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April 24, 2025

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**RE: Geotechnical Evaluation**  
Proposed Additions  
9640 SE 61st Place  
Mercer Island, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this report to discuss the results of our geotechnical evaluation at the referenced site.

The purpose of our evaluation was to provide recommendations for foundation design, grading, and earthwork.

### **Site & Project Description**

The site is located at 9640 SE 61<sup>st</sup> Place in Mercer Island, Washington. The site consists of one irregularly shaped parcel (No. 4260000060) with a total area of 14,275 square feet.

The central portion of the property is developed with a residence with a daylight basement and driveway. The remainder of the property is vegetated with grasses, bushes, and sparse trees. According to City of Mercer Island Maps the site contains potential landslide and erosion hazard areas.

The site generally slopes downward from east to west at variable magnitudes ranging from about 5 to 50 percent and relief of about 55 feet. Most areas have been graded and faced with modular block or basement walls. Block walls are locally terraced with heights of 4 feet or less for individual walls.

The site is bordered to the east by Lake Washington and a residential property, to the south by a shared private road, and to the west and north by residential properties.

The proposed development includes a second story addition and a new deck. Site grading may include cuts and fills of 3 feet or less and foundation loads for the deck are expected to be light.

We should be provided with the final plans to verify that our recommendations remain valid and do not require updating.

### **Area Geology**

The Geologic Map of Mercer Island, indicates that the site is near the contacts between Pre-Olympia glacial till, Pre-Olympia coarse-grained glacial deposits, and Pre-Olympia coarse-grained nonglacial deposits.

These deposits typically consist of coarse grained trace to silty-fine sand with gravel and cobble. These materials are typically dense to very dense below a weathered zone.

## Soil & Groundwater Conditions

As part of our evaluation, we drilled two hollow stem auger borings where accessible.

Disturbed soil samples were obtained during drilling by using the Standard Penetration Test (SPT) as described in ASTM D-1586. The Standard Penetration Test and sampling method consists of driving a standard 2-inch outside-diameter, split barrel sampler into the subsoil with a 140-pound hammer free falling a vertical distance of 30 inches. The summation of hammer-blows required to drive the sampler the final 12-inches of an 18-inch sample interval is defined as the Standard Penetration Resistance, or N-value. The blow count is presented graphically on the boring logs in this appendix. The resistance, or “N” value, provides a measure of the relative density of granular soils or of the relative consistency of cohesive soils.

The soils encountered were logged in the field and are described in accordance with the Unified Soil Classification System (USCS).

The borings encountered approximately 6 inches of topsoil underlain by approximately 3 to 4 feet of loose to medium dense, silty-fine to medium grained sand trace gravel (Possible Fill over Weathered Glacial Till). These materials were underlain by dense to very dense, silty-fine to medium grained sand with gravel (Glacial Till), which continued to the termination depths of the explorations.

Groundwater was not observed or encountered in the borings. Based on our observations and nearby historic explorations to the east, groundwater can become perched on the denser till during the wet season with more persistent groundwater at or near the elevation of the adjacent Lake Washington.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project. It would be necessary to install a piezometer to determine groundwater depths over a typical year.

## City of Mercer Island GIS Mapped Hazards

The City of Mercer Island GIS maps indicate that the site contains a potential slide and erosion hazard area. These designations are likely present due to the mapped geologic units, which can exhibit pre-historic landslide features in some areas.

Based on our explorations and explorations from adjacent properties, this area is underlain by dense till-like soils and not landslide or mass wastage deposits. The risk of soil movements in this area is very low. Mitigation is not warranted.

## Statement of Risk

Per Section 19.07.160B2 of the Mercer Island City Code, development within geologic hazard areas require that a Geotechnical Engineer licensed within the State of Washington provide 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.

The project meets the criteria of b from above. The soil conditions are not consistent with potential landslide hazard areas or erosion hazard areas. The dense till-like soils at shallow depths are resistant to instability as well as erosion due to high shear strength and fines content.

