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Geological & Geotechnical Consulting
5205 23rd Avenue West
Everett, WA 98203-1557

January 30, 2024
Project No. 23-017

Mr. David Do
4649 Forest Ave SE
Mercer Island, WA 98040

Subject: Geotechnical Services Report
Beachfront DADU
4649 Forest Ave SE, Mercer Island, Washington

This report summarizes the results of our geological and geotechnical evaluation of the property located at the above noted address in Mercer Island. The subject property is currently developed with a decades old small beach cottage/shed. According to the Mercer Island geological hazard maps the property is classified as a critical area due to landslide, erosion and seismic hazards. Based on the current plans the existing beach cottage/shed will be demolished and a new 600 square foot DADU will be constructed on the site. Access to the property is via a trail and stairs down the slope to the beach.

Existing Conditions

The subject building site is located at beach level on the far western portion of the overall property. The property begin along the west side of the Forest Ave SE right of way and extends approximately 425 to the west, well beyond the existing shoreline. The upper portion of the property is 85 feet wide in the north-south direction. In the midportion of the site the width slims down to about 20 feet and then near beach level extends back out to about 60 feet wide.

An existing residence is located on the upper portion of the property. Landscaping and stairs and a portion of a steep concrete driveway occupy the midportion of the parcel. Near beach level the parcel is nearly flat and contains the old cottage/shed and a boat dock. The shoreline is protected from erosion with a rockery. The steep concrete driveway leads to the existing residence that is on the adjacent property to the south. This house is located just above beach level and is well down the slope from the existing house on the subject site. The driveway begins on the adjacent property, goes onto subject property, back onto the neighboring property, back on the subject property and then back onto the adjacent property and ends at the neighboring garage.

The entire slope area between Forest Avenue SE at the top and the flat beach area at the bottom is either heavily landscaped with multiple small rockeries and wood walls or covered by the winding concrete driveway. At the toe of the slope, just beyond the concrete driveway, is an approximate 6 foot tall rockery that separate the slope from the level beach area.

Subsurface Conditions

On October 22, 2023, 3 exploration borings – hand augers - were excavated on the subject site. See Figure 1, Site and Exploration Plan for boring locations. The borings generally encountered a small thickness of clean sand overlying silt sediments. The massive silt sediments were observed at a depth of 2.1 feet on the south side of the property, contained an approximate 18 inch layer of medium dense sand and then became all silt below a depth of 5-1/2 feet. On the north side of the property the silt sediments were observed at a depth of 2 feet and extended for the full depth of the boring to 9.5 feet. The hand auger logs are attached with this report.

All of the observed material is likely old landslide deposits from long ago as the property is located at the south end of an area of a large, ancient landslide that begins along Forest Ave SE and extends a significant distance to the north. Reportedly, the residences in this area are generally underlain by 10 to 15 feet of disturbed silt soils overlying hard, glacially consolidated silt soils.

Hydrology

There was no visual observations of any ground water seepage or hydrophilic (water loving) plants on the west facing slope or on the level beach area. Ground water should be expected long term at or near lake elevation. Water levels within the hand borings is at different levels, most likely due to the slow transmission of water within the silt sediments.

Mappings and Other Nearby Studies

According to the Geology Map of Mercer Island, by Troost and Wisher, 2006, the site is mapped as Pre-Olympia fine grained non-glacial deposits (Qponf) overlying Pre-Olympia non-glacial deposits. The beach area where the planned DADU will be located is mapped as Holocene lake deposits (Ql). It is our opinion that the mapped lake deposits are reworked old landslide deposits.

Many studies have been conducted by this firm and others along Forest Ave SE and the west side of Mercer Island. Multiple large and small landslides have occurred along this side of the island over the past eons. It is generally thought that most of the large rotational slides occurred when the Puget Sound area deglaciated about 10,000 years ago and the sudden lowering of the impounded water resulted in the destabilization of the slopes. Since then, many much smaller landslides have occurred within these disturbed areas, generally wherever ground water is a continuing issue, where cuts have been made into the disturbed soil and not properly supported, where fill soils have been pushed onto the slopes and where surface water is not properly controlled. We are unaware of any instability of the larger landslide block and the area is fully developed with homes and both surface and ground water have generally been controlled.

Nearby studies where exploration borings have been placed into the near shore environment (lake deposits) have indicated that the materials are generally disturbed silt sediments overlying glacially consolidated silt/clay sediments.

Geologic Hazards

Seismic Hazards

The parcel is located within the Seattle Fault Zone. Generally, there are four types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture; 2) seismically induced landslides; 3) liquefaction; and 4) ground motion.

The risk of ground rupture is low as no fault splays have been recognized within the immediate area.

There is always a risk of seismically induced landslides when dealing with sloping ground. However, the slope above the site is fully developed with 2 homes, a long winding concrete driveway and multiple small landscape walls. Immediately to the east of the planned structure, is an approximately 5 to 6 feet tall rockery. All of these items would have to fail in order to have a potential impact on the planned DADU. The actual building site is nearly level with no potential for slope movement.

The risk of liquefaction is low given the observed soil conditions which are primarily silt sediments. The underlying glacially consolidated sediments are more granular in nature but dense to very dense and not subject to liquefaction.

Based on the encountered site conditions, and the planned construction, it is our opinion that the proposed construction will not be affected by any of these hazards other than ground motion. For this project the structural engineer should follow 2021 International Building Code recommendations for Site Class D soils.

Erosion Hazards

Due to the flat lying nature of the building site there is little potential for erosion from the site provided that best management practices are followed. Any significant erosion would need to come onto the site from the west facing slope area. However, this area is fully developed with little erosion hazard potential. Prior to our field investigation the site was flooded with many thousands of gallons of water from a water main break well up the slope along West Mercer Way. Even though the large volume of water flowed for several hours before it could be stopped, the amount of erosion on the slope area was much less than expected and far less than would ever be created by storm water runoff.

