

E3RA

November 7, 2008
T08191

Barend Van Zanten
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Olympia, Washington 98507
(360) 866-3929

Subject: **Drainage Recommendations Letter**
Planned New Residence
1919 Berry Street
Olympia, Washington

Dear Mr. Van Zanten:

E3RA is pleased to submit this letter which provides drainage recommendations for the residence planned at your lot located at 1919 Berry Street in Olympia, Washington.

Our scope of services consisted of surface observations, geotechnical research, review of previous geotechnical reports and current construction plans, and letter preparation. This letter has been prepared for the exclusive use of Barend Van Zanten, and his consultants, for specific application to this project, in accordance with generally accepted geotechnical practice.

PROJECT DESCRIPTION

The project site is a rectangular lot located on the west side of Berry Street in Olympia, Washington. It measures 50 feet along the Berry Street alignment and extends 107 feet west of the alignment. The site slopes down from Berry Street at grades that are initially steep, and then become gentle. Slopes off site to the west become steep again.

Plans call for the construction of a residence with two main stories and a loft. An attached garage will be located on the east side of the residence, near Berry Street. Because the site slopes steeply down 10 feet or so from Berry Street, the garage will be built above current grades to provide access from the street. The garage floor will be at or near the surface elevation of Berry Street, and will be constructed on top of a high stem wall. The stem wall will be backfilled, and so it will retain the backfill. According to preliminary construction plans provided by you, the foundation for this wall will extend a few feet below original grades.

PREVIOUS WORK

We reviewed two previous geotechnical reports for the site. The first, entitled *Geotechnical Report* was prepared by Geotechnical Testing Laboratories and dated August 2, 2003. The second, entitled *Subsurface Evaluation of the Roadway Slope and Other Geotechnical Issues at 1919 Berry Street NE, Olympia* and dated April 30, 2005, was prepared by Bradley-Noble Geotechnical Services.

We also reviewed contoured site plans, which were based on a survey by Butler Surveying and included plans and details for an onsite storm water drainage system that were prepared by Matthews Engineering Services. Additionally, we reviewed Preliminary Building Plans, dated September 4, 2003, that were provided by Ralph J. Fairbanks, P.E.

The Preliminary Building Plans indicate that the east side of the planned building near Berry Street, which is the wall that will support the garage, will be comprised of a 12 inch thick concrete retaining wall that will rise to the approximate level of Berry Street and will function as a stem wall/retaining wall. The space between the stem wall/retaining wall will be backfilled so that the garage, which will be at the approximate surface elevation of the surface of Berry Street, can be accessed from the street. The stem wall/retaining wall will have a wide foundation footing that will extend approximately 6 feet from the east edge of the wall into the hillside and the west side of the footing will extend 2 feet west of the west edge of the wall. To address the seepage on the site, all of the backfill for the retaining wall will be comprised of clean gravel. A 6 inch diameter footing drain will be placed at the east side of the base of the wall, just above the top surface of the wide footing that extends 6 feet into the hillside.

The report by Geotechnical Testing Laboratories recommends a drainage zone behind the retaining wall consisting of 18 inches of fines-poor coarse sand and gravel, a non-woven geotextile fabric between the drainage zone and other wall backfill, and a 4 inch perforated pipe placed in the drainage zone at the base of the wall to collect seepage and then direct the seepage to an appropriate location.

The Bradley Noble report recommends drainage of site seepage by excavation of the house footprint down to firm native soils followed by placement of a geotextile fabric, then placement of 2 feet of quarry spalls, placement of more fabric, then placement of 1 foot of 3 to 6 inch compacted crushed basalt.

SITE CONDITIONS

We observed site conditions and discussed the planned construction with the client on October 7, 2008. During our visit we observed that the site slopes down to the west from the east boundary at Berry Street across a roadway fill embankment at grades of about 50 percent over an elevation change of 10 to 12 feet. The remainder of the site slopes down to the west at grades that measure between 15 and 20 percent. Slopes 30 feet or so west of the site steepen to about 30 percent.

Seepage was observed on the east part of the site, where it emanates from the base of the fill embankment that supports Berry Street.

Vegetation on the site consists of several alders, maples and holly, with grass, blackberries and sword ferns.

A storm water collection and conveyance system, consisting of catch basins and a tight line pipe, has been installed on site.

Our review of the log of a previous boring conducted by Bradley Noble on Berry Street near the east site boundary indicates that the fill embankment consist of 10 to 12 feet of medium dense granular fill and the underlying native soils consist of dense to very dense gravelly silty sand, which in turn overlies very dense silty sand. The log also indicates that a saturated zone several feet thick extends from about 8 feet below the pavement surface of Berry Street to a depth of about 12 feet below the pavement surface.

The report by Geotechnical Testing Laboratories indicates that groundwater can lie within a foot or two of the surface on the gentler-sloped parts of the site.

CONCLUSIONS AND RECOMMENDATIONS

We recommend that the general drainage design offered in the Preliminary Building Plans, which call for all of the backfill to consist of clean gravel and a 6 inch diameter perforated pipe at the base of the wall, be followed in order to address site seepage. We would add these additional recommendations and clarifications: the gravel backfill should consist of 1 inch or larger drain rock and should in no instance be less than 3 feet in thickness behind the wall; the wall footing, which will parallel the Berry Street fill embankment, should extend at least 2 feet below existing grades everywhere so that all of the seepage that emanates from the embankment is collected; the footing should be based on firm, non-yielding native soils; a non woven geotextile fabric be placed between the drain rock and other soils; and the collected seepage be directed to the existing storm water system on the site.

In our opinion, the 12 inch thick concrete retaining wall depicted in the Preliminary Building Plans, which has a foundation that extends east 6 feet into the hillside and west 2 feet from the wall, will adequately address lateral earth pressures presented by drain rock backfill.

We do not recommend a quarry spill drainage system under the house footprint since the site seepage will be intercepted by the wall drain. The house foundation can simply be based on firm non-yielding native soils or on properly compacted structural fill.

CLOSURE

The conclusions and recommendations presented in this report are based, in part, on our interpretations and assumptions regarding subsurface conditions interpreted by ourselves and those presented in the two referenced geotechnical reports; therefore, if variations in the site conditions are observed at a later time, we may need to modify this report to reflect those changes.

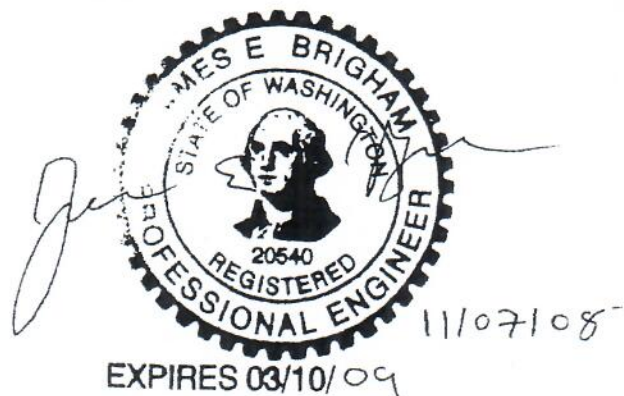
We appreciate the opportunity to be of service on this project. If you have any questions regarding this report or any aspects of the project, please feel free to contact our office.

Respectfully submitted,

E³RA, Inc.



Fred E. Rennebaum, L.E.G.
Senior Geologist



James E. Brigham, P.E.
Principal Engineer

FER:JEB:jb

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