SE 38th Street ROW to the north, and existing single-family residences to the other three sides. A one-story single-family house with a daylight basement currently occupies the eastern portion of the site. Based on review of the GIS maps, the existing site grade generally slopes down from the NW corner to the SE corner with an average gradient of about 16 percent and a total elevation relief of about 25 feet between the property lines.

Based on the information provided to us, we understand that it is proposed to remove the existing carport and shed and add a garage at the same location. We also understand that the proposed garage will be a one-story wood frame structure with concrete slabs on grade. We anticipate that temporary excavations for the new foundation construction will likely be on order of about 2 to 3 feet.

Based on review of City of Mercer Island GIS maps, the site is located within a potential slide, erosion, and seismic geologic hazard areas. As such, a geotechnical engineering evaluation is required as part of the building permit application. The objective of our geotechnical study is to explore the near-surface soil and groundwater conditions and provide geotechnical design recommendations for the proposed addition. In addition, our geotechnical study will evaluate the potential risks to the project from the mapped geologic hazard areas.

Plate 1. Proposed addition location, looking south (7/25/2025).

The conclusions and recommendations outlined in this report are based on our understanding of the proposed development, which is in turn based on the project information provided to us. If the above project description is substantially different from your proposed improvements, or if the project scope changes, PanGEO should be consulted to review the recommendations contained in this study and make modifications, if needed.

SUBSURFACE EXPLORATIONS

Our subsurface exploration program for the current study consisted of performing two dynamic cone penetrometer tests (DCPT-1 and DCPT-2). The DCPTs extended to depths of about 1½ to 12 feet below grade. The dynamic cone penetration tests consisted of driving a 1.4-inch diameter cone tip with a 35- pound hammer free falling 15 inches per stroke. The number of blows needed to achieve each 4-inch (10 cm) penetration was recorded and then converted to equivalent Standard Penetration Tests (SPT) N-values using an empirical method outlined in A Portable Dynamic Penetrometer for Geotechnical Investigations (Triggs and Simpson, 1991). A geologist from PanGEO performed the DCPTs and recorded the blows. The summary DCPT logs are included as Figures A-2 and A-3 in Appendix A.

Additionally, on July 25, 2025, we excavated two supplementary hand borings using a hand auger at the same locations as the DCPTs. The hand borings were excavated to depths of about 3 to 12 feet below the existing grade. The soil samples were described in general accordance with the symbols and terms outlined in Figure A-1 in Appendix A. 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 perform the subsurface exploration, collect representative samples, and to document the soil samples obtained from the hand borings.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The Geologic Map of Mercer Island, Washington (Troost, et al., 2006) mapped the surficial geologic unit at the subject site as Pre-Olympia fine-grained glacial deposits (Map Unit Qpogf). Pre-Olympia fine-grained glacial deposits are described as laminated to massive silt and clay with sandy interbeds. This unit is typically hard in its undisturbed state.

SOIL CONDITIONS

The soils observed in our hand borings generally consisted of about 3 feet of fill in DCPT-1 and about 1 foot of fill overlying medium stiff to very stiff, silt with clay. The following is a general description of the soils encountered in the hand borings. Please refer to the summary hand boring logs (Appendix A) for additional details.

> ***UNIT 1 – Fill:*** Under a surficial layer of topsoil, the DCPT-1 encountered about 3 feet of dense to very dense, light brown, silty sand with gravel, occasional cobble, and occasional rootlets and organics in the upper two feet. We interpret this unit as fill on its consistency and texture incongruent with the geology typical of the area. DCPT-1 terminated at about 3 feet due to practical refusal. Under a surficial layer of mulch, DCPT-2 encountered about 1 foot of loose, brown, silty sand, with occasional cobbles.

> ***UNIT 2 – Pre-Olympia Fine-Grained Glacial Deposits:*** Below the fill, hand boring DCPT-2 generally encountered medium stiff to hard, gray, silty clay to the bottom of the test hole. This unit appears to be generally consistent with the mapped Pre-Olympia fine grained glacial deposits. This unit was not encountered in DCPT-1.

GROUNDWATER CONDITIONS

No obvious signs of groundwater or seepage were observed in either hand boring. 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 (typically October through May).

GEOLOGIC HAZARDS ASSESSMENT

LANDSLIDE HAZARDS

The entirety of the site is mapped within a potential landslide hazard area according to the City of Mercer Island's Geologic Hazards Map (See Plate 2, following page).