Landslide Hazards

There is no potential for a landslide to occur on the building site. The overall vicinity (extending north, south and east) of the project has had multiple small areas of earth movement in the past and will likely have more small landslides in the future. These slides generally occur where ground

water is an issue, where unregulated landfilling has occurred, where unregulated slope cuts have occurred and where storm water runoff is not well controlled. As such, there will always be some potential for a landslide to occur on the slope area above the site to the east and impact the planned new DADU. However, the slope area above the site has been fully developed for decades, storm water appears to be fully controlled and other than small surficial slides reported and mapped in various locations there has been no reported large scale movement in the area that could impact the new construction.

Conclusions and Recommendations

Based on the results of our site reconnaissance, subsurface investigation and literature review, it is our opinion that the subject building site is located in an area that is underlain ancient landslide debris which overlies glacially consolidated sediments. The bearing soils are fine grained and extremely moisture sensitive. As such they will be easily disturbed, especially during inclement weather conditions. If the bearing soil becomes disturbed during construction, it will be necessary to either remove the disturbed soil or recompact it back to a medium dense or better condition prior to footing concrete placement. If re-compaction is not possible it will be necessary to remove the disturbed soils, import a select granular material such as Type 17 backfill or clean crushed rock, and place it as structural fill up to desired subgrade elevation. Structural fill must be placed in maximum 8 inch thick lifts and each lift compacted to a medium dense or better condition prior to placement of the succeeding lift.

The most significant soil excavation required for this project is the foundation system. It is our understanding that all work will be conducted by hand due to the limited access to the site. Due to the proximity to the nearby lake care must be taken to avoid placing loose soil from the foundation and plumbing excavations into an area that could erode into the lake. Ideally the excavated soil would be removed from the site. However, due to the lack of equipment access that will likely be difficult. If excavated soils remain on the site we recommend they be placed no closer than 25 feet to the lake shore, no thicker than 24 inches, that some type of wall or rockery be constructed to mitigate any risk of the soils being washed into the lake and that they be immediately covered with an erosion control matt until such time as a substantial vegetation cover can be established.

Foundations

The new foundation system should be designed as a rigid box with all structural elements suitably reinforced to withstand potential small areas of weaker soil conditions. All new building foundations must extend down through any existing fill soils or loose native soils to bear on the underlying stiff or better silt sediments that were observed approximately 2 feet below existing grade or on imported Type 17 or crushed rock backfill, if necessary. An allowable soil bearing value of 1,500 psf, a passive earth pressure of 150 pcf and a soil friction factor of 0.35 may be used in the design of these new foundations. The backfill around foundation units must be placed and compacted in lifts to a medium dense or better condition in order for the passive earth pressure

value to apply. Anticipated settlement over a 20 foot span should be less than ¾ inch total and ½ inch differential for equally loaded foundations.

Retaining Walls

Based on the existing plans there are no retaining walls required for the project. Should the plans change, we should be contacted to provide geotechnical parameters for the wall design.

Drainage

Storm water from impermeable surfaces, footing drains and wall drains should be collected and discharged into a city approved storm water drainage system. On-site infiltration of storm water is not applicable for this site due to the underlying silt soil.

Erosion

Suitable best management practice (BMP) erosion control measures should be implemented for the project. A silt fence should be installed as per Mercer Island requirements along the north, south and west sides of the site. Soil stockpiles should be covered with plastic sheeting to contain in-situ moisture and prevent storm water runoff. Areas of disturbance should be limited to necessary construction areas. Cleared areas that are not being worked should be covered with thick (minimum 2 inches) straw mulch. Due to the limited access for equipment a rocked construction entrance will not be required. Absolutely no sediment may be allowed to wash into the adjacent lake.

Summary

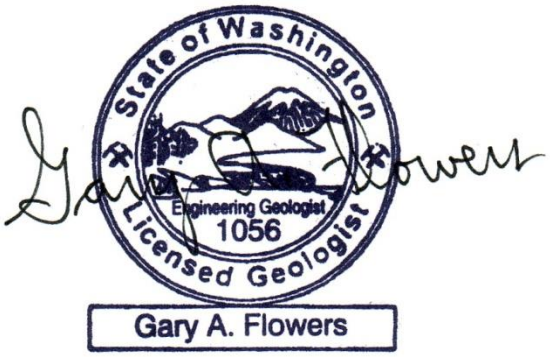
The planned new construction will have no adverse impact on the adjacent steep slope or any adjacent properties or critical areas. The site has been developed for decades with an old beach cottage currently used as a storage shed for beach and water sport necessities. This structure is currently within the buffer area for the shoreline, erosion hazard and landslide hazard areas. The demolition of this existing structure and construction of a somewhat larger, single story, 600 square feet, wood framed structure, will have no adverse impact on these buffer areas provided the recommendations herein are suitably followed.

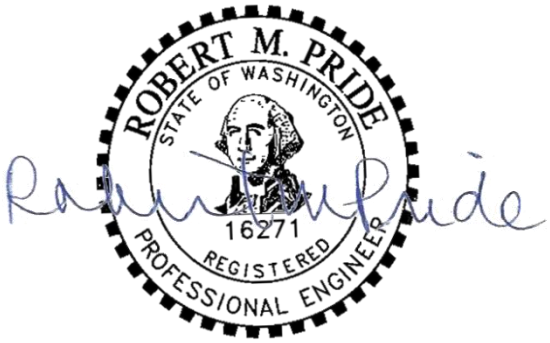
City required statement of risk – "Construction practices are proposed for the alteration that would render the development as safe as it were not located in a geologically hazardous area and do not adversely impact adjacent properties".

Construction monitoring and consultation services should be provided in order to verify that subsurface conditions are consistent throughout the property and will provide suitable bearing for the new footings. Other construction monitoring activities may be required by city officials.

Our findings and recommendations provided in this report were prepared in accordance with generally accepted principles of engineering geology and geotechnical engineering as practiced in the Puget Sound area at the time this report was submitted. We make no other warranty, either express or implied.

Respectfully submitted,





Gary A. Flowers, P.G., P.E.G.
Principal Engineering Geologist

Robert M. Pride, P.E.
Geotechnical Engineer

Attachments: Hand Auger Logs
Figure 1: Site & Exploration Plan

HAND AUGER LOGS
4649 FOREST AVENEU SE
MERCER ISLAND, WA

HA - 1 Near midpoint on south side of cottage/shed. Approximate elevation 25 feet.