**Erosion Hazard**

The Natural Resources Conservation Services (NRCS) maps for King County indicate that the site is underlain by Kitsap silt loam (15 to 30 percent slopes). Based on our experience, the site soils would have a slight to moderate erosion potential in a disturbed state depending on the slope magnitude.

It is our opinion that soil erosion potential at this project site can be reduced through landscaping and surface water runoff control. Typically, erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, such as silt fences, hay bales, mulching, control ditches and diversion trenches. The typical wet weather season, with regard to site grading, is from October 31<sup>st</sup> to April 1<sup>st</sup>. Erosion control measures should be in place before the onset of wet weather.

**Seismic Hazard**

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the International Building Code (IBC). A Site Class *D* applies to an overall profile consisting of medium dense to very dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for  $S_s$ ,  $S_t$ ,  $F_a$ , and  $F_v$ . The USGS website includes the most updated published data on seismic conditions. The following tables provide seismic parameters from the USGS web site with referenced parameters from ASCE 7-16 and ASCE 7-22.

Seismic Design Parameters (ASCE 7-16)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			$F_a$	$F_v$	$S_{DS}$	$S_{D1}$	
D	1.448	0.502	1.0	Null	0.966	Null	0.62

Seismic Design Parameters (ASCE 7-22)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA <sub>M</sub>
			F <sub>a</sub>	F <sub>v</sub>	S <sub>DS</sub>	S <sub>D1</sub>	
D	1.61	0.63	Null	Null	1.14	Null	0.73

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The site has a low likelihood of liquefaction. For items listed as “Null” see Section 11.4.8 of the ASCE.

## Conclusions and Recommendations

### General

The site is underlain by glacial till which becomes denser with depth. Dense soils are generally present within a few feet of the ground surface in this area (other than areas underlain by wall backfill).

The proposed deck may be supported on a shallow foundation system bearing on medium dense or firmer native soils or on structural fill placed on the native soils. Local overexcavation of loose weathered native soils may be necessary depending on the proposed elevations and locations of the new footings.

Footings should be embedded an adequate depth to avoid surcharging any walls. A 1H:1V envelope should be maintained from the base of new footings to the back of any walls at their base.

### Foundation Design

The proposed deck may be supported on a shallow spread footing foundation system bearing on undisturbed medium dense or firmer native soils or on properly compacted structural fill placed on the suitable native soils. Any undocumented fill and/or loose native soils should be removed and replaced with structural fill below foundation elements.

Structural fill below footings should consist of clean angular rock 5/8 to 4 inches in size. We should verify soil conditions during foundation excavation work.

For shallow foundation support, we recommend widths of at least 16 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed deck. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 2,000 pounds per square foot (psf) may be used for design.

A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than 1/2 inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 250 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas). The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

### **Erosion and Sediment Control**

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

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

## CLOSURE

This report was prepared for the exclusive use of Lana Fauser and her appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Cobalt Geosciences, LLC.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes and assumed structural loads. Cobalt Geosciences should be provided with final architectural and civil drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of Lana Fauser who is identified as “the Client” within the Statement of General Conditions, and its agents to review the conditions and to notify Cobalt Geosciences should any of these not be satisfied.

Sincerely,

**Cobalt Geosciences, LLC**



4/25/2025  
Phil Haberman, PE, LG, LEG  
Principal

### Statement of General Conditions

**USE OF THIS REPORT:** This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

**BASIS OF THE REPORT:** The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

**STANDARD OF CARE:** Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

**INTERPRETATION OF SITE CONDITIONS:** Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

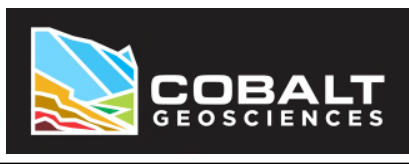
**VARYING OR UNEXPECTED CONDITIONS:** Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

