

September 28, 2022

JN 22338

Mercer Island Country Club
8700 S. E. 71st Street
Mercer Island, Washington 98040

Attention: Dorrinda Pierce

Sent To: Rain City Architecture – Clint Bailey
via email: clint@raincityarchitecture.com

Subject: **Geotechnical Report**
Proposed Tennis Court Shelter
Mercer Island Country Club
8700 S.E. 71st Street
Mercer Island, Washington

Greetings:

This report presents our geotechnical engineering report findings related to the planned inflatable tennis court shelter to be erected on the eastern portion of the Mercer Island Country Club (MICC) property. The scope of our services consisted of assessing the site surface and subsurface conditions, and then developing this summary report.

Based on the provided drawings, an inflatable shelter will be installed over the northern four of the eight outdoor tennis courts currently located on the eastern end of the MICC property. The courts themselves will be resurfaced, but will not be expanded. Selective demolition of existing features, such as removal of small concrete walls along the north and south sides of the four tennis courts, and cutting/coring the paved surface for utilities and supports for the shelter will be needed. Small concrete pads will be poured for the air handling equipment, and at the ingress/egress doorways. Other than potential excavations for these new foundation/slab elements, and a drainage system to handle runoff from the shelter, no significant grading is expected for this project. Lateral loads acting on the cover, such as from wind, will be resisted by inclined helical anchors installed around the entire perimeter.

The City of Mercer Island GIS maps the area of the eight tennis courts as a potential seismic hazard area. The remainder of the MICC property, as well as the surrounding neighborhoods and the commercial property to the north of the site (Mercer Island Village Shopping Center) are not mapped as potential seismic hazard areas. There are no other geologically critical areas mapped within at least 600 feet of the planned development areas.

We visited the subject property on September 10, 2022 to observe the existing site conditions. The ground surface on the MICC property is relatively flat, with some gentle undulations. This is consistent with the surrounding area. The tennis courts themselves are situated immediately east of the main building and the outdoor swimming pool. Based on our observations, at least portions of the tennis courts were originally filled a few feet above the pre-existing grades. However, there are no steep or tall slopes around the courts.

We are familiar with the subsurface conditions on the site from: 1) geotechnical studies our firm has completed for projects surrounding this site, 2) explorations conducted for a geotechnical study on the western portion of the MICC property, and 3) review of geologic mapping for the area. We have provided geotechnical engineering services for projects in the surrounding neighborhoods, as well as within the Mercer Island Shopping Center property. Test pits were conducted on the west end of the MICC complex for a geotechnical study completed in 1983 by Earth Consultants.

Based on this information, we know that the native soils beneath the site consist of a few feet of topsoil and weathered, silty sand overlying dense to very dense silty sand with varying amounts of gravel. This dense to very dense soil has been glacially compressed, and is referred to as Glacial Drift or Glacial Till. As noted above, it appears likely that up to a few feet of fill was placed over the native soils for the outdoor tennis courts. Sometimes, localized zones of subsurface water can be found perched on top of the dense to very dense soils, which are essentially impervious. This seasonal perched water table is usually not very thick, and often goes away near the end of dry summer 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 glacially-compressed soils that are highly competent and will not experience strength loss (liquefaction) in the event of an earthquake. The potential for liquefaction of the fill and looser soils is negligible, as the soil has to be saturated by a relatively thick water table. Any seasonal water table present below the site would be thin enough that excess pore pressure could drain away quickly in an earthquake, eliminating the hazard of liquefaction. Considering our findings, it is our professional opinion that there is no seismic hazard area under the planned development area, or the remainder of the MICC property.

The helical anchors that will be installed to provide lateral support for the new shelter will be embedded into the dense to very dense, non-liquefiable soils.

Seismic Hazard: The underlying glacially-compressed soils beneath the site are not susceptible to seismic liquefaction. No additional measures, beyond what are recommended in this report, are necessary to address the mapped seismic hazard.

Erosion Hazard: The site does not lie in mapped erosion hazard area and the amount of site disturbance for the proposed development will be limited. Proper temporary erosion control measures will depend heavily on the weather conditions that are encountered. 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. 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 will 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.

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, glacially-compressed 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.

HELICAL ANCHORS

Helical anchors consist of single or multiple helices 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 the lateral capacity for vertical anchors in bending 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 (pounds) of the anchor in axial tension or compression can be estimated roughly by multiplying the installation torque in foot-pounds by 10. Using this correlation to torque, an ultimate capacity of at least 2 times the allowable capacity should be achieved. A typical allowable anchor capacity for mid-size anchors in the site soils is 15 to 25 kips, and it will likely require multiple helices to achieve these capacities. The uppermost helix should be embedded at least 5 feet below the existing ground surface.

The anchors should be installed by a specialty contractor familiar with design and installation of anchor systems. The contractor can assist with refining the anchor design and details and estimating capacities for different soil and anchor conditions. It is often necessary to modify helix configurations and even installation techniques to address conditions during installation, especially when dense soils and/or bedrock are present at shallow depths.

LIMITATIONS

This report has been prepared for the exclusive use of the Mercer Island Country Club, 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

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.



9/28/2022

Marc R. McGinnis, P.E.
Principal

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