GEOTECH
CONSULTANTS, INC.

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July 1, 2024

JN 24233

Shena Lee and Elizabeth Scallon
3450 – 79th Avenue Southeast
Mercer Island, Washington 98040
via email: *shenalee.photography@gmail.com; elizabeth.scallon@gmail.com*

Subject: **Geotechnical and Critical Areas Report**
Proposed Additions
Lee - Scallon Property
3450 – 79th Avenue Southeast
Mercer Island, Washington

Greetings:

This report presents our geotechnical engineering report related to the planned additions to be constructed on the east side of your existing residence. The scope of our services consisted of assessing the site surface and subsurface conditions, and then developing this summary report.

Based on the provided plans, and our discussions with you, additions will be constructed off the northeast and southeast corners of the main floor for an expansion of the dining room and the master bedroom, respectively. These additions will have framed floors overlying a crawl space. No deep excavations are anticipated for the new construction. Due to limited access to the eastern side of the house, all excavation and construction will be accomplished without large equipment.

The City of Mercer Island GIS maps your entire lot as lying within a Potential Landslide Hazard and an Erosion Hazard. There are no steep slopes mapped on, or around, your property. No episodes of slope movement have been documented in the vicinity of the site within recent history.

We visited the subject property on June 28, 2024 to observe the existing site conditions and to conduct subsurface explorations. Overall, the property slopes downward to the west at a gentle to moderate inclination. There are no steep slope areas on, or near, the site. Similar to the single-family homes to the north and south, your house consists of one story overlying a basement floor.

We are familiar with the native subsurface conditions on the property from review of published geologic maps, previous involvement with a similar addition two lots to the south (#3464), and the results of test borings that we conducted in the proposed development area. Published geologic maps indicate that the site is underlain by Glacial Drift, a fine-grained, glacially-compressed soil typically comprised of sandy silt or silty sand. We have found this competent soil on projects located within one block of your property. Test borings were conducted at the locations shown on the attached Site Exploration Plan. These explorations found fill, and layers unconsolidated silt and sandy silt to the maximum 7-foot explored depth. The unconsolidated native silt soils have been deposited over the underlying Glacial Drift by erosion and/or slope movement following the recession of the last glaciers over 10,000 years ago. We expect that loose, uncompacted fill is also present behind the backfilled basement walls of the house. Perched groundwater seepage was encountered at a depth of 6 feet within a sandier zone.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

THIS SECTION CONTAINS A SUMMARY OF OUR STUDY AND FINDINGS FOR THE PURPOSES OF A GENERAL OVERVIEW ONLY. MORE SPECIFIC RECOMMENDATIONS AND CONCLUSIONS ARE CONTAINED IN THE REMAINDER OF THIS REPORT. ANY PARTY RELYING ON THIS REPORT SHOULD READ THE ENTIRE DOCUMENT.

Based on our observations, and available information about the subsurface conditions in the area, it is our opinion that the additions should be supported on deep foundations that extend into the glacially-compressed silt. This avoids excessive settlement of footings that would result from consolidation of the loose, near-surface soils. We recommend that either small-diameter pipe piles or helical piles be used to support the new deck columns. Both of these foundation systems can be installed using hand-carried equipment, and are being commonly used for projects such as this one.

Potential Landslide Hazard Areas: The slopes on and around the site are gentle to moderate. They are not susceptible to instability under static or seismic conditions. As discussed above, the silt soils are not prone to strength loss during an earthquake.

It is our opinion that no buffers or setbacks are required for the planned construction, provided the recommendations presented in this report are followed. The recommendations presented in the report are intended to prevent adverse impacts to the stability of the site and the neighboring properties, and to avoid the planned additions from being damaged by slope movement. The excavations for the new foundations will be shallow, and will not increase the potential for instability on neighboring properties.

Erosion Hazard Areas: The site meets the City of Mercer Island's criteria for an Erosion Hazard Area. However, the erosion potential related to this project is low, due to the limited ground disturbance anticipated. The temporary erosion control measures needed during the site development will depend heavily on the weather conditions that are encountered during the site work. One of the most important considerations, particularly during wet weather, is to immediately cover any bare soil areas to prevent accumulated water or runoff from the work area from becoming silty in the first place. A straw wattle or wire-backed silt fence should be erected as close as possible to the planned work areas, and the existing vegetation around the work area should be left in place. Soil stockpiles should be minimized. Following rough grading, it may be necessary to mulch or hydroseed bare areas that will not be immediately covered with landscaping or an impervious surface.

We provide the following "statement of risk" to satisfy City of Mercer Island conditions:

"It is our professional opinion that the development practices proposed in this report for the new development would render the alteration as safe as if it were not located in a geologic hazard area."

