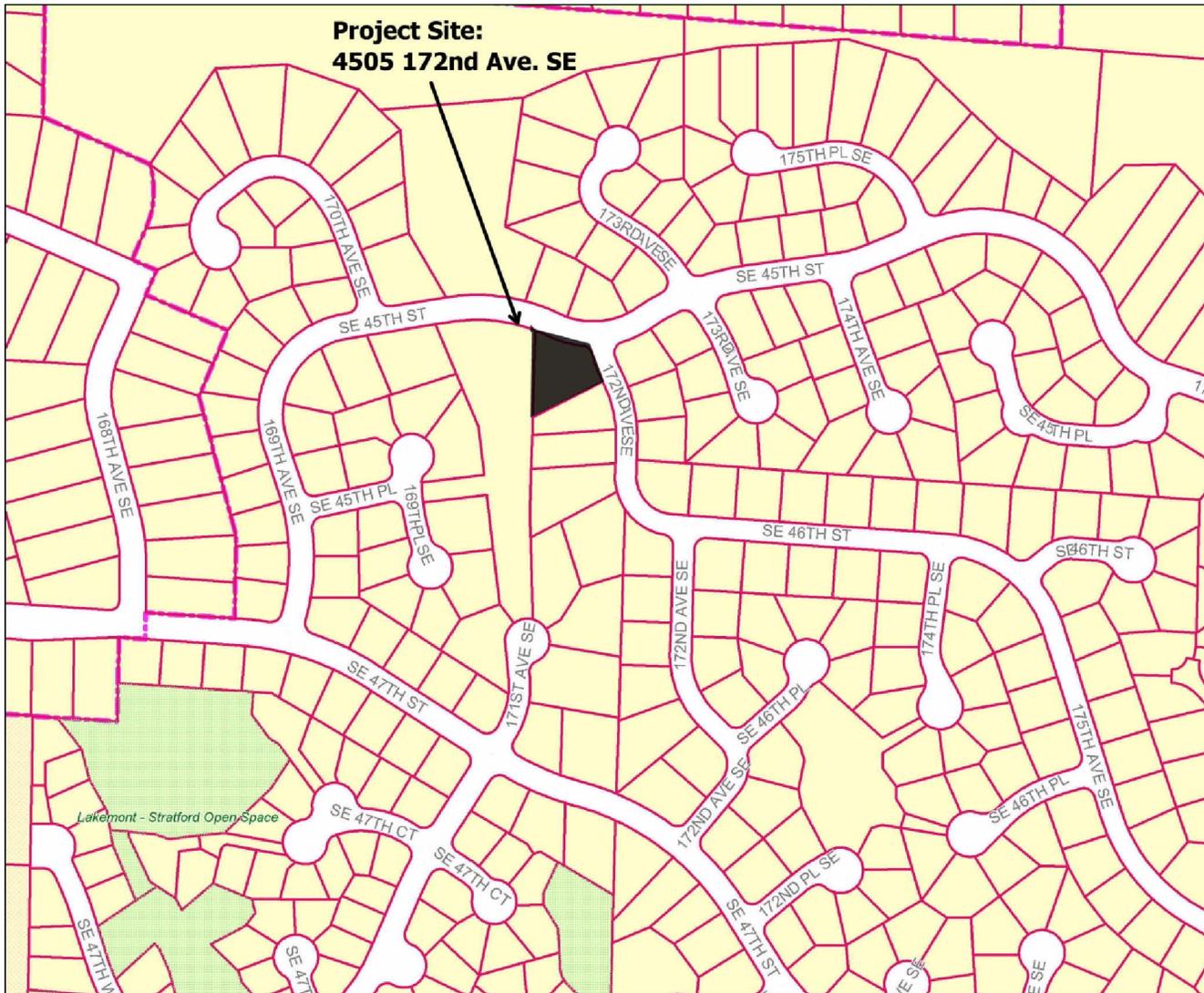


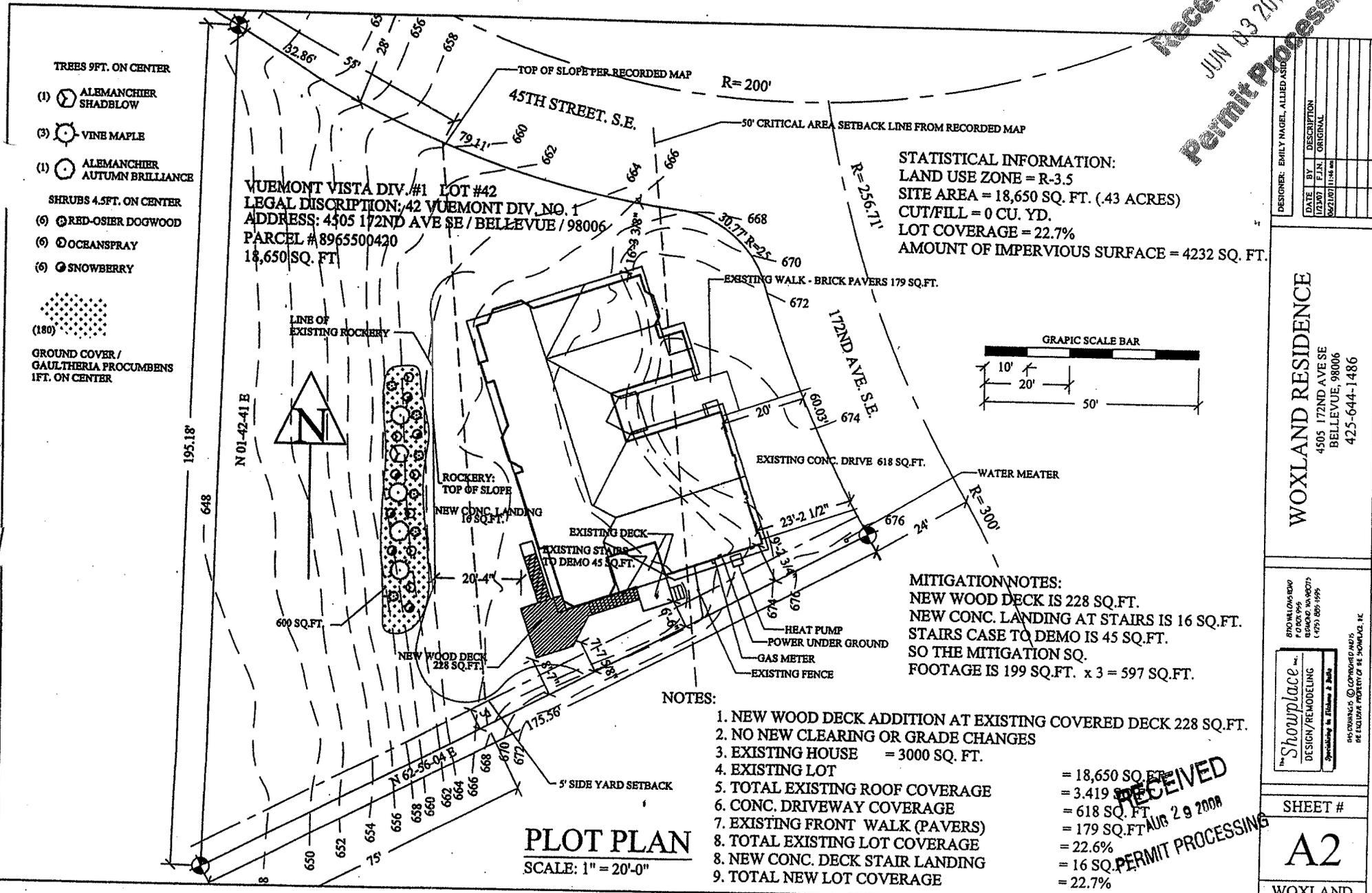
Woxland Slope Buffer Modification Vicinity Map

File Number: 10-113250-LO



Site Plan

Received
JUN 23 2010
Permit Processing



PLOT PLAN

SCALE: 1" = 20'-0"

SHEET #

A2

WOXLAND

June 1, 2010

JN 08226

Dan Woxland
4505 – 172nd Avenue Southeast
Bellevue, Washington 98006

Subject: **Geotechnical Engineering Report and Critical Areas Report**
Rear Yard Landscaping and Rockery Reconstruction
Woxland Residence
4505 – 172nd Avenue Southeast
Bellevue, Washington
Bellevue File No. 10-110078-DB

Dear Mr. Woxland:

via email

This combined geotechnical engineering report and Critical Areas Report is intended to be submitted to the City of Bellevue along with your application for a Critical Areas Land Use Permit.

