PanGEO INCORPORATED
Geotechnical & Earthquake Engineering Consultants

October 22, 2020
File No. 17-405.200

Mr. Hu Wen
125 - 152nd Place Northeast
Bellevue, Washington 98007

Subject: Response to City of Mercer Island Review Comments
8251 West Mercer Way, Mercer Island, Washington

Dear Mr. Hu:

PanGEO, Inc. is pleased to present this letter responding to review comments from the City of Mercer Island. We previously prepared a geotechnical report providing recommendations for the construction of a residence at this site dated February 8, 2018.

The geotechnically related comments from the City of Mercer Island reviewer are presented below. Our responses follow:

***Review Comment:** Page 24, No. 1, SUB 4: A reduced bearing pressure was not included in the design of the foundations in the crawl space, as required with the sloping ground conditions as shown on sheets A5.01 and A5.02. Geotechnical engineer to provide specific recommendation for bearing pressures to be used for this sloping ground condition or provide additional embedment requirements for the footings. Footing sizes to be modified as needed with the reduced bearing pressure or show additional embedment requirements for the footings located on sloping ground.*

Response: Some of the footings in the crawl space of the residence will be located on or at the top of a slope that is as steep as 2½H:1V (Horizontal:Vertical) and up to 10½ feet tall. We used the following Meyerhoff equation for ultimate bearing capacity of a footing on a slope to evaluate the bearing capacity of the soils based on the footing configuration:

$$q_u = cN_{cq} + \frac{1}{2}\gamma B N_{yq}$$

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Where:

- Cohesion (c) = 0 pounds per square foot
- Friction Angle (φ) = 34 degrees, for very dense sandy gravel
- Soil Unit Weight (γ) = 135 pounds per cubic foot
- Footing Width (B) = 4.5 feet (per design plan)
- N_{cq} and N_{yq} are bearing capacity factors based on the geometry of the slope, footing depth, and soil conditions. Ncq does not apply because we assumed c = 0 psf. N_{yq} was derived from Figure 1, below, based on soil friction and inclination of the slope.

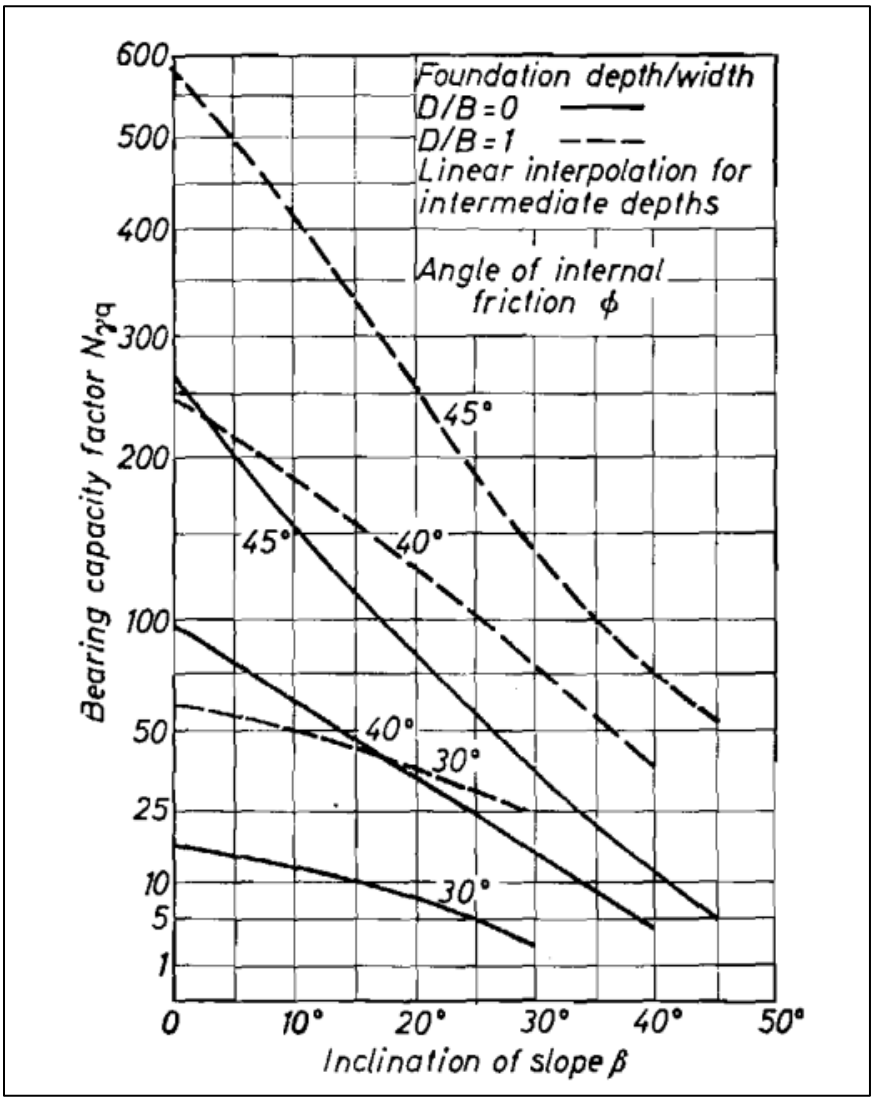

Figure 1: *Bearing capacity factors for a strip foundation located at the top of a slope, where β is the angle of the slope from horizontal.*

We evaluated the allowable bearing capacity using the current foundation layout with no setback and no embedment (N_{yq} = 28 and calculated an allowable soil bearing capacity (factor of safety of 3.0) of 2,800 psf for the current foundation configuration.

In order to achieve a factor of safety of 3.0 for the design allowable soil bearing pressure of 3,000 psf, the footing so should be setback at least three feet from the face of the slope at the footing invert elevation (N_{cq} = 0 and N_{yq} = 35).

Based on our additional analysis, we recommend embedding the footings such that they have at least three feet of horizontal setback from the face of the crawl space slope at the elevation of the footing in order to achieve the recommended allowable soil bearing capacity of 3,000 psf.

Alternatively, a maximum allowable bearing pressure of 2,800 psf could be used for hte current foundation configuration.

Review Comment: ***Page 38, No. 4, SUB 4: Section 6.4 of the geotechnical report does not provide recommendations for the proposed rockery. This rockery is being installed to support a 4- to 5-foot high fill with a 6-foot high fill slope above it. Rockeries are not intended to support fills. An engineered structural retaining wall should be designed for this location. Revise design accordingly.***

Response: We do not recommend the construction of rockeries against a fill section. An engineered structural retaining wall should be used at this location.

CLOSURE

We trust this information meets your current needs. If you have any questions, please let us know.

Sincerely,

PanGEO, Inc.

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