**PLANNING, DESIGN, OR CONSTRUCTION:** Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.



 **Approximate Boring Location**  
B-1

King County imap Image



Proposed Additions  
9640 SE 61st Place  
Mercer Island, Washington

**Site Image**  
**Figure 1**

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## Unified Soil Classification System (USCS)

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION	
<b>COARSE GRAINED SOILS</b> (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines	
		Gravels with Fines (more than 12% fines)	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures	
		Gravels with Fines (more than 12% fines)	GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines	
		Sands with Fines (more than 12% fines)	SP	Poorly graded sand, gravelly sands, little or no fines	
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures	
		Sands with Fines (more than 12% fines)	SC	Clayey sands, sand-clay mixtures	
		Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			Inorganic	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
Organic	OL		Organic silts and organic silty clays of low plasticity		
Silts and Clays (liquid limit 50 or more)	Inorganic		MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt	
	Inorganic	CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay		
	Organic	OH	Organic clays of medium to high plasticity, organic silts		
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor	PT	PT	Peat, humus, swamp soils with high organic content (ASTM D4427)	

Classification of Soil Constituents
<p>MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).</p> <p>Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).</p> <p>Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).</p>

Grain Size Definitions	
Description	Sieve Number and/or Size
Fines	< #200 (0.08 mm)
Sand	#200 to #40 (0.08 to 0.4 mm)
-Fine	#40 to #10 (0.4 to 2 mm)
-Medium	#10 to #4 (2 to 5 mm)
-Coarse	
Gravel	#4 to 3/4 inch (5 to 19 mm)
-Fine	3/4 to 3 inches (19 to 76 mm)
-Coarse	
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Relative Density (Coarse Grained Soils)		Consistency (Fine Grained Soils)	
N, SPT, Blows/FT	Relative Density	N, SPT, Blows/FT	Relative Consistency
0 - 4	Very loose	Under 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
Over 50	Very dense	15 - 30	Very stiff
		Over 30	Hard

Moisture Content Definitions	
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table



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Soil Classification Chart

Figure C1

# Log of Boring B-1

Date: April 2025

Depth: 9'

Initial Groundwater: None

Contractor: Geo

Elevation:

Sample Type: Split Spoon

Method: Hollow Stem Auger

Logged By: PH Checked By: PH

Final Groundwater: None

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description	Groundwater	Moisture Content (%)	SPT N-Value
								Plastic Limit ———●———— Liquid Limit	0    10    20    30    40    50
			3			Vegetation/Topsail			
2			4 5		SM	Loose to medium dense, silty-fine to medium grained sand trace to with gravel, mottled yellowish brown to grayish brown, moist. (Possible Fill over Weathered Glacial Till)			
4					SM	Dense to very dense, silty-fine to medium grained sand trace to with gravel, grayish brown, moist. (Glacial Till)			
6			18 25 35						
8			35 42 50						
10						End of Boring 9' Refusal			
12									
14									
16									
18									
20									
22									
24									
26									
28									
30									
32									
34									



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 Mercer Island, Washington

**Boring  
 Log**

# Log of Boring B-2

Date: April 2025

Depth: 9'

Initial Groundwater: None

Contractor: Geo

Elevation:

Sample Type: Split Spoon

Method: Hollow Stem Auger

Logged By: PH Checked By: PH

Final Groundwater: None

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description	Groundwater	Moisture Content (%)	SPT N-Value
								Plastic Limit ———●———— Liquid Limit	0 10 20 30 40 50
			3			Vegetation/Topsail			
2			4		SM	Loose to medium dense, silty-fine to medium grained sand trace to with gravel, mottled yellowish brown to grayish brown, moist. (Possible Fill over Weathered Glacial Till)			
4			7						
6			21		SM	Dense to very dense, silty-fine to medium grained sand trace to with gravel, grayish brown, moist. (Glacial Till)			
8			28						
			28						
			30						
			45						
			50						
10						End of Boring 9' Refusal			
12									
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34									



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**Boring  
 Log**