In conjunction with our borings, a site reconnaissance of the subject property was also conducted on July 25, 2025. The site is generally level except for the portion directly north of the property where the topography slopes down from north to south to the subject property. We did not observe any signs of significant instability of the slope such as tension cracks, hummocky terrain, or signs of downward movement or slumping of soil accumulated against the building foundation. Large diameter trees were observed to be vertical on the slope.

As noted in Figure 2, the proposed addition will be located beyond the toe of the steep slope, and the existing house is present between the area of the proposed addition and steep slope. The area of the addition is flat, and not prone to earth movements or landslides. Additionally, the grading/earthwork for the proposed project will be minor. As such, based on our document review and site reconnaissance, and based on the soil conditions encountered in the hand borings at the subject site, it is our opinion that the site appears to be globally stable in its present condition, and the landslide susceptibility at the site is considered low. It is also our opinion that the proposed garage as currently planned will not decrease the site stability or adversely impact stability of the subject site and surrounding properties, provided that the proposed project is properly designed and constructed. It is our further opinion that building setback distance due to a potential landslide hazard is not needed for the proposed project.

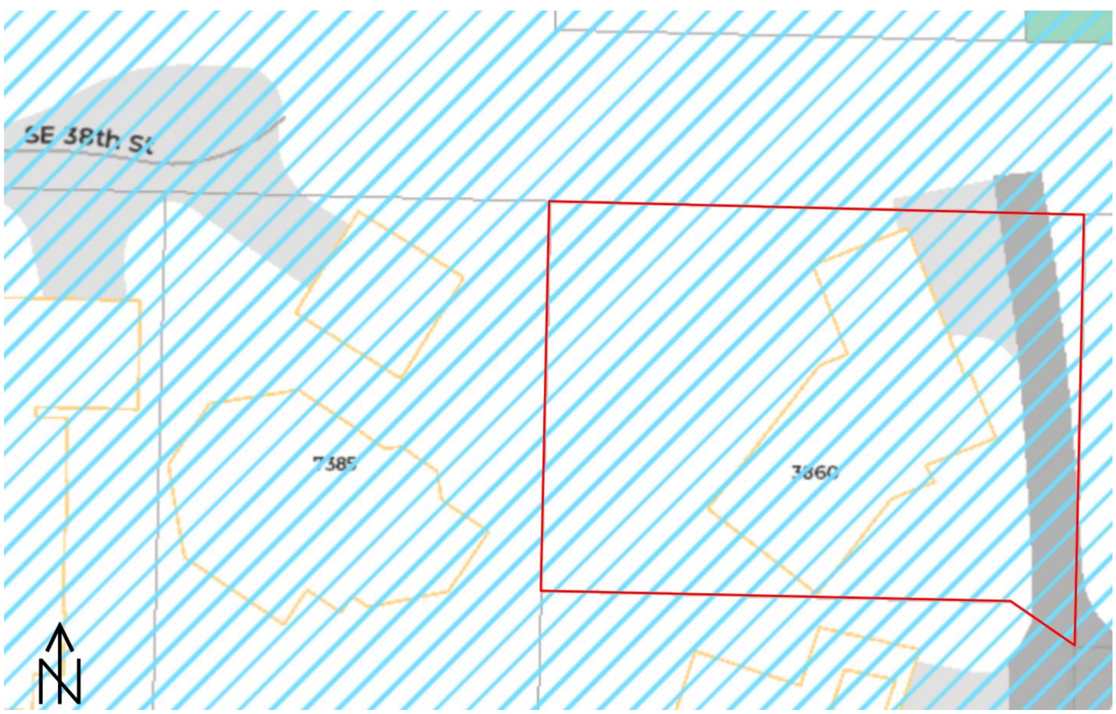


Plate 2. Potential slide area (blue hashed area) mapped on the subject property (Mercer Island GIS map). Subject site it outlined in red.

EROSION HAZARDS

The entirety of the site is mapped within a potential erosion hazard area in accordance with the City of Mercer Island's Geologic Hazards Map (see Plate 3 on the following page). Based on the results of our hand borings, the cohesive site soils at the location of the proposed addition are anticipated to exhibit a relatively low to moderate erosion potential. Although the current addition project is planned within the limits of the mapped erosion hazard area, the addition is in a flat area of the site, and the excavation for the new addition will be minor and lower than the surrounding grades on all sides. As such, in our opinion, the potential 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 fencing or straw rolls at the southern and eastern construction perimeter, covering stockpiled soil with plastic sheets, and maintaining a clean construction entrance. Permanent erosion control measures should include establishing vegetation, landscape plants, and hardscaping at the end of the project.

