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Attention: Daniel Dawson

August 1, 2002



Geologic Reconnaissance  
Proposed Tollgate Western Employment Park  
North Bend Washington  
GEI File No. 6776-002-00

## INTRODUCTION

The purpose of this letter is to summarize our geologic reconnaissance of the proposed Tollgate Western Employment Park in North Bend, Washington. Dan Dawson of Otak requested our services during a telephone conversation with Gordon Denby of GeoEngineers on July 29, 2002. Our services were provided in general accordance with our master Services Agreement with Otak (Agreement #CL-6776). The location of the site is shown on the Vicinity Map, Figure 1, and Site Plan, Figure 2.

The site is currently undeveloped. We understand that possible activities at the site could include commercial and/or residential development. GeoEngineers has been retained to complete a surficial geological reconnaissance of the site and to review published geologic reports and other documents relative to geologic conditions at the site. Results from our reconnaissance and review are intended to assist project planning at the site, and are not intended as a geotechnical evaluation of the site.

## SITE CONDITIONS

### GENERAL

The site is located approximately 1 mile west of downtown North Bend. The site is roughly rectangular in shape and measures approximately 900 feet (east-west) by 1,300 feet (north-south). The north property line is adjacent to Alm Way, the south property line is adjacent to Northwest 8<sup>th</sup> Street, and the east property boundary is located along a small creek (Figure 1). A commercial facility (Nintendo building) is located south of the site and a Puget Sound Energy power substation is located immediately northeast of the site. Private residences are located along Alm Way immediately north of the site.

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Conditions at the site were evaluated by completing a geologic reconnaissance on July 30, 2002. The reconnaissance was completed by a geologist from our firm and included general documentation of surface topography, soil, vegetation, and seepage conditions. The drawing titled "Tollgate Western Employment Park" (Otak, July 29, 2002) and geologic maps and references were reviewed prior to our visit. Otak also provided GeoEngineers with a portion of an EIS for a larger project that describes conditions at the site.

## **SITE GEOLOGY**

According to the map titled "Surficial Geology, Skykomish and Snoqualmie Rivers Area, Snohomish and King Counties, Washington" (Booth, 1990), the site is underlain by younger alluvium. The alluvium is described as composed of sand, silt, and gravel and was likely deposited as floodplain or channel deposits by the nearby Snoqualmie River. An approximately 1,000-foot diameter rock knoll, composed of intrusive and metamorphic rock, is mapped within the generally level floodplain deposits approximately ½ mile north of the site. Andesite and other volcanic and meta-sedimentary rocks are mapped southwest of the site on the map titled "Geologic Map of the Snoqualmie Pass 30 x 60 Minute Quadrangle, Washington" (Tabor et al., 2000). Outcrops of both andesite and meta-sedimentary rock are also present along road cuts on Interstate-90 approximately 2,000 feet south of the site.

## **SURFACE CONDITIONS**

The site can be separated into two distinct landform areas: a level area in the north and east portions of the site and a steep-sided knoll in the southwest portion of the site. According to the FEMA Flood Insurance Maps (1995), the north and east portions of the site are located within an area described as "areas of 500-year floods; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 100-year flood." A small, unnamed creek is located along the east margin of the site.

In general, the level floodplain area is situated between Elevation 330 feet and Elevation 340 feet. This area is sparsely forested with 6- to 24-inch diameter alder, maple, fir, spruce, and cedar trees. The understory within this area is composed of thick blackberry, salmonberry, sword fern, and other shrubs. Silty, poorly drained soil was observed within much of this area. No seepage was observed in this area.

The steep-sided knoll in the southwest portion of the site rises approximately 60 to 70 feet above the floodplain surface. Slopes along the north edge of the knoll were observed to be inclined from 50 percent to greater than 100 percent. Vegetation on the knoll consists of 12 to 30-inch diameter fir and cedar trees with an understory composed of sword fern, salal, and oregon grape. Surface soil appears to be relatively well drained and no seepage was observed in this area.

Near-vertical rock outcrops were observed on the north edges of the knoll and within 6 inches of the surface elsewhere on the knoll. The rock outcrops were up to 40 feet wide and 30 feet high in some areas. The approximate area of the site inferred to be underlain by bedrock is shown on

Figure 2. Rock was also exposed at a road cut along a gravel road that extends west from Northwest 8<sup>th</sup> Street at the southwest corner of the site. Large boulders, up to 6 feet in diameter, were observed at the base of some of the outcrops. Rock exposed at the surface consisted of conglomerate, sandstone, and siltstone. The outer inch of the rock surface was observed to be relatively weathered and could be broken under shovel and finger pressure. Rock encountered below the weathered layer was observed to be very hard and could not be broken under shovel pressure. These rocks appear to be similar to meta-conglomerate bedrock exposed south of the site on Interstate-90 and may be consistent with the rocks mapped at a rock knoll approximately ½ mile north of the site.