GEOTECHNICAL ENGINEERING REPORT

1.0 INTRODUCTION

1.1 Overview: Proposed Rear yard Landscaping and Rockery Reconstruction
Woxland Residence
4505 – 172nd Avenue Southeast
Bellevue, Washington
Bellevue File No. 10-110078-DB

Geotech Consultants, Inc. previously prepared a geotechnical assessment for a deck expansion dated July 31, 2008. A copy of this previous report is attached.

1.2 Background: Expansion of your southwestern deck was recently completed under building permit 08-133616-BR. At this current time, you have undertaken landscaping improvements in the rear, western yard of your property. This work started with removal of some of the grass between the house and the pre-existing rockery that defined the western edge of the rear yard. This original rockery, which was constructed with inadequately-sized rocks and without any subsurface drainage provisions, was removed in order to properly rebuild it. The landscaping work and rockery reconstruction were subsequently stopped by the City of Bellevue. At the time, the southern approximately one-third of the rockery had been rebuilt, and the grass in this southern portion of the yard has been mostly removed. You are now applying for a permit that would allow completion of the rockery construction and modifying the landscaping in the rear yard area to eliminate most of the grass west of the house, replacing it with sand-set stepping stones and numerous shrubs. Based on the measurements we have taken of the already-completed southern portion of the rockery, and our discussions with you, the reconstructed rockery will be no more than 3 to 3.5 feet in height. The slope that was located below the pre-existing rockery has been left untouched. No clearing or grading has occurred on this slope, nor are they planned as part of the new project. During our recent visit to the site we noted that

small maple trees had been planted on this slope as part of the required mitigation from the previously deck expansion project.

1.3 Purpose and Scope of Services: We previously prepared a geotechnical assessment for expansion of the deck dated July 31, 2008. In order to prepare this current report, we revisited the site on May 18, 2010 to observe the existing conditions and assess the exposed geology, and review the new proposed work with you.

1.4 Investigations Summary: During our two visits to the site we have been able to assess the near-surface soil conditions in the area of the rear yard and western rockery by hand excavating shallow test holes. We are also familiar with the general geology of the area from the previous work on other residential properties in the vicinity, and review of available geologic maps. You were also able to provide us with information related to the grading that occurred in this area at the time the house was originally constructed approximately 24 years ago. The subsurface conditions of the site are discussed below in sub-sections **2.3** and **2.4**.

1.5 Report Overview: This report presents geotechnical considerations for reconstruction of the existing west rockery and modifying the rear yard landscaping.

2.0 SITE CONDITIONS

2.1 Location and Surface Conditions: The Woxland property is located on the southwest corner of Southeast 45th Street and 172nd Avenue Southeast. The existing residence, which has a west-facing daylight basement is situated on the eastern half of the property. Recently, the existing deck located on the southwestern corner of the house was reconstructed and expanded slightly toward the west. The ground surface on the eastern portion of the lot generally slopes down toward the west. From our observations, and our discussions with you, it is apparent that the grades on the site and the adjoining properties were modified during the original development of the property. There is a stepped rockery along the southern portion of the property that allows a transition of grade from the adjoining southern lot to the subject site. The rear, western yard area is relatively flat, having been graded to that condition in conjunction with placing several feet fill behind a small rockery that defined the western edge of the rear yard. This short rockery was in place at the time of our previous visit to the site in July 2008. It was apparent at that time from the aged and weathered condition of the rocks that the rockery had been in place for many years. There were no apparent drainage provisions behind that original rockery. The area within approximately 2 feet of the face of the rockery is, and was previously, relatively level. Below, to the west of, this narrow bench the ground slopes down the west at an inclination of 45 to 50 percent. This slope is uniform in nature and has an overall height of approximately 15 feet. Due to the height and inclination of the slope, it meets the City of Bellevue's criteria (LUC 20.25H.120) as a steep slope hazard area. The uniform grade of the slope and the lack of any taller native vegetation on it indicated to us that the slope was manmade. You were present during the original construction of the house approximately 24 years ago and have confirmed that the soil excavated for the daylight basement was pushed toward the west to create the slope and the western, rear yard area. Since our July 2008 visit, several small maple trees have been planted on the face of the slope. We understand that this was completed as part of mitigation required for the previous expansion and reconstruction of the deck. We have observed no indications of instability, such as tension crack or downsets on or near the steep slope. You have confirmed that there have been no signs of slope movement since the house was originally constructed and the slope was created.