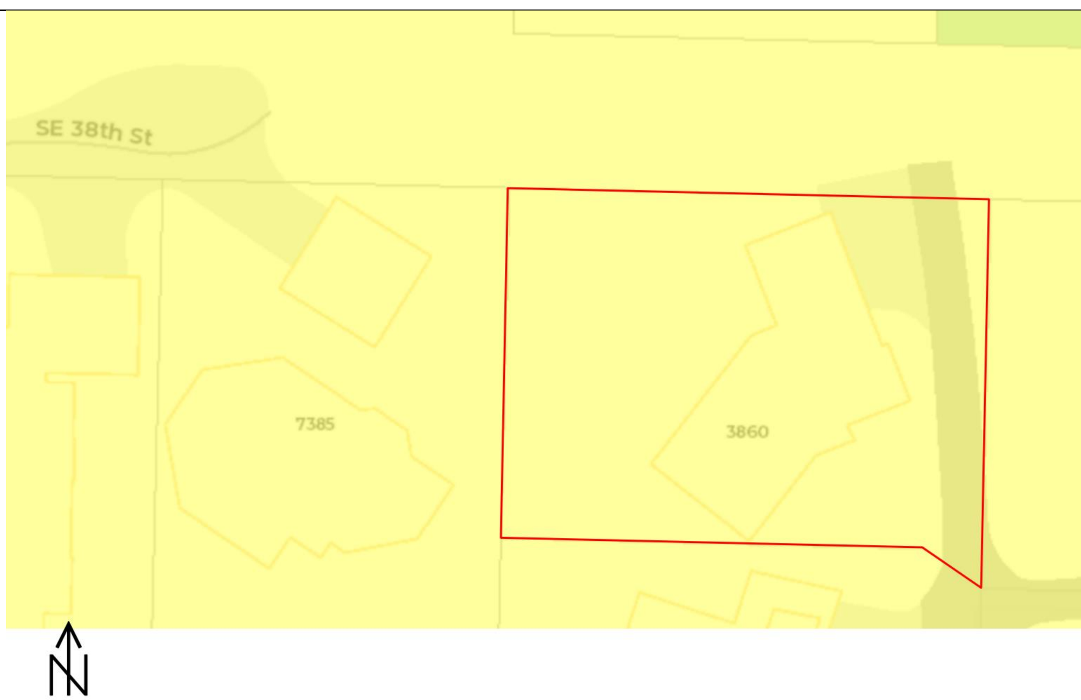


Plate 3. Erosion hazard area (shaded in yellow) mapped on the subject property (Mercer Island GIS map). Subject property is outlined in red.

SEISMIC HAZARDS

Based on review of the City of Mercer GIS Maps, the entirety of the site is mapped as a seismic/soil liquefaction hazard area (see Plate 4 on the following page).

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 to medium dense, and be below the groundwater table.

Based on our subsurface explorations, the site is predominately underlain by silty clay at shallow depths, without a well-defined water table (i.e. no observation of groundwater). Based on these conditions, in our opinion, the liquefaction potential of the soils underlying the site is low and design considerations related to soil liquefaction are not necessary for the addition project.