0.0' – 1.3' Medium dense, very moist, brown, medium sand, trace silt
1.3' – 2.0' Medium dense, very moist, brown, gravelly, medium sand, trace silt

Bottom of hole at 2.0' on 10/22/23. Refusal on large gravel. Probing with T-handle soils probe indicates stiff silt/clay below the gavel layer. No groundwater.

HA – 2 Moved 2 feet west from HA-1. Approximate elevation 25 feet.

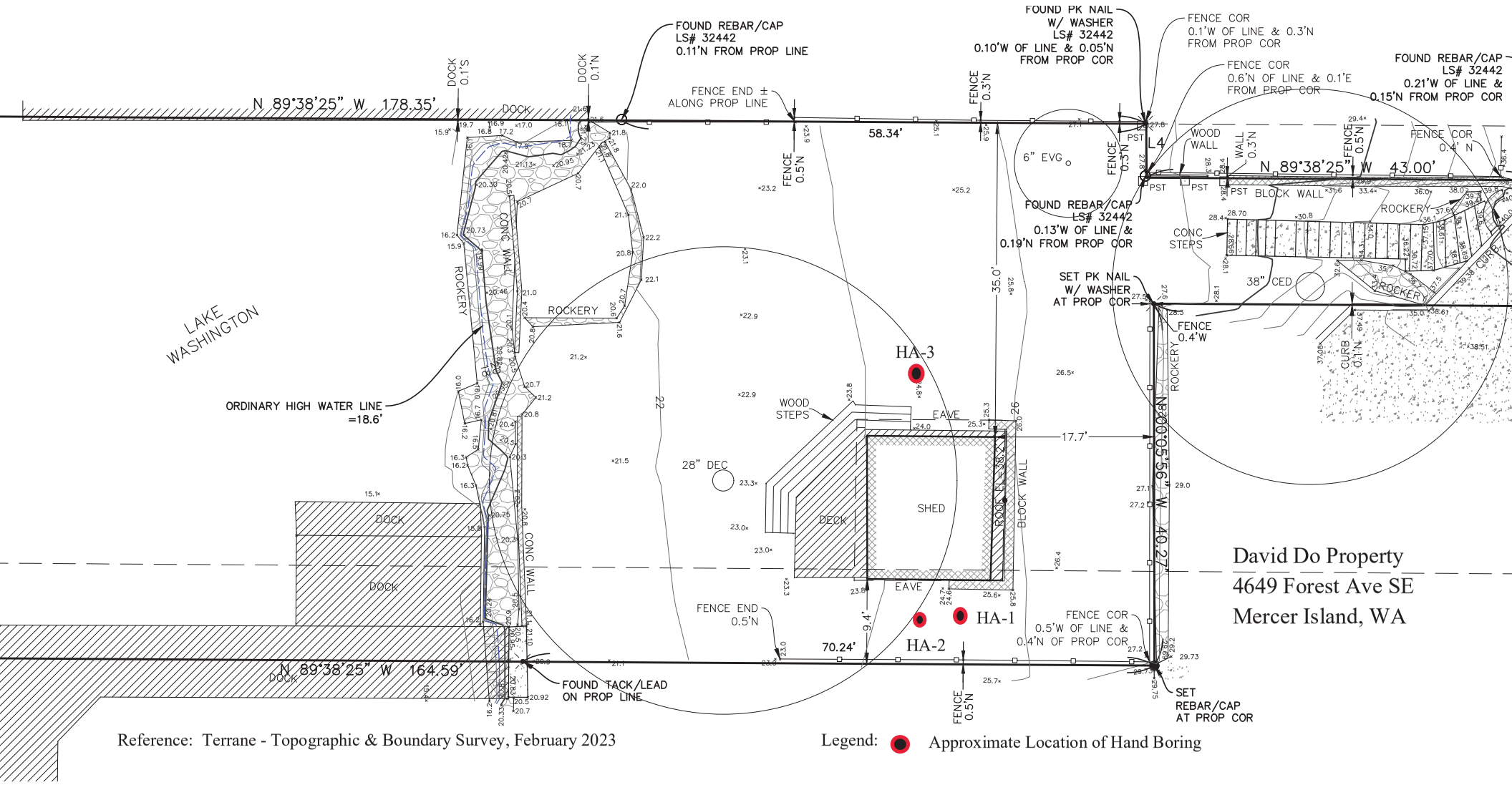
0.0' – 1.3' Medium dense, very moist, brown, medium sand, trace silt
1.3' – 2.1' Medium dense, very moist, brown, gravelly, medium sand, trace silt
2.1' – 4.0' Stiff, moist, gray silt
4.0' – 5.8' Medium dense, moist, medium sand
5.8' – 7.5' Stiff, moist, gray, silt to sandy silt

Bottom of hole at 7.5' on 10/22/23. Water at depth of 4.5'

HA – 3 Near midpoint on north side of cottage/shed. Approximate elevation 25 feet.

0.0' – 1.0' Loose to medium dense, very moist, brown, medium sand, trace silt
1.0' – 1.6' Medium dense, very moist, brown, gravelly, medium sand, trace silt
1.6' – 2.0' Stiff, moist, gray sandy silt
2.0' – 9.5' Stiff, moist, gray, silt to sandy silt

Bottom of hole at 9.5' on 10/22/23. Water at depth of 8.7'



Reference: Terrane - Topographic & Boundary Survey, February 2023

Legend: ● Approximate Location of Hand Boring

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5205 23rd Avenue West
Everett, WA 98203-1557

February 14, 2025
Project No. 23-017

Mr. David Do
4649 Forest Ave SE
Mercer Island, WA 98040

Subject: Geotechnical Services Report Addendum – Mitigation Sequencing
Beachfront DADU
4649 Forest Ave SE
Mercer Island, Washington

This letter address the city requirement for mitigation sequencing for your project as per MCC 19.07.100. This code section requires an evaluation of a series of mitigation measures to minimize impacts to critical areas on the site or adjacent properties. Each mitigation measure must be addressed before considering and incorporating the next measure in the sequence.

