

August 27, 2024

JN 24306

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via email: akihideu@gmail.com

Subject: **Foundation and Critical Area Considerations**
Proposed Outdoor Living Spaces
Uchida Residence
4300 – 89th Avenue Southeast
Mercer Island, Washington

Greetings:

This report presents our geotechnical engineering report related to the planned work associated with outdoor living spaces 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 information provided by David Reed Cahill, a new covered deck will be constructed off the east side of the southern approximately one-fourth of the house. The existing elevated deck located to the north of this new covered deck will be reconstructed. This reconstructed deck will likely not be covered. Off the north half of the house, a new covered patio will extend out from the east side of the residence. New isolated footings will be constructed for the roofs and decks. The amount of excavation/grading anticipated for the new construction will be limited in area.

The City of Mercer Island GIS maps your entire lot as lying within a Potential Seismic Hazard area, which is related to the potential for liquefaction (soil strength loss) to occur during a large earthquake. The GIS does not indicate any other geologically critical areas on, or near, your property.

We visited the subject property on August 26, 2024 to observe the existing site conditions and to evaluate subsurface conditions in several test holes that had been excavated in the footprint of the planned new construction. The entire lot and the surrounding area are relatively flat, with a very slight slope down toward the north.

We are familiar with the native subsurface conditions on the property from review of published geologic maps, explorations that our firm has completed in close proximity to the site, and the results of explorations conducted during our site visit. Our firm has completed geotechnical studies and observed foundation excavations for projects located within a one to 2 block radius of your property. Four test holes had been excavated to the east of your house, and we were able to assess the conditions in each of these explorations. The conditions observed were consistent with our expectations from our previous work. The test holes exposed 12 inches of topsoil and 18 inches of loose, heavily-weathered silty sand underlain by dense Glacial Till. The Glacial Till consists of a gravelly, silty, fine-grained sand that has been glacially compressed. This dense, cemented soil is commonly referred to as hardpan. No groundwater seepage was encountered in

the test holes. However, the explorations were conducted in summer, and localized subsurface water is often found perched on top of the impervious Glacial Till following extended wet weather.

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, the site is underlain by highly-competent Glacial Till soils. The foundations for the new deck, stairs, and front porch should be supported using footings that bear on the Glacial Till.

Seismic Hazard Area: The glacially-compressed soils beneath the site that will support the planned new construction are not susceptible to seismic liquefaction. Beyond bearing the footings on competent Glacial Till, no mitigation measures are needed to address the Seismic Hazard mapping.

The site does not meet the City of Mercer Island's criteria for an Erosion Hazard Area. Considering the limited ground disturbance planned, and the existing site conditions, the potential for significant soil erosion from the planned development is low. 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. The existing vegetation around the work area should be left in place wherever possible. It will be important to avoid tracking soil and/or mud onto the neighboring streets. Soil stockpiles should be minimized and should be covered in wet weather. 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.

The Glacial Till soils underlying the site are impervious to the downward percolation of water. As a result, the use of onsite infiltration to dispose of stormwater runoff is infeasible. We understand that splash blocks will be utilized for the new roof areas. Considering the presence of your large grass-covered yard to the east of the development, this dispersion method appears for handling any new roof runoff.

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."

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 C (Very Dense 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 dense, glacially-compressed soils beneath the site that will support the footings are not susceptible to seismic liquefaction under the ground motions of the MCE because of their compact nature and high internal strength.

CONVENTIONAL FOUNDATIONS

The proposed new construction can be supported on conventional continuous and spread footings bearing on undisturbed, dense, native soil. We recommend that continuous and individual spread footings have minimum widths of 12 and 16 inches, respectively. Exterior footings should also be bottomed at least 18 inches below the lowest adjacent finish ground surface for protection against frost and erosion. The local building codes should be reviewed to determine if different footing widths or embedment depths are required. Footing subgrades must be cleaned of loose or disturbed soil prior to pouring concrete. Depending upon site and equipment constraints, this may require removing the disturbed soil by hand.

An allowable bearing pressure of 2,500 pounds per square foot (psf) is appropriate for footings supported on dense, native soil. A one-third increase in this design bearing pressure can be used when considering short-term wind or seismic loads. For the above design criteria, it is anticipated that the total post-construction settlement of footings founded on competent native soil will be less than one-inch, with differential settlements on the order of one-quarter-inch in a distance of 25 feet along a continuous footing with a uniform load.

Lateral loads due to wind or seismic forces may be resisted by friction between the foundation and the bearing soil, or by passive earth pressure acting on the vertical, embedded portions of the foundation. For the latter condition, the foundation must be either poured directly against relatively level, undisturbed soil or be surrounded by level, well-compacted fill. We recommend using the following ultimate values for the foundation's resistance to lateral loading:

PARAMETER	ULTIMATE VALUE
Coefficient of Friction	0.40
Passive Earth Pressure	300 pcf

Where: pcf is Pounds per Cubic Foot, and Passive Earth Pressure is computed using the Equivalent Fluid Density.

If the ground in front of a foundation is loose or sloping, the passive earth pressure given above will not be appropriate. The above ultimate values for passive earth pressure and coefficient of friction do not include a safety factor.

LIMITATIONS

This report has been prepared for the exclusive use of Akihide Uchida, and his 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

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.



8/27/2024

Marc R. McGinnis, P.E.
Principal

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