2.2 Geologic Setting: Available geologic maps for the area indicate that the site is underlain by glacial till, which is a glacially-compressed mixture of gravel, silt and fine-grained sand. We have encountered this competent native soil on other projects that we have been associated with in the area. In undisturbed conditions, glacial till is overlain by one to 2 feet of weathered till and organic topsoil. Glacial till often contains isolated boulders.

Shallow groundwater can be found in the weathered soil perched on top of the unweathered glacial till. This groundwater is typically localized and varies with recent precipitation and the condition of the upgradient land relative to recharge through infiltration.

2.3 Subsurface Soil Conditions: As summarized in the attached report, fill over dense, silty sand was encountered in a shallow test hole that we excavated in the area of the southwestern deck expansion. During our recent visit, we completed a shallow hand-excavated test hole at the face of the reconstructed portion of the western rockery. As expected, this test hole encountered fill consisting of slightly gravelly, silty sand.

2.4 Groundwater Conditions: During our site visits, no indications of groundwater seepage were apparent on the property, including on the face of the western slope.

2.5 Subsurface Contamination: Not Applicable to this project.

3.0 DISCUSSION AND CONCLUSIONS

3.1 Slope Stability: The undisturbed glacial till soils that underlie the site are not susceptible to instability during static or seismic loading conditions. As discussed above, no indications of instability have been observed in the filled western slope since it was originally created.

3.2 Seismic Considerations: In accordance with Table 1613.5.2 of the 2006 International Building Code (IBC), the site soil profile within 100 feet of the ground surface is best represented by Site Class Type C (Very Dense Soil).

3.3 Site Work: The site work anticipated for this project involves reconstruction of the pre-existing rockery and removal of some of the existing grass to be replaced with a garden and landscaping. No significant grading, either cutting or filling, is expected. The steep western slope will not be disturbed.

3.4 Retaining Structures: No retaining walls beyond the reconstructed rockery are anticipated for the new construction.

3.5 Rockeries: The project includes reconstruction of the pre-existing rockery with improved facing rocks and drainage.

3.6 Foundation Support: No new foundations are planned as part of the project.

4.0 RECOMMENDATIONS

4.1 Site Grading and Earthwork: The amount of grading, including filling, expected for this project is negligible. The only fill to be placed will be limited to the facing rocks and drainage rock for the rockery, topsoil to cover the drainage rock, and sand bedding for the planned stepping stones.

4.2 Temporary Shoring and Retaining Walls: Temporary excavation shoring will not be needed for this project. The short temporary sloped cuts for completion of the rockery reconstruction will be possible without the use of shoring.

4.3 Rockeries: As a part of the rear yard landscaping, the existing western rockery is being replaced. As discussed previously, the old rockery was in relatively poor condition and had no drainage measures behind it. The original rockery had been entirely removed at the time of our May 18, 2010 site visit, and reconstruction of the new rockery on the southern portion of the site had begun. The new rockery will have a maximum height of approximately 3 to 3.5 feet. The construction of the new rockery that we observed appears to be more appropriate for a permanent structure. The facing rocks are adequately sized and appear to be more interlocked than those of the old rockery. A perforated 4-inch-diameter drain is being installed behind the lower rocks, and a minimum width of approximately 12 inches of free draining crushed rock is being placed behind the facing rocks.

We recommend that the same construction techniques be utilized to complete the reconstruction of the rockery. Any space between the facing rocks and the short temporary cuts in the existing rear yard fill soils should be backfilled with the free draining crushed stone. If topsoil is to be placed over the top of the free draining rock, a non-woven filter fabric should first be laid over the rock to separate the two different materials.