Background/Existing Conditions

The area of the subject property where a new DADU is proposed is currently developed with a decades old small beach cottage/shed. According to the Mercer Island geological hazard maps the property is classified as a critical area due to landslide, erosion and seismic hazards. Based on the current plans the existing beach cottage/shed will be demolished and a new 864 square foot DADU will be constructed on the site. Access to the property is via a trail and stairs down the slope to the beach.

The subject building site is located at beach level on the far western portion of the overall property. The property begins along the west side of the Forest Ave SE right of way and extends approximately 425 to the west, well beyond the existing shoreline. The upper portion of the property is 85 feet wide in the north-south direction. In the midportion of the site the width slims down to about 20 feet and then near beach level extends back out to about 60 feet wide.

An existing residence is located on the upper portion of the property. Landscaping and stairs and a portion of a steep concrete driveway occupy the midportion of the parcel. Near beach level the parcel is nearly flat and contains the old cottage/shed and a boat dock. The shoreline is protected from erosion with a rockery. The steep concrete driveway leads to the existing residence that is on the adjacent property to the south. This house is located just above beach level and is well down the slope from the existing house on the subject site.

The entire slope area between Forest Avenue SE at the top and the flat beach area at the bottom is either heavily landscaped with multiple small rockeries and wood walls or covered by the winding concrete driveway. At the toe of the slope, just beyond the concrete driveway, is an approximate 6 foot tall rockery that separates the slope from the level beach area.

Mitigation Sequencing

A. Avoiding the impact altogether by not taking a certain action or parts of an action. The applicant shall consider reasonable, affirmative steps and make best efforts to avoid critical area impacts. However, avoidance shall not be construed to mean mandatory withdrawal or denial of the development proposal or activity if the proposal or activity is an allowed, permitted, or conditional use in this title. In determining the extent to which the proposal should be redesigned to avoid the impact, the code official may consider the purpose, effectiveness, engineering feasibility, commercial availability of technology, best management practices, safety and cost of the proposal and identified changes to the proposal. Development proposals should seek to avoid, minimize and mitigate overall impacts based on the functions and values of all of the relevant critical areas and based on the recommendations of a critical area study. If impacts cannot be avoided through redesign, use of a setback deviation pursuant to section 19.06.110(C), or because of site conditions or project requirements, the applicant shall then proceed with the sequence of steps in subsections B through E of this section;

The proposed development is a replacement of an existing, dilapidated structure. The ground surface is level in the development area and there is little planned grading beyond excavation for the building footings. The new structure will be set back against the east property line such that the front edge will be no closer to the lake edge than the existing building. Due to extremely limited site access, all excavation for the new foundation system will be hand excavated and all building materials will be hand carried onto the site. There is no way to avoid building the structure within the geologic hazard areas or their buffers. As detailed in our geotechnical report for the project, and fully incorporated into the building plans, all applicable measures have been included to mitigate any impacts to the structure, or to adjacent properties, due to the nature of the geologic hazards. No further redesign of the structure should be required.

B. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, using a setback deviation pursuant to section 19.06.110(C), using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;

The magnitude of this project is small – an 864 sf structure. And it is replacing an existing structure that has been in place on the site for decades and is badly in need of replacement. The existing structure is, and the replacement structure will be, located within the geologic hazards and their buffers. Other than cancelling the project there is no way to alter the location. The existing structure is uninhabitable and must be eventually replaced. The proposed new structure will be set as far away from the edge of the lake as is possible and is no closer than the existing structure. Both are well outside of a 25 foot buffer line from the edge

of the lake. Due to access issues only hand operated equipment will be used on the project. There will be no impacts to the geologic hazards or to adjacent properties.

C. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

The environment will not be adversely impacted. Removing a dilapidated structure and replacing it with another small, but slightly larger structure, all with small power or hand equipment only, will not be detrimental to the existing environment. The existing landscaping is nil, consisting only of some poorly maintained lawn grass. New, city approved landscaping will significantly enhance the overall environment of the area.

D. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

The existing structure is badly deteriorated and requires full replacement. The new structure will be constructed to all existing codes and should have a lifespan of many decades. Grading for the new structure is minimal with less than 25 cy of soil disturbance. Existing landscaping is nearly nonexistent with only some poor quality lawn grass. Planned new landscaping will significantly improve the environment and increase protection against future erosion of sediment to the lake. During construction all best management practices will be implemented to protect the adjacent lake from any detrimental impacts such as erosion of sediment into the lake.

E. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments;

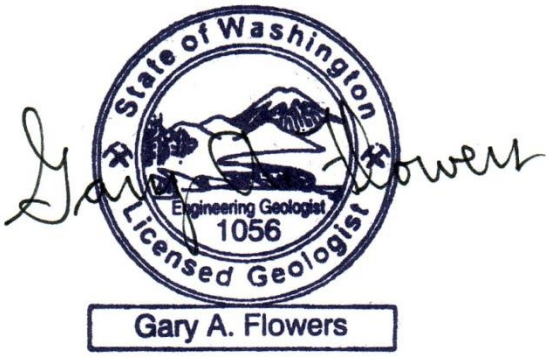
Construction of the new planned structure will have no significant adverse impact to the environment or to adjacent properties. Construction by hand will reduce impacts to the lowest achievable level. Significant city approved landscaping will enhance the local environment over existing conditions.

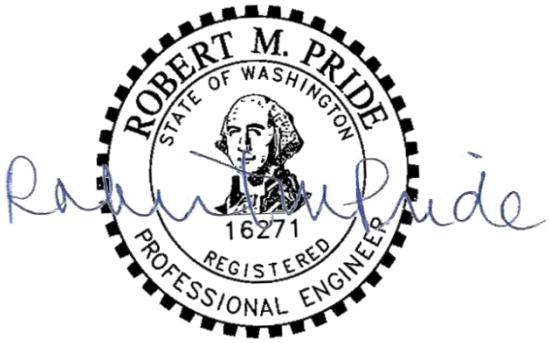
F. Monitoring the impact and taking appropriate corrective measures to maintain the integrity of compensating measures.

