

November 11, 2021

JN 21452

Timothy Blood and Georgia Miller
2420 – 63rd Avenue S.E.
Mercer Island, Washington 98040
via email: georgiam2420@gmail.com

Subject: **Foundation and Critical Area Considerations**
Proposed Residential Additions
2420 – 63rd Avenue S.E.
Mercer Island, Washington

Greetings:

This report presents our geotechnical engineering report related to the planned work associated with expansion of your existing home. The scope of our services consisted of assessing the site surface and subsurface conditions, and then developing this summary report.

Based on our discussions with Clint Bailey of Rain City Architecture, we expect that an addition will be constructed on the eastern side of your home. This expansion will be at the main floor level of your existing house and will be one story in height. The addition will have an office space off the northeast corner of the house and a sunroom off the southeast corner, with a bathroom expansion and hallway added between these two rooms. No deep excavation is expected for the planned work, which will likely be completed all, or mostly, using manual methods due to very limited access around the house.

The City of Mercer Island GIS maps your entire lot as a Potential Landslide Hazard, while only the eastern half of the lot is mapped as an Erosion Hazard. There are no steep slopes mapped on, or around, your property.

We visited the subject property on November 8, 2021 to observe the existing site conditions. Your residence consists of two stories overlying a shallow basement that underlies the entire footprint. There is a driveway sloping down to the one-car garage that occupies the northern one-third of the basement. The area around the house is landscaped. Most of the property slopes gently downward toward the west to 63rd Avenue S.E. Along the eastern edge of the property is a short, moderately-sloped area rising to the rear yard of your eastern neighbor. This sloped area contains several established trees. We saw no indications of recent slope movement on this short slope. From our 35+ years of providing geotechnical services on Mercer Island, we are not aware of any large-scale episodes of slope movement in the site vicinity, which is known to be underlain by competent glacially compressed soils. Review of aerial photographs on King County's iMap website shows trees covering the eastern slope back to at least 1936 (old photograph), with no indications of bare or disturbed areas that would be indicative of slope movement.

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 previously on your southern neighbor's property by another geotechnical firm. The geologic mapping indicates that this area is underlain by glacial till, a highly-

competent, glacially-compressed mixture of gravel, silt, and fine-grained sand. Our firm has completed explorations and observations of excavations for houses located four lots to the south, and two lots due west of your property. These projects encountered glacially-compressed soils consisting of silt or gravelly, silty sand (glacial till). Test holes conducted previously on your southern neighbor's property were also available from the City of Mercer Island's GIS. These explorations encountered glacial till and/or glacially-compressed silt within a few feet of the ground surface. Based on our site observations, the near-surface soil in the area of the additions will be fill that was placed to backfill the eastern foundation wall of the house. This soil will not be well-compacted, and its depth will increase closer to the house. Shallow groundwater seepage was encountered in one of the test holes conducted previously on your southern neighbor's property. It is relatively common to encounter at least localized zones of subsurface water perched on top of the impervious glacially-compressed soils 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.

The site and surrounding area are underlain by competent, glacially-compressed native soils. However, several feet of fill and loose soils are present in the area of the eastern expansion of the house. Excavating to reach dense soils in the area of the addition does not appear feasible, and the new construction must not bear on the backfill, in order to prevent excessive post-construction settlement. We recommend that the new addition, including the floors of the new construction, be supported on 2-inch-diameter pipe piles, which would be driven to refusal in the glacially-compressed soils using portable jackhammers.

The underlying glacially-compressed soils beneath the site are not susceptible to seismic liquefaction. The pipe piles will be driven through the fill and any loose upper soils and will be embedded into this dense, non-liquefiable native soil layer.

The planned addition is not close to any steep or tall slope areas. The dense to very dense, glacially-compressed soils that underlie the site are not susceptible to instability, even during a strong earthquake. The stability of the short slope on the eastern side of the site will not be adversely affected by the shallow excavations needed for the new development. This sloped area also does not pose a risk to the planned new construction. No buffer or other mitigation measures are required to address the Potential Landslide Hazard mapping of the site.

The site disturbance for the proposed development will be limited, and will occur primarily on gently-slope ground. The mapped Erosion Hazard can be mitigated by implementing proper temporary erosion control measures that will depend heavily on the weather conditions that are encountered. We anticipate that a silt fence will be needed around the downslope sides of any work areas. Existing ground cover and landscaping should be left in place wherever possible to minimize the amount of exposed soil. Small soil stockpiles should be covered with plastic during wet weather. Soil and mud should not be tracked onto the adjoining streets, and silty water must be prevented from traveling off the site. It should be possible to complete the planned addition during the wet season without adverse impacts to the site and neighboring lots. On most construction projects, it

is necessary to periodically maintain or modify temporary erosion control measures to address specific site and weather conditions.

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 development 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 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 dense soils beneath the site are not susceptible to seismic liquefaction under the ground motions of the MCE because of the absence of near-surface groundwater.

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. In general, a minimum of two piles should be used in isolated pile caps, in order to prevent eccentric loading on individual piles.

LIMITATIONS

This report has been prepared for the exclusive use of Timothy Blood and Georgia Miller, 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.



11/11/2021

Marc R. McGinnis, P.E.
Principal

cc: **Rain City Architecture** – Clint Bailey
via email: clint@raincityarchitecture.com

MRM:kg