No water flow was observed in the small, unnamed creek along the east property boundary at the time of our visit. In general, the creek appears to flow within a 5 to 10-foot wide channel with poorly defined banks and bed. Vegetation within and adjacent to the creek area consists of skunk cabbage, salmonberry, horsetail, blackberry, and other shrubs. Soft, silty soils were encountered within the creek bed to depths of at least 1 foot below the surface. Standing water was observed at both ends of a 36-inch diameter corrugated metal pipe (CMP) culvert that crosses beneath Northwest 8<sup>th</sup> Street. The CMP culvert was observed to be partially blocked with debris and elevated approximately 1.5 feet above the standing water. The creek crosses beneath Alm Way through a 10-foot wide timber pile supported concrete span. A quarry-spall channel and shallow standing water were observed beneath the span.

## CONCLUSIONS

Based on our geologic reconnaissance and information review, it is our opinion that development at the site is feasible. Existing structures located north, east, and south of the site suggest that the site is suitable for both commercial and residential development; however, the presence of near-surface bedrock may limit development within the southwest portion of the site.

The generally level areas in the north and east portions of the site are similar topographically to adjacent developed areas. Only limited mass grading would be required to produce large level development areas in these portions of the site. However, the east and north portions of the site are located within mapped floodplain areas and may be subject to floodplain limitations. Significant drainage and soil improvements may also be required within these relatively poorly drained areas. In addition, the alluvial soils present may contain compressible layers that may require pre-loading or deep foundation systems. Detailed subsurface explorations will be required prior to evaluating foundation and foundation support requirements for these areas.

Bedrock exposures were observed throughout the steep-sided knoll located in the southwest portion of the site. The presence of the surface/near-surface bedrock may result in difficult construction conditions that may limit the feasibility of development in this portion of the site. Based on our limited observations, significant mechanical ripping of the rock will likely not be feasible because of its competence (hardness). The bedrock appears to be similar to rock observed in outcrops along Interstate 90 south of the site appears to have been excavated using blasting techniques. Similar techniques may be required for any significant grading or leveling within the southwest portion of the site.

Steep slopes, inclined from 50 percent to near vertical, are present along the edges of the bedrock knoll in the southwest portion of the site. Large boulders observed at the base of outcrops and steep slopes along the knoll suggest periodic rock failures and mass wasting. These areas will likely be subject to sensitive areas review and may be subject to setbacks and building buffers.

### LIMITATIONS

This report has been prepared for use by Otak to assist in project planning for the proposed Tollgate Western Employment Park near North Bend, Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

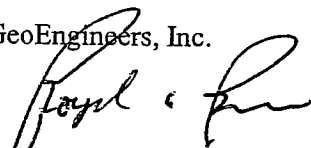
Our interpretation of subsurface conditions is based on our field observations and published geologic maps and references. No subsurface explorations were completed as part of our services. It is possible that subsurface conditions may vary from those described above and within other published documents. This report should not be construed as a guarantee of subsurface conditions.

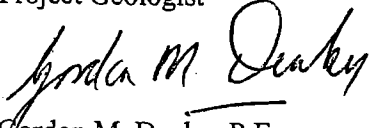
Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted geotechnical and engineering geology practices in this area at the time this report was prepared. No warranty or other conditions, express or implied should be understood.

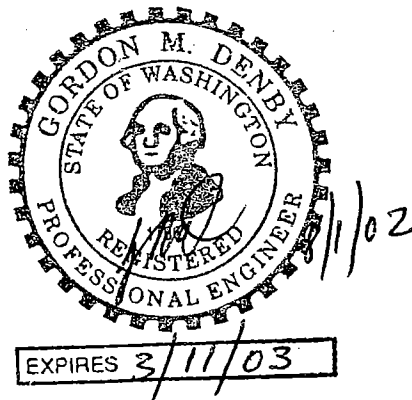
We appreciate the opportunity to be of service to Otak. Please contact us if you have any questions or concerns regarding the information presented in this review letter.

Respectfully submitted,

GeoEngineers, Inc.

  
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Project Geologist

  
Gordon M. Denby, P.E.  
Principal



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Attachments