Monitoring for both soil bearing and erosion control should be provided during construction and improved, if required, to mitigate any adverse conditions. All new and improved landscaping should be carefully maintained to assure viability.

Our findings and recommendations provided in this report were prepared in accordance with generally accepted principles of engineering geology and geotechnical engineering as practiced in the Puget Sound area at the time this report was submitted. We make no other warranty, either express or implied.

Respectfully submitted,





Gary A. Flowers, P.G., P.E.G.
Principal Engineering Geologist

Robert M. Pride, P.E.
Geotechnical Engineer

February 20, 2025
Project No. 23017

Mr. David Do
4649 Forest Ave SE
Mercer Island, WA 98040

Re: Geotechnical Plan Review
Beachfront DADU
4649 Forest Ave SE
Mercer Island, WA

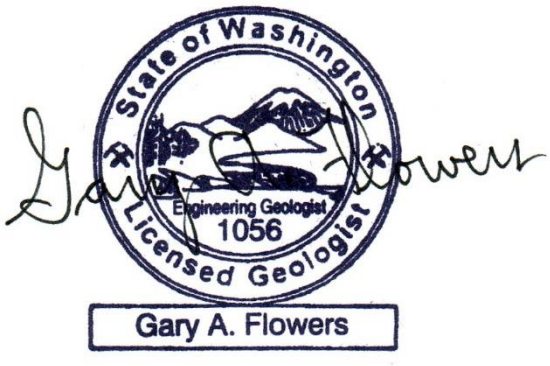
As per MICC 19.07.110(B)(11) we have completed a review of the geotechnical aspects of the most recent plan sheets for the above noted residential project. The plans were prepared by Studio Shed and include architectural sheets, A-000, A-001, A-100, A-200, A-201, A-300, and E-100. The plans also include structural sheets S-001, S-002, S-100A, S-100B, S-101, S-102, S-200 and S-300. The plan sheets are dated 8/20/2024.

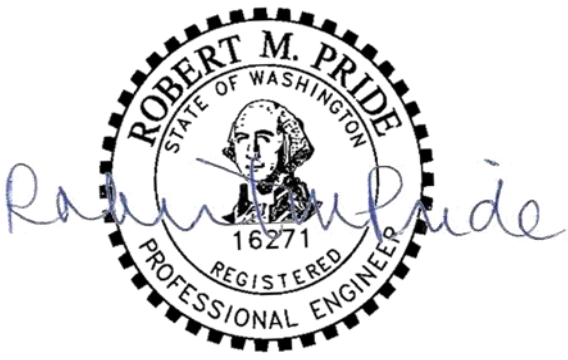
We have also reviewed conceptual landscape plans by Rubenkonig Planning & Landscape Architecture, PLLC. The plans included sheets L1, L2 and L3 of 3 and were dated 2/5/2025.

It is our opinion that the above noted plans are in conformance with the recommendations provided in our soils report.

Please contact our office if you have any more questions or concerns.

Respectfully submitted,





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September 12, 2025
Project No. 23-017

Mr. David Do
4649 Forest Ave SE
Mercer Island, WA 98040

Subject: Geotechnical Services Report Addendum – Seismic Evaluation
Beachfront DADU
4649 Forest Ave SE, Mercer Island, Washington

This letter addresses the city request for additional subsurface information and characterization to further evaluate potential seismic hazard issues with the project site.

Background/Existing Conditions

The area of the subject property where a new DADU is proposed is currently developed with a decades old small beach cottage that is quite debilitated and currently used as a storage shed. According to the Mercer Island geological hazard maps the property is classified as a critical area due to landslide, erosion and seismic hazards. Based on the current plans the existing beach cottage/shed will be demolished and a new 864 square foot DADU will be constructed on the site. Access to the property is via a trail and stairs down the slope from the existing main residence to the beach.

The subject building site is located at beach level on the far western portion of the overall property. The property begins along the west side of the Forest Ave SE right of way and extends approximately 425 feet to the west, well beyond the existing shoreline. An existing residence is located on the upper portion of the property adjacent to the street. Landscaping and stairs and a portion of a steep concrete driveway occupy the midportion of the parcel. Near beach level the parcel is nearly flat and contains the old cottage/shed and a boat dock. The shoreline is protected from erosion with a rockery. The steep concrete driveway leads to an existing residence that is on the adjacent property to the south. The adjacent residence to the south and the adjacent residence to the north, are both located at beach level and presumably on similar soil conditions.

Subsurface Exploration

On August 1, 2025, a limited access Acker drill rig was mobilized to the site by Geologic Drill Partners, Inc. This small, limited access drill rig was necessary as access for any larger type of drill rig was inordinately difficult.

Two borings were drilled for this small project and small site. The approximate boring locations were measured from existing features at the site and are indicated on the attached Site & Exploration Plan. The borings were drilled to the maximum capacity of the Acker drill rig.

Soil samples were obtained from the borings at 2 ½ and 5-foot intervals in general accordance with Standard Penetration Test (SPT) sampling methods (ASTM test method D-1556) in which the samples are obtained using a 2 inch outside diameter split spoon sampler. The sampler was driven into the soil 18 inches using a 140-pound weight 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 sampler 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. After auger withdrawal the borings were backfilled with drill cuttings and bentonite chips in accordance with Department of Ecology guidelines. A licensed engineering geologist was present throughout the field exploration to observe the drilling, assist in sampling, and to document the soil samples obtained from the borings.

Boring EB-1 was drilled to 20 feet. The upper 15 feet consisted of medium stiff to stiff, silt with some sand to sandy silt. At a depth of 20 feet about 2 ½ feet of heaving sand into the auger was encountered and a soil sample was unable to be taken at that depth. The sample above at 15-16 ½ feet, and observations from the driller, indicated a contact between fine grained and granular soil at a depth of about 16 feet. Stiff to very stiff, brown silt to sandy silt was observed to be overlying medium dense to dense, gray, gravelly sand.