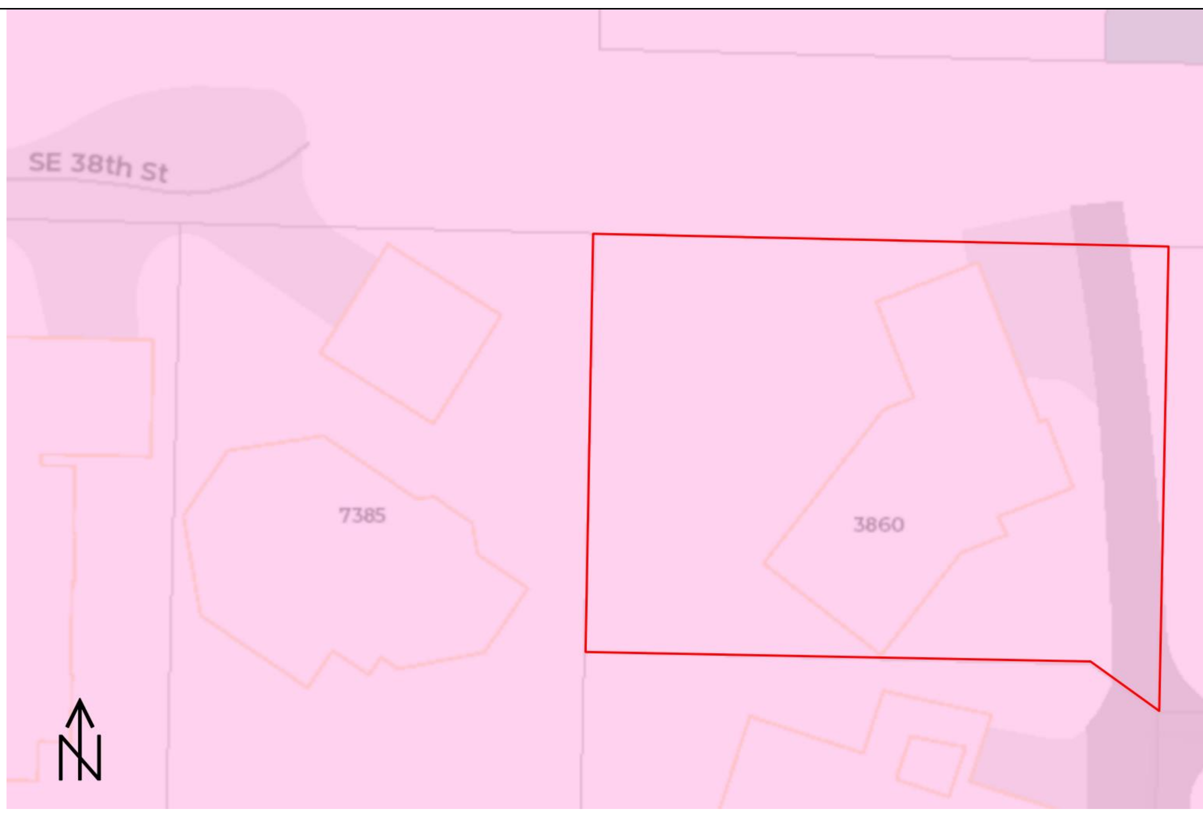


Plate 4. Seismic hazard area (shaded in pink). mapped on the subject property (Mercer Island GIS map). Subject property is outlined in red.

GEOTECHNICAL DESIGN RECOMMENDATIONS

SEISMIC DESIGN CONSIDERATIONS

We understand that the project will be designed in accordance with the 2021 editions of the International Building Code (IBC), and ASCE 7-16, which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years). For design purposes, Site Class D (Stiff Soil) is considered appropriate for the seismic design for the project site.

NEW ADDITION FOUNDATIONS

The proposed project consists of the construction of an at-grade garage to the existing house, as described above. Based on the soil conditions encountered, in our opinion, the new addition may be supported by conventional shallow footings.

Shallow Foundations

Based on the results of our hand borings at the site and geologic information in the vicinity, it is our opinion that conventional shallow footings may be used to support the new addition, provided the footings bear on competent soil approximately 2 feet below the ground surface. We recommend that an allowable soil bearing pressure of 2,000 psf be used for sizing the new footings. The recommended allowable 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. Continuous footings should have a minimum width of 18 inches.

Foundation Performance

Total and differential settlements are anticipated to be within tolerable limits for footings designed and constructed as discussed above. Footing settlement under static loading conditions is estimated to be about ¾-inch, and differential settlement across the new addition should be about ½ inch or less. Most settlement will be realized during construction as the dead loads are applied.

Lateral Resistance

Lateral loads acting on the foundations may be resisted by passive earth pressure developed against the embedded portion of the foundation system and by frictional resistance at the bottom of the footings. For footings bearing on the native soils or on compacted structural fill, a frictional coefficient of 0.35 may be used to evaluate sliding resistance. Passive soil resistance may be calculated using an equivalent fluid unit weight of 250 pcf, assuming properly compacted structural fill with a level backslope will be placed against the footings. The above values include a factor of safety of 1.5. Unless covered by pavements or slabs, the passive resistance in the upper 12 inches of soil should be neglected.

Footing Subgrade Preparation

All footing subgrades should be carefully prepared. We anticipate the competent soils to be about 1½ to 2 feet below the existing grade. The footing subgrades should be in firm and unyielding conditions prior to placement of concrete. If the soil is loose and cannot be compacted to a dense condition, they should be over-excavated 12 inches and the resulting over-excavation should be backfilled with properly compacted structural fill. Footing subgrade preparation should be observed by a representative of PanGEO, prior to placing forms or rebar, to verify that conditions are as anticipated in this report.

