GEOTECH
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November 13, 2023

JN 23396

GM Investment Group, LLC
P.O. Box 32
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Attention: Will Mentor
via email: wmentor@gm-ig.com

Subject: **Foundation Design Criteria and Evaluation of Infiltration Feasibility**
Proposed Residence and DADU
2740 – 61st Avenue S.E.
Mercer Island, Washington

Greetings:

This report presents our geotechnical conclusions related to foundation design and the feasibility of onsite infiltration of storm water for the planned redevelopment of the subject lot. On November 12, 2023, the undersigned principal geotechnical engineer visited the site to assess the subsurface conditions. The west and east sides of the lot abut 61st Avenue S.E. and 62nd Avenue S.E., respectively. The existing residence is located in the western portion of the lot. The subject property, as well as the surrounding lots, generally slopes gently down toward the west. There are no steep slopes on, or near, the site. Our review of the Mercer Island GIS indicates that there are no mapped geologic Critical Areas on the site, or in the surrounding area.

Our firm has previously conducted subsurface explorations and observed foundation excavations for several projects within a one block radius of the subject property. Four test holes were completed on the property at the approximate locations shown on the attached Site Exploration Plan. These test holes found topsoil and a layer of heavily-weathered silt overlying dense, glacially-compressed silt. These are typical soil conditions for the area. No groundwater seepage was encountered in the test holes. However, perched seepage is often found on top of the dense silt following extended wet weather.

The following is a log of the four test holes:

Depth (feet)	Description
0 – 1.0	Topsoil
1.0 – 2.5	Orangish-brown, mottled SILT, low plasticity, very moist, loose
2.5 – 3.5	Grayish-brown SILT, low plasticity, very moist, dense

No seepage was observed in the test holes.

CONCLUSIONS AND RECOMMENDATIONS

Based on the conditions observed in the test holes and surrounding excavations, and our previous experience with other projects in the immediate vicinity, it is our professional opinion that conventional foundations can be utilized for the proposed residence and DADU. All footing areas

will have to be excavated down to the dense, native, glacially-compressed soil. This may require overexcavation below the planned footing grades. We recommend that the footings be excavated using a smooth bucket, in order to prevent the subgrade disturbance that can result from the teeth on an excavator's bucket. Where overexcavation below the planned footing grades is necessary, the additional excavation can be backfilled to the planned footing grade using compacted quarry spalls or railroad ballast rock.

The silt soils will be easily disturbed once they are exposed. As a result, we recommend that the footing subgrades be protected with a layer of clean crushed gravel, in order to prevent disturbance and softening of the bearing soils during the placement of foundation forms and rebar.

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) 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 soil that will support the foundations is not susceptible to seismic liquefaction under the ground motions of the MCE.

CONVENTIONAL FOUNDATIONS

The proposed structures can be supported on conventional continuous and spread footings bearing on undisturbed, dense soil, or on compacted crushed rock structural fill placed above this competent native soil. Prior to placing any structural fill beneath foundations, the excavation should be observed by the geotechnical engineer or building inspector to document that adequate bearing soils have been exposed.

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.

Depending on the encountered soil conditions, overexcavation may be required below the footings to expose competent native soil. Unless lean concrete is used to fill an overexcavated hole, the overexcavation must be at least as wide at the bottom as the sum of the depth of the overexcavation and the footing width. For example, an overexcavation extending 2 feet below the bottom of a 2-foot-wide footing must be at least 4 feet wide at the base of the excavation. If lean concrete is used, the overexcavation need only extend 6 inches beyond the edges of the footing.

An allowable bearing pressure of 2,500 pounds per square foot (psf) is appropriate for footings supported on competent 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-half-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.

EVALUATION OF INFILTRATION FEASIBILITY

The dense soil known to underlie this area, and which was observed in the test hole is glacially compressed.

There are no large or continuous pore spaces in the glacially-compressed silt that can transmit water. This soil is essentially impermeable, preventing water from percolating downward, which often causes a perched water table to form following extended heavy rainfall. This perched groundwater condition has been encountered previously on nearby sites.

Considering the observed soil conditions, and the likely presence of seasonal shallow perched groundwater, it is our professional opinion that infiltration of runoff from impervious surfaces is infeasible for this site. Attempting to infiltrate or disperse runoff from impervious surfaces on the site would only increase the potential for surface and subsurface drainage problems on neighboring properties, as well as the adjacent streets.