Boring EB-2 was drilled to 20 feet and sampled to 21 ½ feet. No further drilling could be done as the hard silt/clay soil bound up the auger such that it could not be turned. Observed soils above the hard silt/clay consisted entirely of stiff to very stiff, silt with trace sand to sandy silt.

Groundwater

No significant amount of ground water was observed in either boring. Saturated soil was observed about 6 feet deep in EB-1 and minor seepage was observed at about 8 feet depth in EB-2. The fine grained soil likely smeared the sides of the borings and restricted ground water flow into the borings. Given the nearness to the lake, ground water will ultimately reflect the lake level which is about 5 feet below ground surface on the west side of the site.

Other Nearby Studies

There have been multiple geotechnical studies performed all along the properties on Forest Ave SE. These studies were previously reviewed during our original geotechnical evaluation of the subject site. The most meaningful studies were for the property immediately adjacent to the site (4651 Forest Ave SE) and the next property to the south (4661 Forest Ave SE) as they are very near the subject site and have at least one exploration boring or pit at the same elevation as our current borings for the site. These explorations confirm our findings. Copies of exploration pit

TH-2, approximate elevation 22 feet, from 4651 Forest Ave SE and exploration boring PG-1, approximate elevation 22 feet, from 4661 Forest Ave SE are attached. It should be noted that the blow counts (N-value) from TH-2 were derived from a Porter Sampler which can be roughly converted (correlated) to SPT values. The Porter penetration resistance in blows per 6 inches approximately correlates to the SPT values in blows per foot.

Site Geology

According to the Geology Map of Mercer Island, by Troost and Wisher, 2006, the site is mapped as Pre-Olympia fine grained non-glacial deposits (Qponf) overlying Pre-Olympia non-glacial deposits. The beach area where the planned DADU will be located is mapped as Holocene lake deposits (Ql). As stated in our previous geotechnical report, dated January 30, 2024, it is our opinion that the mapped lake deposits are reworked old landslide deposits. Also as previously stated, nearby studies where exploration borings have been placed into the near shore environment (lake deposits) have indicated that the materials are generally disturbed silt sediments overlying glacially consolidated silt/clay sediments.

Exploration borings EB-1 and EB-2 both encountered about 4 feet of disturbed material in the upper portion of the borings. In B-1 the soil had a disturbed matrix and in B-2 there was a slight blocky texture. This soil was medium stiff (B-1) closest to the lake and very stiff (B-2) furthest from the lake. Both samples consisted of moist, gray silt with some sand. This is most likely old fill soil but could also be colluvium from upslope sources.

Underlying this disturbed appearing soil was 9 to 12 feet of medium stiff to very stiff, gray silt with some sand to sandy silt with occasional pebbles and several small (1/2 inch thick) sand interbeds. Based on the density of this soil unit and lack of any organic material, we interpret this soil unit to be old landslide deposits from upslope sources and not lake deposits, as mapped on the published map for the area. This is in agreement with multiple studies in the area by others.

Below the old landslide deposits, the material in each boring was significantly different. At a depth of 15 ½ feet in EB1 the soil changed from silt to well sorted, medium sand with gravel. This material was medium dense (nearly dense) and based on drilling action appeared to extend to the bottom of the boring at a depth of 20 feet. As stated above, heaving sand into the auger prevented additional sampling of this material.

In EB-2, on the east side of the planned building pad, the soil changed at a depth of 13 feet from sandy silt to very stiff, becoming hard with depth, silty clay to clayey silt. Although a sample was able to be attained from 20 to 21 ½ feet, the auger could not be further advanced into the hard silt/clay with the limited access drill rig.

This lower material in each boring is consistent with the pre-Olympia nonglacial deposits mapped at the site. The high SPT-N values indicate that this material has been glacially overridden and consolidated.

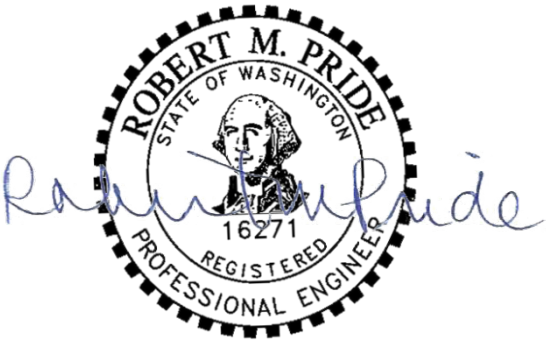
CONCLUSIONS AND RECOMMENDATIONS

The findings in the two recently drilled exploration borings confirm the soil conditions encountered in the Hand Borings previously placed on the site for our January 30, 2024, geotechnical report. As such, our recommendations remain the same. Soil with a potential for liquefaction is typically cohesionless, poorly sorted, fine to medium sand and must be loose and below the groundwater table. Although most of the soil underlying the planned building site will be below water table as influenced by the nearby lake level, the soil is predominantly fine-grained deposits. In the upper 15 feet only very thin (1/2 inch thick) sand seams were observed. Below a depth of 15 feet in exploration boring EB-1, nearest the lake, medium dense to dense, well graded sand with gravel was observed. However, the well graded soil matrix and density of this material is sufficient to mitigate liquefaction potential.

Based on these conditions, in our professional opinion, the liquefaction potential of the site is negligible and neither additional liquefaction analysis nor design considerations related to soil liquefaction are necessary for this project. The geotechnical recommendations provided in our January 30, 2024, technical report should be followed for design of the project.

Our findings and recommendations provided in this report were prepared in accordance with generally accepted principles of engineering geology and geotechnical engineering as practiced in the Puget Sound area at the time this report was submitted. We make no other warranty, either express or implied.