Footing Drains

Footing drains should be installed along all sides of the new addition, and tied into the existing house footing drain system, if present, or an appropriate discharge point if no such system already exists. Footing drains should consist of a 4-inch diameter perforated PVC pipe, surrounded with at least 6 inches of washed rock, and wrapped in a geotextile fabric. Under no circumstances should roof downspout drain lines be connected to the footing drain systems. Roof downspouts must be separately tightlined to appropriate discharge locations. Cleanouts should be installed at strategic locations to allow for periodic maintenance of the footing drain systems.

FLOOR SLABS

Concrete slab-on-grade floors are feasible for the proposed project and may be supported on competent firm soils or on newly placed structural fill. If loose soils encountered at the slab subgrade level cannot be adequately compacted, we recommend removing a minimum of 1 foot of loose soil below the slab, and placing 1 foot of properly compacted structural fill to create a firm surface for the slab.

We recommend that the slabs be constructed on a minimum 4-inch-thick capillary break. The capillary break should consist of free-draining, clean crushed rock or well-graded gravel compacted to a firm and unyielding condition. The capillary break material should have no more than 10 percent passing the No. 4 sieve and less than 5 percent by weight of the material passing the U.S. Standard No. 100 sieve. We also recommend that a 10-mil polyethylene vapor barrier be placed below the slab.

STATEMENT OF MINIMUM RISK

We understand that the site is mapped as a geologic hazard area. Per Mercer Island City Code Section 19.07.160.B.3, 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 public health, safety, and welfare.

It is our opinion that Criterion B for the potential landslide hazard and seismic hazard is met through our site reconnaissance and subsurface explorations. In our opinion the site of the proposed addition is not located in a potential slide area, and the potential for seismic induced soil liquefaction is low. Criterion C for the erosion hazard can be met through best management practices during construction, including the proper use of temporary erosion control measures, minimizing earthwork activities during periods of heavy precipitation, and minimizing exposed areas in the wet season. Permanent erosion control measures including landscape and hardscape installations will effectively mitigate the risk of erosion in the long term.

CONSTRUCTION CONSIDERATIONS

TEMPORARY EXCAVATIONS

As currently planned, the proposed addition will require excavations of about 2 feet below the existing grade to reach competent native soils. 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, if needed, 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 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. 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. In our opinion, the on-site silty sand and silt with clay is moisture sensitive and will be difficult or impossible to compact to a dense condition. As such, the on-site soils are not suitable to be used as structural fill. Structural fill, if needed, should consist of imported, well-graded, granular material, such as WSDOT Gravel Borrow, or approved equivalent. If use of the on-site soil is planned in a non-structural area, the excavated soil should be stockpiled and protected with plastic sheeting to prevent softening from rainfall in the wet season.

STRUCTURAL FILL PLACEMENT AND COMPACTION

Structural fill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557.

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.

WET WEATHER EARTHWORK

In our opinion, the proposed site construction may be accomplished during wet weather (such as in winter) without adversely affecting the site stability. However, earthwork construction performed during the drier summer months likely will be more economical. Winter construction will require the implementation of best management erosion and sedimentation control practices to reduce the chance of off-site sediment transport. Some of the site soils contain a high percentage of fines and are moisture sensitive. Any footing subgrade soils that become softened either by disturbance or rainfall should be removed and replaced with structural fill, Controlled Density Fill (CDF), or lean-mix concrete. General recommendations relative to earthwork performed in wet conditions are presented below:

- Site stripping, excavation and subgrade preparation 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;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil;
- Structural fill should consist of less than 5% fines; and
- Excavation slopes should be covered with plastic sheets.

SURFACE DRAINAGE AND EROSION CONSIDERATIONS

Surface runoff can be controlled during construction by careful grading practices. Typically, this includes the construction of shallow, upgradient 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.

ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the proposed addition, PanGEO should be retained to conduct a review of the final project plans and specifications, and to monitor the construction of geotechnical elements.

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 Matt and Linnea Augustine, 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.