4.4 Reinforced Soil Structures: Not Applicable to expected project scope.

4.5 Structure and Foundations: Not Applicable to expected project scope.

4.6 Floors: Not applicable to expected project scope.

4.7 Pavements: Not Applicable to expected scope of project.

4.8 Utilities: Not Applicable to expected scope of project.

4.10 Hazards and Mitigation: The proposed landscaping and rockery reconstruction will not disturb the steep slope. The area that will be disturbed by the proposed work is currently grass yard that will be replaced with garden and landscape cover. No new impervious area will be created. In order to prevent the project from increasing the landslide potential on the western slope, we recommend the following mitigation measures:

- Leave the steep slope, including its existing vegetated cover, undisturbed.
- Provide permanent planting and landscaping in the area between the rockery and the house that will prevent soil erosion.

The steep slope to the west of the proposed work area appears to have been created by past grading, but it is not excessively tall. Considering the competent nature of the underlying soils, the limited scope of the proposed project, and the fact that the new work will not encroach closer to the steep slope than the existing rockery already did, we support a modification to Bellevue Land Use Code (LUC) 20.25H.120, which requires a 50-foot buffer from steep slopes. The planned rockery reconstruction and new landscaping will not adversely affect the stability of the steep slope, provided the recommendations of this report are followed. The buffer area above the manmade slope already contained a rockery and grass yard, which are simply being

reconstructed or modified. This planned work will not cause additional degradation of the buffer area, nor will it adversely impact stability of the slope.

Beyond the above recommended measures, no mitigation, such as planting additional vegetation, is necessary for the project to encroach into the minimum 50-foot buffer area. It is our professional opinion that the edge of the top-of-slope buffer can be set at the face of the reconstructed rockery, which is in the same location as the original rockery. This buffer reduction will not adversely impact the stability of the steep slope below the rockery.

CRITICAL AREA REPORT

Below are our responses to specific items in the Bellevue Land Use Code (LUC 20.25H.125, 20.25H.140, 20.25H.145, and 20.25H.255) related to steep slope performance standards and Critical Areas Report requirements.

LUC 20.25H.125:

- A. The natural slope of the ground had been previously modified by grading for the house and original landscaping, which included various rockeries and placing fill for the rear, western yard area. The reconstruction of the western rockery and modification of some of the rear yard area to garden and landscaping will not significantly alter the pre-existing ground contours. The reconstructed west rockery will follow the same alignment as the original rockery. The proposed work will not decrease the buffer further, or encroach into the steep slope below, and will not change the pre-existing grades on the steep western slope.
- B. The reconstructed rockery will be in the same location as the pre-existing rockery, preventing any further encroachment into the buffer or the steep slope.
- C. Reconstruction of the rockery with improved drainage in its pre-existing alignment will not adversely impact slope stability or soil erosion potential on the site or the adjacent properties. It should improve stability of the short fill located immediately behind the rockery by providing more appropriate drainage and long-term lateral support. The vegetation on the steep slope below the rockery will remain in its current configuration.
- D. The reconstructed rockery will maintain the same topographic break that previously occurred between the western yard and the steep slope. This reduces the amount of ground disturbance to allow the grade transition from the yard to the slope below.
- E. The only impervious area anticipated is the facing rocks of the reconstructed rockery itself. The new garden and landscaped area will be pervious ground, similar to the grass yard that previously existed. The amount of this impervious area will not be increased over the pre-existing condition.
- F. The grades that existed previously in the rear yard and on the steep slope will not be changed by the proposed work.
- G. The rockery reconstruction and landscape work are independent of the existing home and expanded deck, and occur in an area that was previously disturbed by grading for the yard and original rockery.
- H. Other than reconstruction of the pre-existing rockery, no structures would be built as a part of the planned work. Item H does not apply to the proposed scope of work.
- I. No decks, parking pads or garages are proposed for the work. Item I does not apply.
- J. A *Landscape Planting Plan* prepared by Outer Spaces, LLC has been prepared. This plan indicates that the areas disturbed by the rockery reconstructed and new landscaping will be entirely covered with materials appropriate for permanent erosion

protection. No additional mitigation is necessary. As expected, no work on the steep slope is indicated. The existing vegetation on the steep slope has been functioning properly for permanent erosion control and does not need to be supplemented or modified.