If the interior crawl space grades for the additions are below the final surrounding grade, it would be appropriate to install footing drains around the additions.

We recommend including this report, in its entirety, in the project contract documents. This report should also be provided to any future property owners so they will be aware of our findings and recommendations.

SEISMIC CONSIDERATIONS

In accordance with the International Building Code (IBC), the site class within 100 feet of the ground surface is best represented by Site Class Type D (Stiff Soil).

The IBC and ASCE 7 require that the potential for liquefaction (soil strength loss) during an earthquake be evaluated for the peak ground acceleration of the Maximum Considered Earthquake (MCE), which has a probability of occurring once in 2,475 years (2 percent probability of occurring in a 50-year period). The glacially-compressed soils beneath the site that will support the pipe or helical piles are not susceptible to seismic liquefaction under the ground motions of the MCE because of their compact nature and high internal strength. The looser silt soils closer to the ground surface are also not prone to liquefaction, due to their fine-grained composition.

PIPE PILES

A 2-inch-diameter pipe pile driven with a minimum 90-pound jackhammer or a 140-pound Rhino hammer to a final penetration rate of 1-inch or less for one minute of continuous driving may be assigned an allowable compressive load of 3 tons. Load tests are not required to verify this allowable capacity.

Extra-strong steel pipe should be used. The site soils are not highly organic, and are not located near salt water. As a result, they do not have an elevated corrosion potential. Considering this, it is our opinion that standard “black” pipe can be used, and corrosion protection, such as galvanizing, is not necessary for the pipe piles. Subsequent pipe sections should be connected together using threaded or slip couplers, or by welding. If slip couplers are used, they must fit snugly into the ends of the pipes. This can require that shims or beads of welding flux be applied to the couplers.

Pile caps and grade beams should be used to transmit loads to the piles. Any isolated pile caps should contain at least two piles.

HELICAL PILES

Helical piles consist of single or multiple helixes that are rotated into the ground on the end of round or square metal shafts. These anchors can be used to support both compression and tension loads, but their lateral capacity is negligible due to the relatively small diameter of the metal shafts. The design capacity of single helix anchors is the allowable soil bearing capacity on the helix area. Multiple-helix anchors are typically assumed to have a design capacity equal to the sum of the allowable bearing capacity on each helix, if they are separated more than three helix diameters.

The minimum diameter of a single helix anchor is 8 inches. The ultimate capacity of the anchor in tension or compression can be estimated roughly by multiplying the installation torque by 10. A typical anchor capacity for a double-helix anchor in the expected soil conditions would be 12 to 15 kips if installed to a final torque of 2,400 to 3,000 foot-pounds.

The anchors should be installed by a specialty contractor familiar with the design and installation of chance systems. The contractor can assist with refining the anchor design and details and estimating capacities for different soil and anchor conditions.

LIMITATIONS

This report has been prepared for the exclusive use of the Shena Lee and Elizabeth Scallon, and their representatives, for specific application to this project and site. Our conclusions and recommendations are professional opinions derived in accordance with our understanding of current local standards of practice, and within the scope of our services. No warranty is expressed or implied. The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. Our services also do not include assessing or minimizing the potential for biological hazards, such as mold, bacteria, mildew and fungi in either the existing or proposed site development.

ADDITIONAL SERVICES

In addition to reviewing the final plans, Geotech Consultants, Inc. should be retained to provide geotechnical consultation, testing, and observation services during construction. This is to confirm that subsurface conditions are consistent with those indicated by our exploration, to evaluate whether earthwork and foundation construction activities comply with the general intent of the recommendations presented in this report, and to provide suggestions for design changes in the event subsurface conditions differ from those anticipated prior to the start of construction. However, our work would not include the supervision or direction of the actual work of the contractor and its employees or agents. Also, job and site safety, and dimensional measurements, will be the responsibility of the contractor.

During the construction phase, we will provide geotechnical observation and testing services when requested by you or your representatives. Please be aware that we can only document site work we actually observe. It is still the responsibility of your contractor or on-site construction team to verify that our recommendations are being followed, whether we are present at the site or not.