9/4/2025

Tanner N. Howitz, G.I.T.
Staff Geologist
thowitz@pangeoinc.com

H. Michael Xue, P.E.
Principal Geotechnical Engineer
Mxue@pangeoinc.com

Attachments:

Figure 1 Vicinity Map

Appendix A – Summary Hand Boring Logs

REFERENCES

International Code Council, 2021, *International Building Code.*

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

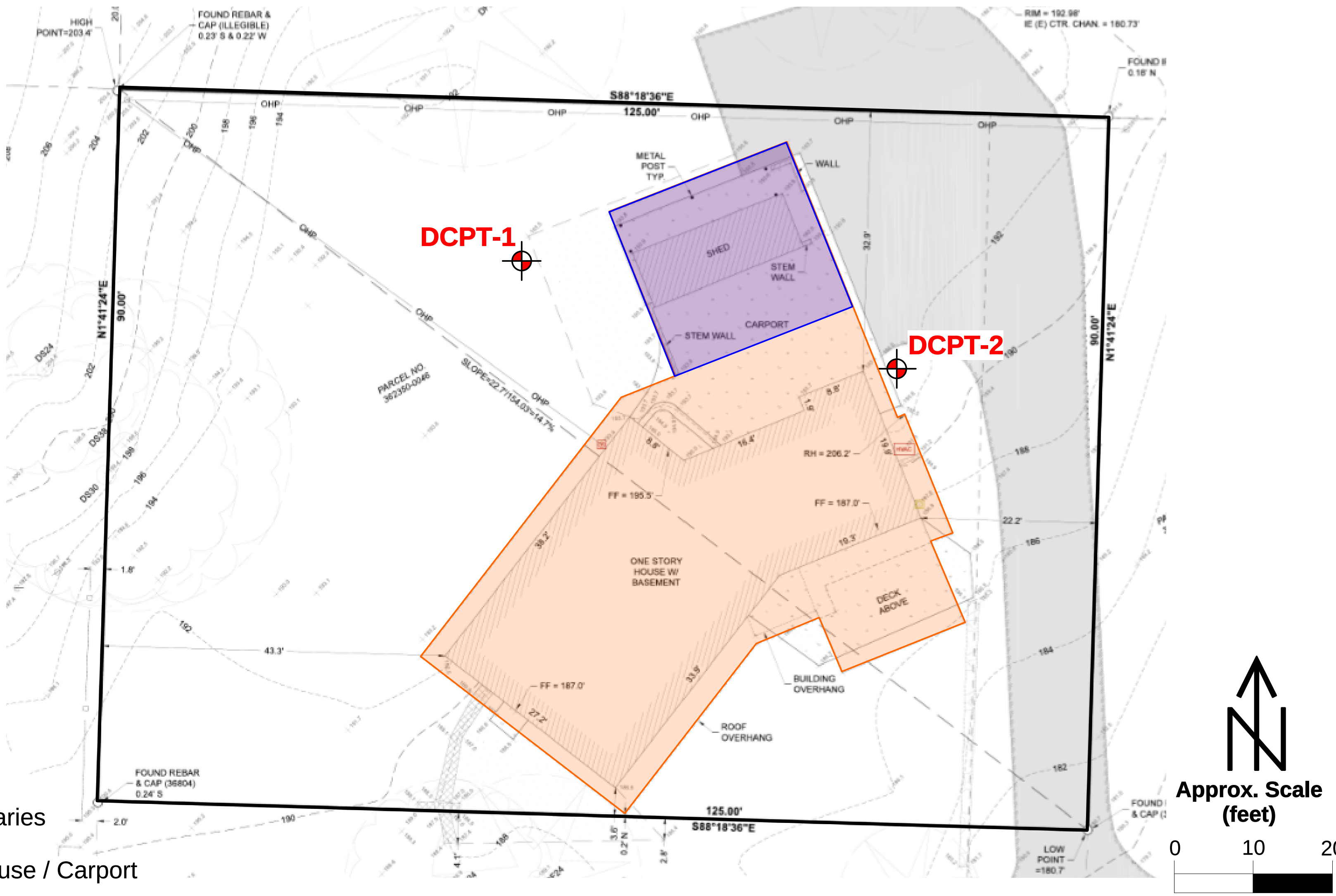
WSDOT, 2025, *Standard Specifications for Road, Bridge and Municipal Construction, M 41-10, Washington State Department of Transportation.*

N

Not to Scale

Base Map: King County iMap

PanGEO INCORPORATED	**Proposed SFR Addition** **3860 West Mercer Way** **Mercer Island, Washington**	**VICINITY MAP**	
		Project No. **25-270**	Figure No. **1**



Legend:

- Site Boundaries
- Existing House / Carport
- Approximate Footprint of Addition
- Approximate DCPT Location (PanGEO, 2025)

Note: Base map modified from the topographic survey prepared by Site Surveying, Inc. dated 2/3/25.