LUC 20.25H.140:

- B.1. A copy of the Landscape Planting Plan showing the proposed scope of the work has already been submitted as part of the Critical Areas Land Use Permit application.
- B.2. Our assessment of the geological characteristics of the site is addressed in section 2 of the *Geotechnical Engineering Report* above.
- B.3. A hazards analysis and description of the project are contained in sections 4 and 1.2, respectively, of the *Geotechnical Engineering Report*.
- B.4. Section 4.10 of the *Geotechnical Engineering Report* provides a recommended buffer, which is the same location as the pre-existing rockery.

LUC 20.25H.145:

- A. As discussed above, the proposed work does not increase the geological hazard to either the surrounding properties, or the site itself, including the existing steep western slope.
- B. The proposed work will not adversely impact other critical areas.
- C. The proposed project does not increase the potential hazard beyond what existed previously. The potential hazard of future instability associated with the pre-existing fill behind the rockery is reduced by the improved construction of the rockery.
- D. The existing portion of the reconstructed rockery is appropriate for the anticipated conditions.
- E. We have prepared a *Geotechnical Engineering Report*, and it is provided above in this document. This report follows the guidelines of the City of Bellevue submittal requirements for geotechnical reports.
- F. The construction used for the southern portion of the reconstructed rockery is appropriate, and would comply with our recommendations.
- G. We would expect that the planned work would not adversely impact habitat, as the work will not occur beyond the previously-disturbed area or extend onto the steep slope.

LUC 20.25H.255:

- B.1. The proposed work will not reduce the function of the buffer or overall critical area, which were previously degraded by the grading that occurred when the house was constructed. A net gain could be derived from the expected reduction in fertilizers, weed control products, and emissions from equipment used to maintain yard areas. Additionally, the improvement of the rockery should reduce the potential that it would fail in the future, which would result in siltation and erosion problems on the steep slope below.
- B.2. Refer to the response above to item B.1.

- B.3. The elimination of grass yard should reduce the amount of chemicals used for fertilization and weed prevention. This should be a net improvement for downstream stormwater function.
- B.4. The restoration has already been started. We understand that you are financially able, and eager, to complete the rockery reconstruction and the planned landscaping.
- B.5. As discussed previously, the function of the buffer for the western steep slope was previously degraded by the grading that occurred when the house was originally constructed. The proposed rockery reconstruction and landscaping will not be more detrimental to the critical area and buffer, and will have some limited positive impacts, as discussed above.
- B.6. Many of the nearby homes have previously completed similar landscaping projects that occurred on, or close to, steep slopes.

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

Attachment - July 31, 2008 Geotechnical Assessment

MRM: jyb

July 31, 2008

JN 08226

Showplace Design and Remodeling
P.O. Box 955
Redmond, Washington 98073

Attention Frank Neel

Subject: ***Foundation and Slope Stability Considerations***
New Deck and Stairs
Woxland Residence
4505 – 172nd Avenue Southeast
Bellevue, Washington

Dear Mr. Neel:

via email

This letter presents our geotechnical conclusions and recommendations related to slope stability and foundation issues for the proposed expansion of the exterior deck on the southwestern corner of the existing residence. In order to develop these recommendations, we completed the following tasks:

- Visited the subject property to observe the existing conditions in the proposed work area and on the slopes around the planned work area.
- Conducted a shallow, hand-excavated test hole on the western edge of the proposed deck, and reviewed our files for available geologic information in the immediate vicinity of the site.

Our services were completed in general accordance with the scope that you authorized in our **Contract for Professional Services**.

