R&R Foundation Specialist
1611 E Marine View Dr
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Statement of Risk

Code information for the required Statement of Risk is as follows:

Per Section 19.07.160B3 of the Mercer Island City Code, development within geologic hazard areas require that a Geotechnical Engineer licensed within the State of Washington provide a statement of risk with supporting documentation indicating that one of the following conditions can be met:

3. Alteration of landslide hazard areas, seismic hazard areas and associated buffers may occur if the conditions listed in subsection (B)(3) of this section are satisfied and the geotechnical professional provides a statement of risk matching one of the following:

a. An evaluation of site-specific subsurface conditions demonstrates that the proposed development is not located in a landslide hazard area or seismic hazard area;

b. The landslide hazard area or seismic hazard area will be modified or the development has been designed so that the risk to the site and adjacent property is eliminated or mitigated such that the site is determined to be safe;

c. Construction practices are proposed for the alteration that would render the development as safe as if it were not located in a geologically hazardous area and do not adversely impact adjacent properties; or

d. The development is so minor as not to pose a threat to the public health, safety and welfare.

Based on our analysis, the site meets the criteria of item D. The underpinning is very minor and associated with the foundation elements only. This work will not affect geologic hazards if erosion control measures are in place until completion and there is proper geotechnical oversight**.**

Conclusions and Recommendation

Based on our observations, it appears likely that the settlement is likely the result of consolidation of weathered soils below the affected areas. This is common near slope faces as excavations often do not fully remove weathered soils that are at greater depths due to the topography changes (slopes downward).

It appears that the site was inadequately stripped of loose soils during construction. Contributing factors could be downspout leakage into the near surface soils, age of the foundation (1967), and inadequately designed foundations for the soil conditions.

The proposed mitigation utilizing helical anchors with steel connections appears suitable to reduce settlement and support the affected portions of the residence. Based on our observations, we anticipate that helical anchors may extend 7 to 15 feet (or more) below grade with an average of 12 feet.

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Excavations required for pier placement will likely be 4 feet or less. There appears to be adequate space for these excavations from the adjacent property lines. We recommend a maximum temporary slope magnitude of 1H:1V (horizontal to vertical).

Helical Piers®

Helical Piers® may be used to support the foundation systems of the residence. The Helical Piers® could be installed using portable rotary tools, truck mounted rotary tools, backhoe mounted rotary tools, caisson drills, or skid-steer loaders. It is important that the torque output, rotational speed, down pressure capability, and angle control of the installation equipment is compatible with the required foundation system. The pile installation equipment should have adequate torque capacity to prevent refusal conditions at relatively shallower depths that are well above recommended bearing depths or layers.

A Helical Pier® consists of an anchor (lead section) with 1, 2, 3 or more helical flights on a shaft. The number and diameter of the helices on the anchor are dependent on the soil characteristics of the site and the design loads to be applied to the pier. Based on these parameters the anchor helix configuration is chosen to best fit the site conditions.

As the anchor is advanced into the soil extension sections (shaft) are placed on the lead section. The shaft configuration is based on the design loads and anticipated installation torque.

The static compression load capacity of a Helical Pier® is the sum of all individual helix capacities below liquefiable soils and in bearing layer. Individual helix static compression capacity is the result of the projected area of the helix, and its bearing pressure.

It is recommended that the piers penetrate into relatively dense native soils a minimum of 7 feet, or until refusal whichever is shallower. The bearing layer will be at variable depths below the existing ground surface due to previously natural slope conditions (anticipated to be 7 to 15 feet (estimated only)). Increased capacity can be obtained with increased penetration, and additional helical flights on the lead section.

Helical Pier® installation should be monitored to verify installation torque, and proper embedment into the presumed bearing layer. The Helical Pier® lengths may need to be modified during construction if it is determined that the depth to the bearing layer varies. Helical Pier® anchors are well suited to field adjustments as length can be varied by merely adding or deleting extension sections (shafts) during installation.

Monitoring installation torque in the field is used to estimate the anchor compression capacity, and also as a quality control during anchor installation, provided that the anchor is bearing in dense or hard soils. Dependent on the pile size and the equipment used to install the anchors, an empirical factor is multiplied by the average torque over the final 3 feet of installation to estimate ultimate capacity.

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Allowable Helical Pier Compression Capacity Pa may be estimated from the following equation provided that the pier is in the recommended bearing soils:

Pa = Kt x T/FoS,

Where T is the applied torque, Kt is the empirical ratio factor. The following industry standards apply to shafts with blades spaced along the shaft at 2.5 to 3.5 times the average blade diameter on center and meeting the manufacturer's specifications. 1.5" and 1.75" Square Shafts - Kt = 9 ft-1 2.875" O.D. Round Shafts - Kt = 9 ft-1 3.0" O.D. Round Shafts - Kt = 8 ft-1 3.5" O.D. Round Shafts - Kt = 7 ft-1 Proof testing of at least three percent of the helical piers in eight equal increments up to 200 percent of the design load, if required by the permitting authority. Each load increment up to the 200 percent of design load should be held for five (5) minutes and the vertical strain monitored. If the total strain between 1 and 5 minutes is less than 0.04 inches, the helical pier may be considered acceptable. If the recorded strain exceeds 0.04 inches, the helical pier should either be deepened and retested or abandoned and a new helical pier shall be installed and tested.

Closure

The information presented herein is based upon professional interpretation utilizing standard practices and a degree of conservatism deemed proper for this project. We emphasize that this report is valid for this project as outlined above and for the current site conditions and should not be used for any other site.