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July 3, 2003

JN 03286

Anthony Dadvar
7527 – 172nd Street Southwest
Edmonds, Washington 98026

Subject: ***Slope Setback Reduction***
Lots 3 and 4 of Dadvar Short Plat
Northeast 43rd Street
Kirkland, Washington

Reference: *Geotechnical Engineering Study, Proposed Plat, Northeast 43rd Street at Burlington Northern Railroad, Kirkland, Washington*; Geotech Consultants, Inc.; July 10, 1997.

Dear Mr. Dadvar: *via facsimile (425) 742-4999*

This letter is intended to serve as an addendum to the above-referenced geotechnical engineering report, in order to address slope setbacks for the homes to be constructed on Lots 3 and 4 of the short plat. The recommendations of our original report were based on a setback from the steeper-than-40 percent slopes of at least 15 feet for the houses. The purpose of our more recent work was to evaluate the feasibility of reducing the slope setback to 5 feet for the foundations of the homes on Lots 3 and 4, and the mitigation measures necessary to protect these structures from damage due to potential slope movement. In order to develop our conclusions, we have accomplished the following tasks:

- Visited the site on June 19, 2003 to discuss the planned site development with you and Terry Walker, Architect.
- Observed the excavation of test pits on June 27, 2003 at the crest of the steeper slope on Lots 3 and 4.
- Conducted a slope stability analysis.

Our services were provided in general accordance with the scope outlined in our **Contract for Professional Services**, which you authorized.

Based on our observations, the slopes on the south sides of Lots 3 and 4, and on the west side of Lot 4 have not undergone recent slope movement. These slopes are not excessively steep (only 40 to 50 percent inclination), nor are they very tall (20 to 22 feet in height). The slopes form the north side of a shallow ravine, which is indicated to be a seasonal drainage. We observed no indications of scour or erosion of the slope's toe adjacent to the site.

During our June 27, 2003 site visit, we monitored the excavation of three test pits located at the crest of the steep slope. The approximate locations of these explorations, TP 8-2003 through TP 10-2003, are indicated on the attached reduced copy of the Topographic Survey. Also attached to this letter are logs for the test pits. The test pits revealed soil conditions that were relatively

consistent with those found in the explorations completed for our previous study. Below the surface vegetation and forest duff, we observed several feet of native, loose to medium-dense, slightly silty to silty sand that became dense to very dense below a depth of 3 to 5 feet. No groundwater or evidence of wet soil conditions were observed to the maximum 11-foot depth of the test pits.

Conclusions and Recommendations

While the slopes along the south sides of Lots 3 and 4, and on the west side of Lot 4, are steeper than 40 percent, they are not excessively steep. Based on this, the lack of recent slope instability on the property, and the consolidated conditions of the soils encountered in the test pits, there is a low probability of soil movement affecting the dense to very dense sands. Any future slope movement would likely be shallow, within the loose soils, and would be relatively small in size. In order to confirm the low potential for slope movement within the dense to very dense sands, we completed a slope stability analysis using the WINSTABL program, which has been developed from the PCSTABL program originally written by Purdue University. Using this stability program, we analyzed the potential for a slide extending just into the dense soils under both static and seismic conditions. This work confirmed our opinion that a failure extending into the dense soils is improbable. Attached are copies of the results of our WINSTABL analyses.

In our opinion, a 5-foot foundation setback from the crest of the steeper slope areas on Lots 3 and 4 can be accomplished without endangering the planned houses. We recommend that the perimeter foundation walls located on the downslope sides of these two homes be extended down to bear directly on the dense to very dense soils. Additionally, these extended walls should be designed as cantilever retaining walls to restrain the loose soils beneath the basement floors in the event of shallow soil movement on the slope. Retention of the loose soils should improve slope stability near the slope's crest.

We recommend that the extended walls be designed to retain soil to a 5-foot depth with an active equivalent fluid density of 40 pounds per cubic foot (psf) acting over this 5-foot height. An allowable bearing capacity of 3,000 pounds per square foot (psf) and a friction coefficient of 0.45 can be used for the wall footing design. This friction coefficient does not include a safety factor.

No fill should be placed above the existing grade between the house and the steep slope. The excavator should be cautioned to avoid disturbance of the steeper slopes and preventing soil from spilling onto the slopes. The excavated sand can be used to backfill the temporary excavation necessary on the outside of the extended foundation walls. This fill should be compacted in maximum 12-inch-thick lifts using a jumping jack compactor.

If you have any questions, or if we may be of further service, please do not hesitate to contact us.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

Marc R. McGinnis, P.E.
Principal

MRM: esm