Please contact us if you have any questions regarding this report.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

Marc R. McGinnis, P.E.
Principal

Attachments: Vicinity Map, Site Exploration Plan 11/13/2023

MRM:kg

(Source: Microsoft MapPoint, 2013)

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VICINITY MAP

2740 - 61st Avenue S.E.
Mercer Island, Washington

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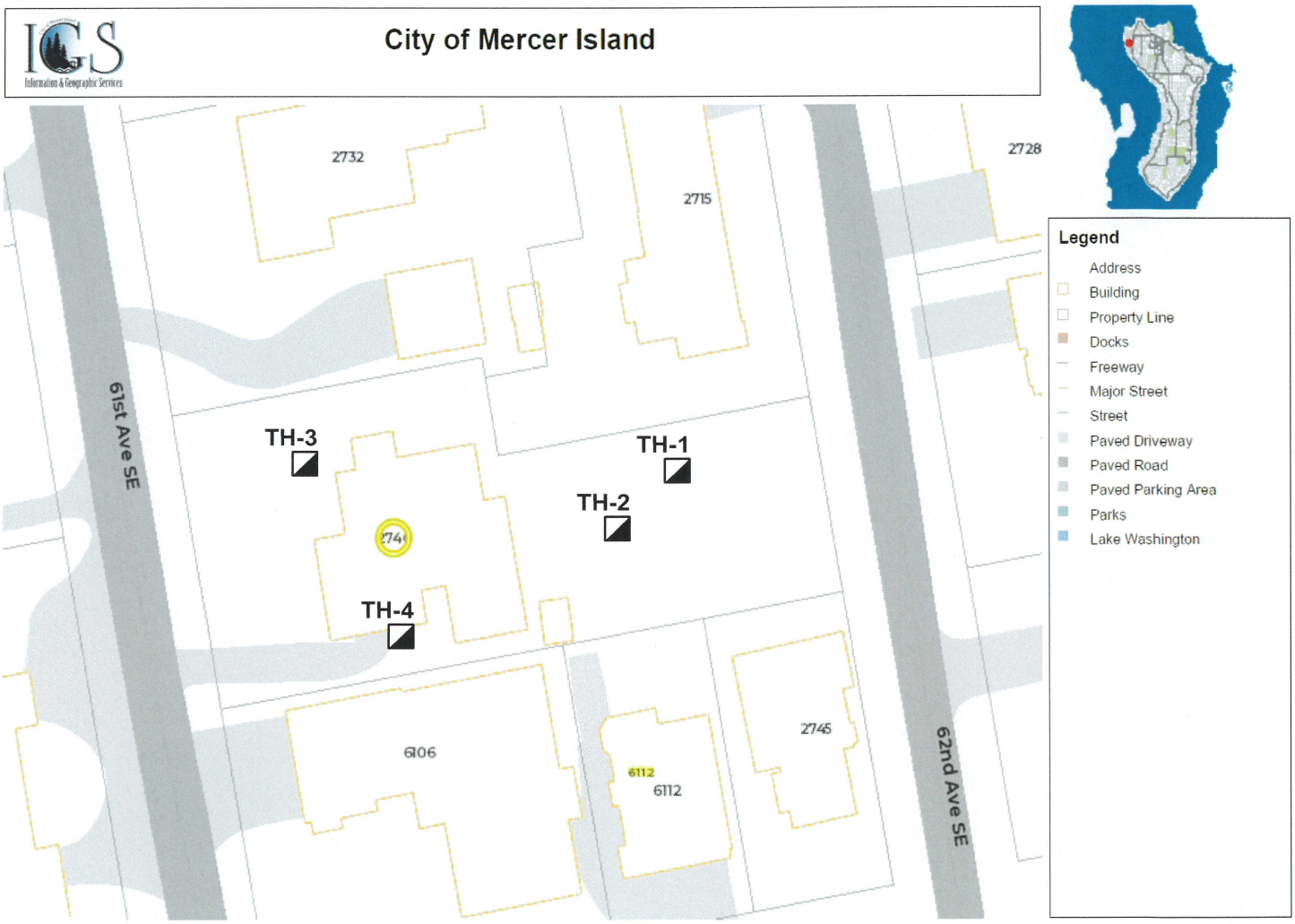
NORTH



Legend:

Test Hole Location

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SITE EXPLORATION PLAN

2740 - 61st Avenue S.E.
Mercer Island, Washington

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