GEOTECH
CONSULTANTS, INC.

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May 14, 2019

JN 15442

Scott Peyree
6059 – 77th Avenue Southeast
Mercer Island, Washington 98040
via email: speyree@qw-corp.com

Subject: **Design Considerations for Pipe Piles and Helical Anchors**
Proposed Remodel of Existing Residence
6059 – 77th Avenue Southeast
Mercer Island, Washington

Dear Mr. Peyree:

From our discussions with Gelotte Hommas Drivdahl, we understand that remodeling of your existing residence will involve the installation of at least two steel moment frames on the western side of the structure. The foundations for these frames will be located behind a backfilled exterior patio. Based on our observations of site conditions, and the explorations conducted as a part of our May 24, 2017 *Geotechnical Engineering Study*, we expect that an unknown thickness of fill is present over the dense, native soils behind this wall. Rather than attempting to excavate deep enough to reach these competent soils, we have recommended that the new foundations be supported on driven 3- or 4-inch-diameter pipe piles. Recommendations for compressive capacities and installation techniques for these piles are presented in our May 24, 2017 report, and can be used for design of the new foundations.

The pipe piles will not provide any substantial uplift resistance. In order to resist the uplift loads on the frame foundations, we recommend that helical anchors be installed into the competent native soils. Helical anchors consist of single or multiple helixes that are rotated into the ground on the end of round or square metal shafts. The edge-to-edge spacing of the helices must be no less than 3 times the diameter of the largest helix. If necessary, the helical anchors could be battered slightly from vertical to obtain the recommended minimum spacing to avoid group effects. 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 minimum diameter of a single helix anchor is 6 inches, and a special helix intended to be installed into glacial till soils may be used. We expect that at least a double-helix anchor consisting of 6- and 8-inch helices may be necessary. It should be possible to achieve an allowable tensile capacity of at least 20 kips (10 tons). The ultimate capacity of the anchor in tension or compression, as measured in pounds, can be estimated roughly by multiplying the installation torque in ft-pounds by 10. A safety factor of at least 2.0 should then be applied to this ultimate capacity. As a result, an installation torque of approximately 4,000 ft-pounds must be achieved for an allowable anchor capacity of 20 kips. The contractor may need to refine the anchor and shaft design to achieve the desired capacity, depending of the soil and anchor conditions.

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.

05/14/19

Marc R. McGinnis, P.E.
Principal

cc: **Gelotte Hommas Drivdahl** – David Grubb
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Dibble Engineers – Richard Hawksworth
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