PanGEO INCORPORATED	Proposed SFR Addition 3860 West Mercer Way Mercer Island, Washington	SITE AND EXPLORATION PLAN
		Project No. 25-270 / Figure No. 2

APPENDIX A

SUMMARY HAND BORING / DYNAMIC CONE PENETROMETER 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	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

LOG KEY 13-104_LOGS.GPJ PANGEO.GDT 6/18/13

PanGEO INCORPORATED
Phone: 206.262.0370

Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Project:	Proposed SFR Addition	Surface Elevation:	193.5ft
Job Number:	25-270	Top of Casing Elev.:	N/A
Location:	3860 W Mercer Way, Mercer Island	Drilling Method:	Portable Dynamic Penetrometer / Hand Auger
Coordinates:	N 47.6 W 122.2	Sampling Method:	GRAB

Depth, (ft)	BLOWS per 10 cm	RESISTANCE Kg/cm2	CORRELATED SPT N-VALUE	GRAPH OF CORRELATED SPT N-VALUES N-Value ▲ (0 5 10 15 20 25)	NOTES OR MATERIAL DESCRIPTION
0	23	102.1	>25	>>▲	Dense to very dense, light brown, silty SAND with subrounded gravel and cobbles, rootlets in upper 2 feet; moist.
	29	128.8	>25	>>▲	
1	37	164.3	>25	>>▲	
	36	159.8	>25	>>▲	
	50	222	>25	>>▲	
3					Probing with a half-inch diameter steel rod at 3 feet below grade yielded zero inches of penetration.
					Hand boring was terminated at approximately 3 feet below grade due to practical auger refusal. Groundwater seepage was not encountered at the time of exploration.
					DCPT terminated at approximately 1.6 feet below grade due to practical refusal.
15					

Completion Depth:	1.6ft
Date Borehole Started:	7/25/25
Date Borehole Completed:	7/25/25
Logged By:	TH/SC
Drilling Company:	PanGEO, Inc.

Remarks: Standard Penetration Test (SPT) N-values reported above have been correlated from field dynamic cone resistance per Triggs & Simpson, "A Portable Dynamic Penetrometer for Geotechnical Investigations." Cone driven with a 35 lb. safety hammer w/15" drop. Coordinates and elevations are approximate. Elevations are estimated from the topographic survey prepared by Site Surveying, Inc. dated 2/3/25. Datum: WGS84/NAVD88

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LOG OF MANUAL CONE PENETROMETER
DCPT-1