Respectfully submitted,

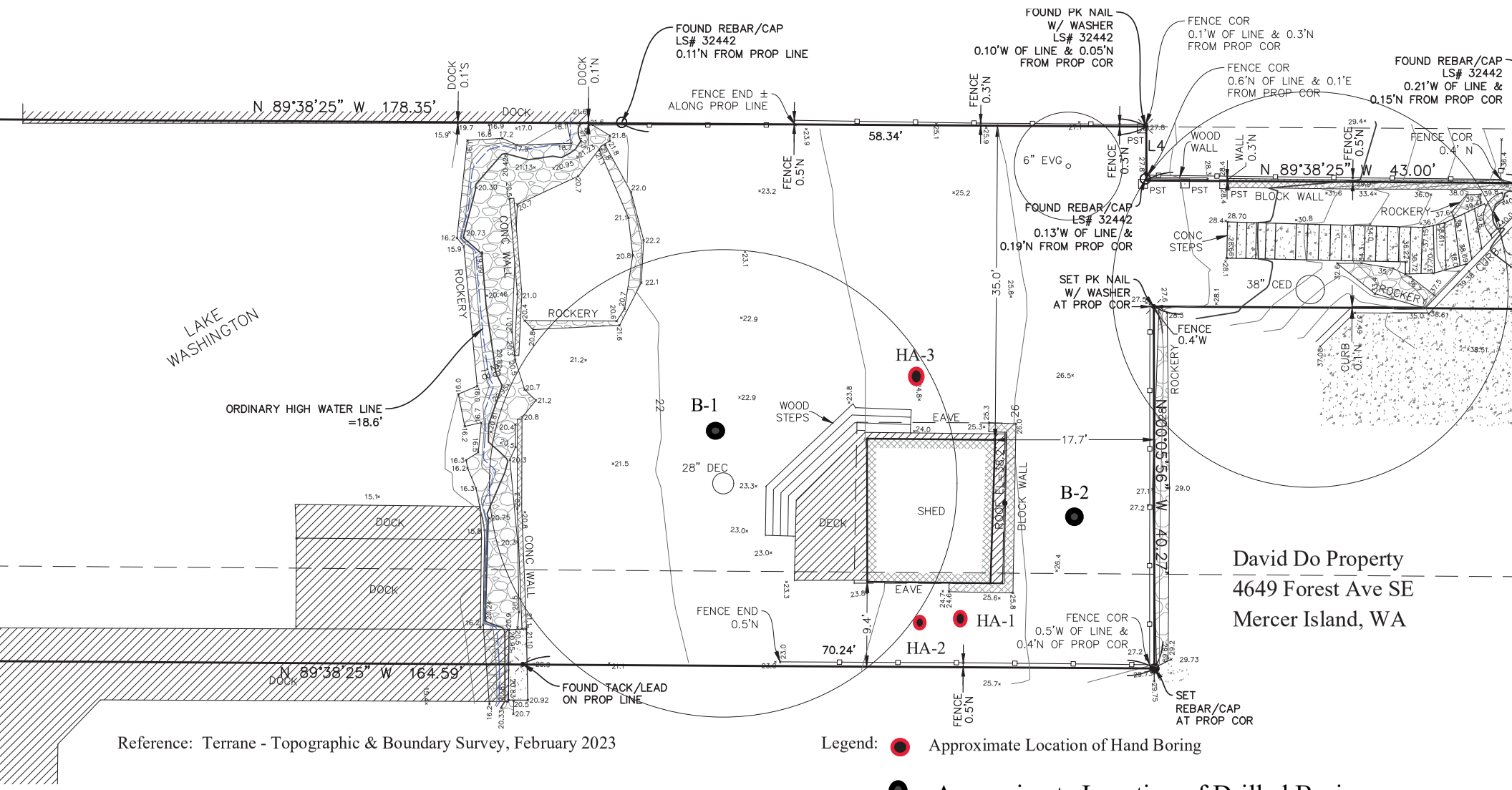


Gary A. Flowers, P.G., P.E.G.
Principal Engineering Geologist

Robert M. Pride, P.E.
Geotechnical Engineer

Attachments: Site & Exploration Plan
Exploration Borings EB-1 & EB-2
Previous Test Hole #2 for 4651 Forest Ave SE
Previous Exploration Boring PG-1 for 4661 Forest Ave SE

SITE & EXPLORATION PLAN



Reference: Terrane - Topographic & Boundary Survey, February 2023

Legend: Approximate Location of Hand Boring

Approximate Location of Drilled Boring

EXPLORATION BORING LOG

Number **EB-1** PAGE 1 OF 1

SEDIMENT DESCRIPTION	DEPTH	SAMPLE	GROUND WATER	STANDARD PENETRATION RESISTANCE Blows/Foot (10 20 30 40)
Medium stiff, moist, gray silt with some sand, disturbed matrix (fill?).		3 4 4		▲ 8
Medium stiff, moist, gray silt with some sand, slightly plastic.	5	3 3 3	▼	6 ▲
Stiff, saturated, gray sandy silt with occasional pebbles.		3 4 6	A.T.D	▲ 10
Very stiff, saturated, brown, sandy silt.	10	6 9 10		▲ 19
Upper 6″ - Very stiff, saturated, brown sandy silt.	15	7 12 15		▲ 27
Lower 12″ Medium dense, saturated, gray, medium sand with gravel, well sorted.				
Drilled to 20 ft. 2 1/2 feet of heave. Cannot sample. Bottom of boring at 20 feet.	20			

Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by geologic Interpretations, engineering analysis, and judgment. They are not necessarily representative of other times and locations. We will not accept responsibility for the use or interpretation by others of information presented on this log.

GARY A. FLOWERS, PLLC

Project: David Do DADU
4649 Forest Ave SE
Mercer Island, WA
AUGUST 2025
PROJECT NO. 23017

EXPLORATION BORING LOG

Number **EB-2** PAGE 1 OF 1

SEDIMENT DESCRIPTION	DEPTH	SAMPLE / GROUND WATER	STANDARD PENETRATION RESISTANCE Blows/Foot (10 20 30 40)
Stiff to very stiff, moist, gray silt with some sand, slight blocky texture.		5 7 8	▲15
Medium stiff, moist, tannish gray silt, with some sand.	5	4 6 7	▲ 13
Very stiff, moist, gray silt, with some sand.		7 8 8	16 ▲
Very stiff, very moist, gray, sandy silt, small 1/2-inch sand interbeds.	10	9 10 10	▲20
Very stiff, very moist, gray, silty clay to clayey silt.	15	9 12 14	26 ▲
Hard, very moist, gray, silty clay to clayey silt.	20	18 22 24	46 ▲
Auger unable to turn further. Bottom of boring at 21-1/2 feet. Free water was not observed in the boring at the time of drilling. Very small groundwater seep observed at 8 feet.			

Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by geologic Interpretations, engineering analysis, and judgment. They are not necessarily representative of other times and locations. We will not accept responsibility for the use or interpretation by others of information presented on this log.

GARY A. FLOWERS, PLLC

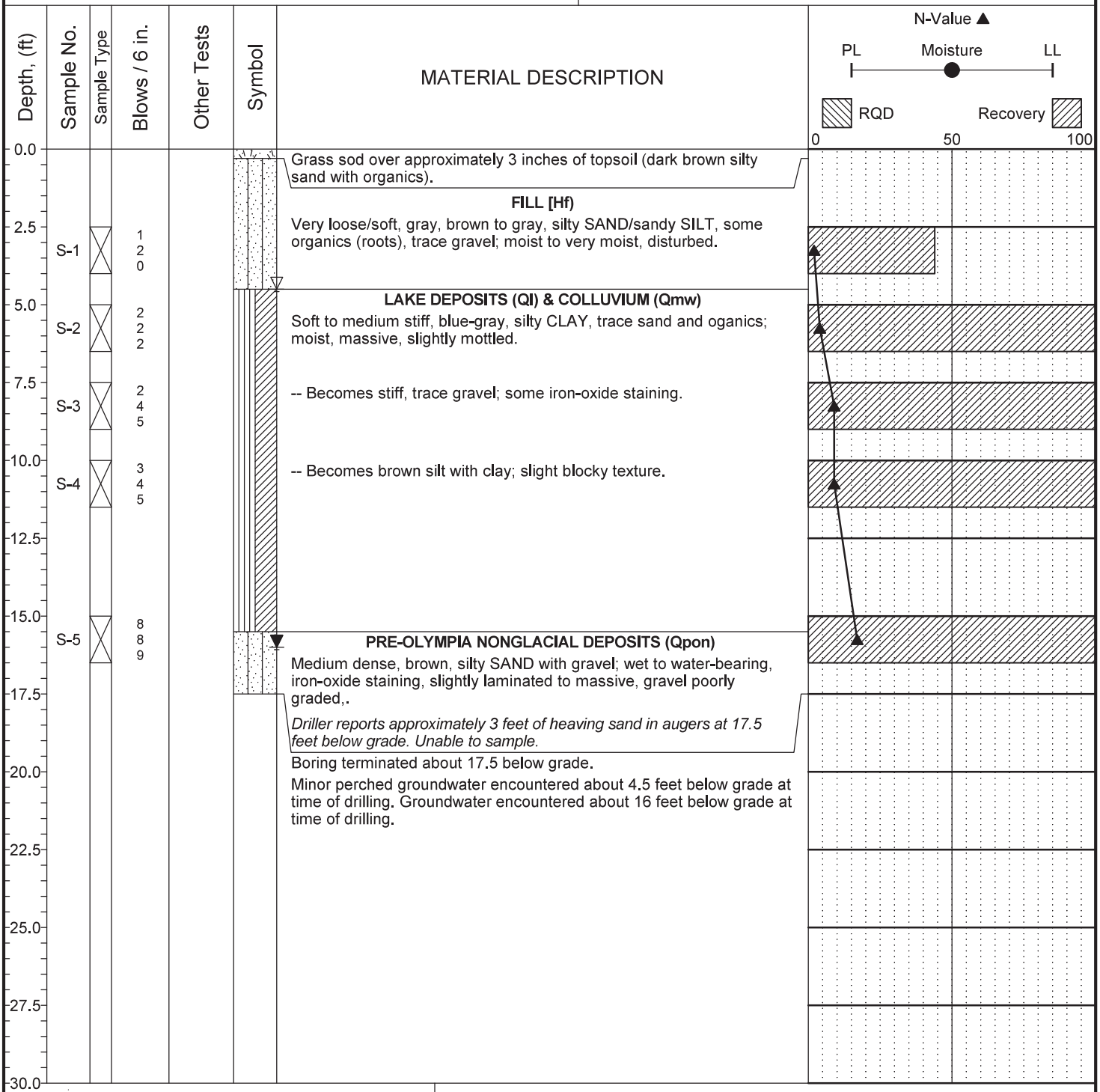
Project: David Do DADU
4649 Forest Ave SE
Mercer Island, WA
AUGUST 2025
PROJECT NO. 23017

JAMES EATON, 1988
4651 FOREST AVE SE
TEST HOLE #2 - APPROXIMNATE ELEVATION 22 FEET

#2

0' -	(6) (9)	Variable brown sandy loam and clayey loam (fill)
2.0' -	(3) (9) (9)	Medium brown sandy clayey silt w/ pockets of silty sand and clasks of clay to 6" across, occasional gravel (ancient slide debris)
4.0' -	(8) (13) (16)	
6.0' -	(6) (15) (20)	Sand grades out
8.0' -	(9) (15) (24)	Light gray silty clay below 8-1.2 ft.
10.0' -	(8) (21) (30)	
12.0' -	(12) (30) (22)	
14.0' -	(8) (13) (26)	Brown well graded sand
15.5' -		Completed 3-1-88; groundwater level at 7.8' 3-2-88' backfilled 3-2-88.

Project:	Zimmer Residence	Surface Elevation:	~22 ft
Job Number:	21-552	Top of Casing Elev.:	n/a
Location:	4661 Forest Ave SE, Mercer Island, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.56205, Easting: -122.23109	Sampling Method:	SPT



Completion Depth:	17.5ft
Date Borehole Started:	12/15/21
Date Borehole Completed:	12/15/21
Logged By:	S. Harrington
Drilling Company:	Geologic Drill Partners

Remarks: Hand-portable Acker drill rig used. Standard Penetration Test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. This surface elevation is estimated from topographic survey prepared by Bush, Roed & Hitchings, Inc., dated June 4, 2021. **Vertical datum: NAVD 88.**

PanGEO INCORPORATED

LOG OF TEST BORING PG-1

Figure A-2

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