We appreciate the opportunity to be of service on this project. Please contact us if you have any questions, or if we can be of further assistance.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

Marc R. McGinnis, P.E.
Principal

7/01/2024

Attachments:

- Vicinity Map
- Site Exploration Plan
- Test Boring Logs
- Footing Drain Detail

cc: **I.B.I. Company**
via email: ibicompany@comcast.net

MRM:kg

NORTH

(Source: Microsoft MapPoint, 2013)

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VICINITY MAP

3450 - 79th Avenue S.E.
Mercer Island, Washington

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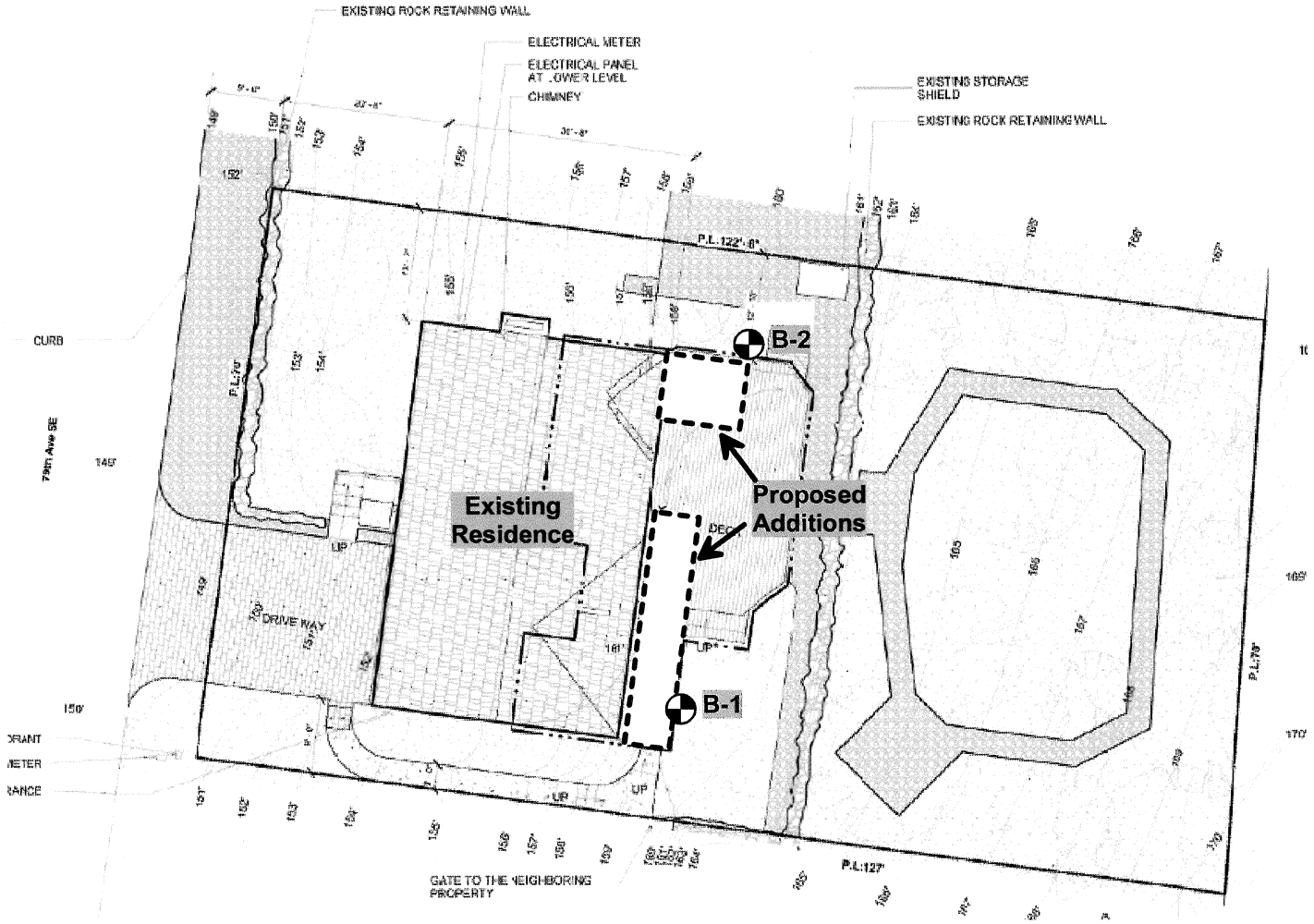

Legend:

Test Boring Location

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SITE EXPLORATION PLAN

3450 - 79th Avenue S.E.
Mercer Island, Washington

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TEST BORING 1

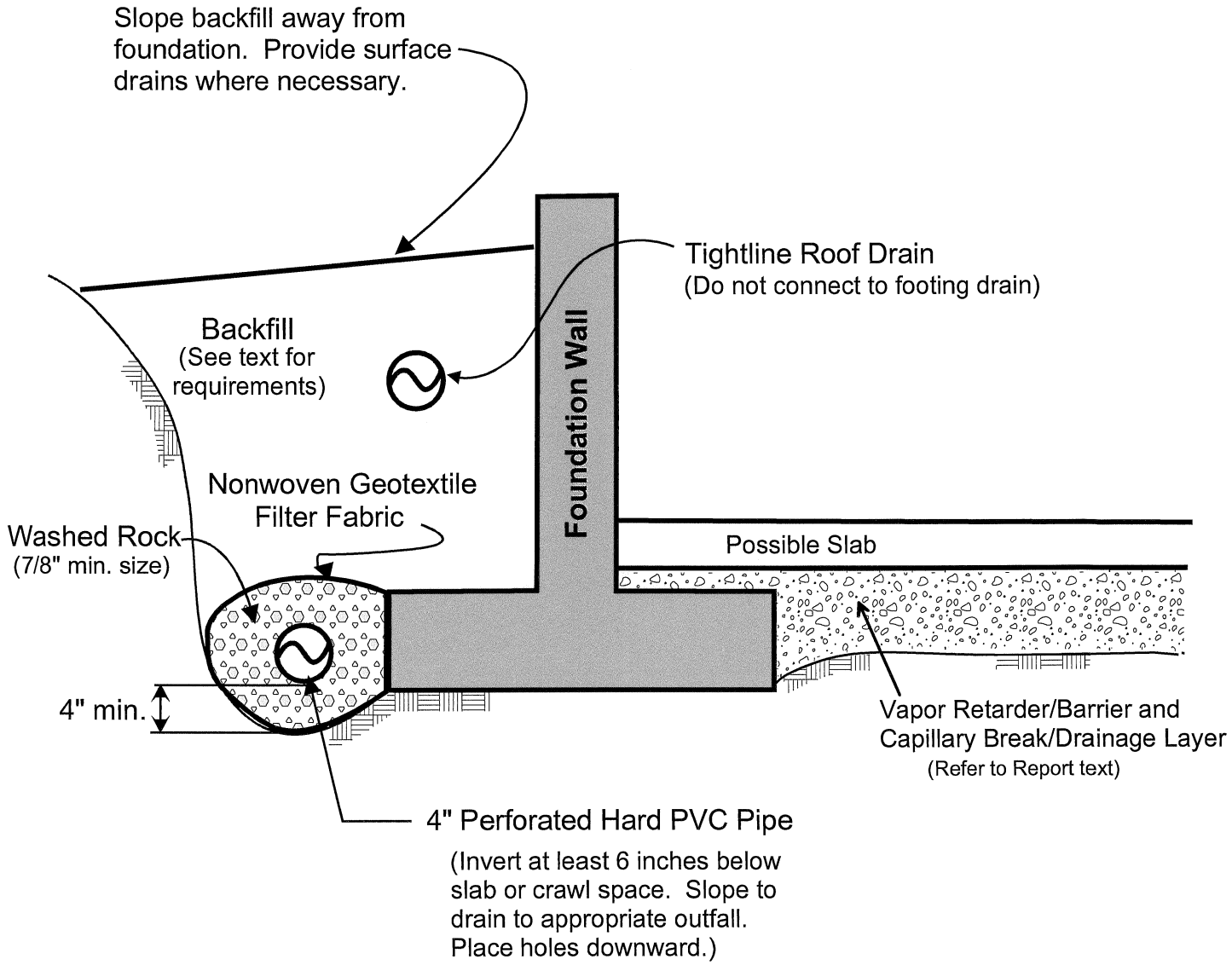
Depth (feet)	Soil Description
0 – 3.0	Bark over Olive-brown, mottled, slightly clayey SILT with organics, very moist, medium-stiff (Colluvium)
3.0 – 4.5	Bluish-gray, mottled, slightly clayey SILT with organics, low-plasticity, very moist, medium-stiff (Colluvium)
4.5 – 7.0	Olive-brown, slightly clayey SILT with organics, very moist, medium stiff (Colluvium) - becomes slightly sandy and wet at 6 feet

Test Boring was terminated at a depth of 7.0 feet on June 28, 2024.
Groundwater seepage was observed at 6.0 feet.

TEST BORING 2

Depth (feet)	Soil Description
0 – 2.0	Brown, mottled, slightly clayey SILT, low plasticity, very moist, loose (FILL)
2.0 – 3.0	Olive-brown, slightly clayey, SILT, low plasticity, very moist, medium-stiff (Colluvium)

Test Boring was terminated at a depth of 3.0 feet on June 28, 2024.
No groundwater seepage was observed.



NOTES:

(1) In crawl spaces, provide an outlet drain to prevent buildup of water that bypasses the perimeter footing drains.

(2) Refer to report text for additional drainage, waterproofing, and slab considerations.

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FOOTING DRAIN DETAIL

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