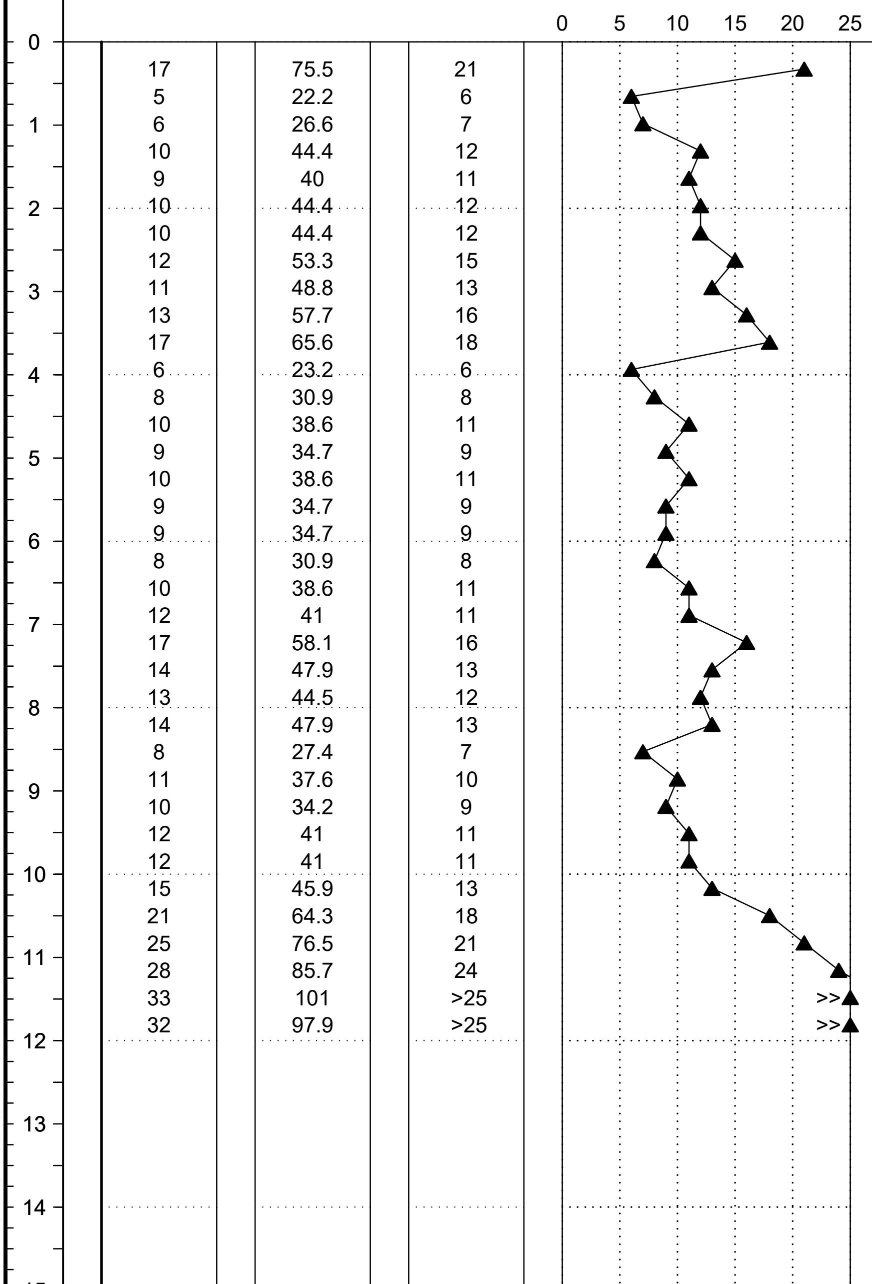
Figure A-2

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

Project:	Proposed SFR Addition	Surface Elevation:	193.8ft
Job Number:	25-270	Top of Casing Elev.:	N/A
Location:	3860 W Mercer Way, Mercer Island	Drilling Method:	Portable Dynamic Penetrometer / Hand Auger
Coordinates:	N 47.6 W 122.2	Sampling Method:	GRAB

BLOWS per 10 cm	RESISTANCE Kg/cm2	CORRELATED SPT N-VALUE
17	75.5	21
5	22.2	6
6	26.6	7
10	44.4	12
9	40	11
10	44.4	12
10	44.4	12
12	53.3	15
11	48.8	13
13	57.7	16
17	65.6	18
6	23.2	6
8	30.9	8
10	38.6	11
9	34.7	9
10	38.6	11
9	34.7	9
9	34.7	9
8	30.9	8
10	38.6	11
12	41	11
17	58.1	16
14	47.9	13
13	44.5	12
14	47.9	13
8	27.4	7
11	37.6	10
10	34.2	9
12	41	11
12	41	11
15	45.9	13
21	64.3	18
25	76.5	21
28	85.7	24
33	101	>25
32	97.9	>25

GRAPH OF CORRELATED SPT N-VALUES



NOTES OR MATERIAL DESCRIPTION

Approximately 3 inches of mulch and garden soil.

Loose, brown, silty SAND, ocasional cobble; moist.

Medium stiff to very stiff, gray, silty CLAY, highly disturbed texture, scattered iron oxide staining; moist.

Very stiff, gray, CLAY, some plasticity; moist.

Hand boring was terminated at approximately 11.8 feet below grade. Groundwater seepage was not encountered at the time of exploration.

DCPT terminated at approximately 11.8 feet below grade due to practical refusal.

Completion Depth:	11.8ft
Date Borehole Started:	7/25/25
Date Borehole Completed:	7/25/25
Logged By:	TH/SC
Drilling Company:	PanGEO, Inc.

Remarks: Standard Penetration Test (SPT) N-values reported above have been correlated from field dynamic cone resistance per Triggs & Simpson, "A Portable Dynamic Penetrometer for Geotechnical Investigations." Cone driven with a 35 lb. safety hammer w/15" drop. Coordinates and elevations are approximate. Elevations are estimated from the topographic survey prepared by Site Surveying, Inc. dated 2/3/25. Datum: WGS84/NAVD88

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LOG OF MANUAL CONE PENETROMETER DCPT-2

Figure A-3

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