Based on the provided plans, and our discussions with you, we expect that the existing deck located on the south side of the house will be expanded to the west. Stairs will extend down from the new deck to the rear yard, allowing pedestrian access along the south side of the house to the rear yard. The new deck and stairs will be constructed of timber, and will be supported on isolated posts that will bear on square concrete footings. The only earthwork expected for this deck expansion will be the excavation necessary to reach bearing soils for the new footings. The bottom of the timber stairs will be carried on a concrete pad. Based on our measurements, and the Plot Plan, the footprint of the deck will be at least 20 feet from the crest of the short, steep slope on the western side of the lot. No filling or grading is planned for the area on the steep slope, or between it and the new deck.

The existing residence is situated on the southwestern corner of 172nd Avenue Southeast and 45th Street Southeast in the Lakemont area of Bellevue. The house consists of one story over a west-facing daylight basement. The eastern portion of the lot, on which the house is located, generally slopes gently to moderately down toward the west. There are no sloped areas steeper than 40 percent and taller than 10 feet on this portion of the property. It is readily apparent that the area around the house, including the rear, western yard, was modified by excavation and filling when the

house was originally constructed. The rear yard is relatively flat to the crest of a short, steep slope that declines down toward the west. There is an obvious grade break that forms the top of this slope. The slope is only approximately 15 feet in height, and it has an inclination of about 50 percent. The surface of the slope is fairly uniform and it is covered with grass. Even before we conducted the test hole discussed in the following paragraph, it was visually obvious that this slope had been modified by grading when the site was originally developed.

We know of no deep-seated landslides in close proximity to the site, and saw no evidence of recent soil movement on the steep, western slope. Shallow soil movement affecting weathered soils has been known to occur along the steeper, taller slopes that are located further north of the site, on north-facing lots overlooking Lake Sammamish, but those slopes are far from this site.

Based on our previous experience in the area, we expect that the site is underlain by native soils that consist of glacially-compressed, gravelly, silty sand (glacial till) and/or weathered bedrock. As discussed above, there are likely fill soils present at the top of the steep, western slope from the previous site grading. During our visit to the property, we conducted a hand-excavated test hole at the expected western edge of the new deck, approximately 20 feet from the crest of the steep slope. This exploration revealed silty sand with sandstone fragments immediately below the grass yard. This soil appears to be fill. Underlying the fill is dense soil encountered at a depth of approximately 3 feet. No indications of seepage were observed on the surface of the western slope at the time of our site visit. However, it is relatively common to encounter at least isolated zones of groundwater perched above and within the dense soil and/or bedrock following extended wet weather.

CONCLUSIONS AND RECOMMENDATIONS

The dense, glacially-compressed soils that underlie the site are not compressible and have a very high internal strength. The slope to the west of the proposed work area appears to have been modified by past grading, but it is not excessively steep or tall. As with any steep slope, there is a potential that shallow movement or creep of the fill and looser, near-surface soil will occur over time. This is the result of natural weathering of the soils, which affects all steep slopes in the Pacific Northwest. However, the planned deck construction will not adversely affect the stability of the slope, nor would future soil movement on the slope affect the deck, provided the recommendations of this report are followed. In order to construct the deck extending closer to the slope than the existing house, it will be necessary to modify Bellevue Land Use Code (LUC) 20.25H.120, which requires a 50-foot buffer from steep slopes. We recommend the following:

- Leave the steep slope, and the 20-foot buffer area between the deck and the top of the steep slope undisturbed. This would maintain the existing vegetative ground cover. Only small amounts of soil will be excavated for the deck construction. Even so, none of the excavated soil should be placed between the deck and the slope.
- Excavate the deck footings down to dense soil.
- Avoid discharging concentrated water toward the slope. We expect that there will be gaps between the deck boards to allow water to simply fall through. The ground beneath the deck should be covered to prevent soil erosion. The existing grass may be able to accomplish this. Alternatively, landscape bark or crushed rock could be laid on the soil for permanent erosion control under the deck.

CONVENTIONAL FOUNDATIONS

We recommend that any new footings for the deck be excavated to bear directly on dense, native soils. The isolated deck footings should have a minimum width of 12 inches, and should be bottomed at least 18 inches below the lowest adjacent finish ground surface for protection against frost and erosion. 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.

An allowable bearing pressure of 2,000 pounds per square foot (psf) is appropriate for footings supported on dense native soil. A one-third increase in this design bearing pressure may be used when considering short-term wind or seismic loads.

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: jyb