

**EXHIBIT J**  
**GEOTECHNICAL REPORT – INFILTRATION RATE ASSESSMENT**



March 29, 2017  
File No. 16-134

Mr. Eric Delfel, P.E.  
**Gray & Osborne, Inc.**  
701 Dexter Avenue North, Suite 200  
Seattle, Washington 98109

**Subject: Geotechnical Evaluation - Infiltration Rate Assessment  
MWWD Lift Station No. 10 Replacement  
Mukilteo, Washington  
G&O #16429**

Dear Mr. Delfel,

As requested, we completed an evaluation to assist you with the infiltration design at the proposed lift station replacement project for the Mukilteo Water and Wastewater District. The existing lift station facility is located near the northwest corner of the intersection of Mukilteo Speedway (State Route 525) and Goat Trail Road in Mukilteo, Washington. The project site is approximately as shown on Figure 1, Vicinity Map.

Our service scope consisted of logging the soils from three infiltration pits excavated for infiltration tests, conducting infiltration tests, exploring the soil conditions below the test depths and summarizing the test results.

### **SUBSURFACE CONDITIONS**

Three infiltration pits (IT-1 through IT-3) were excavated at the site on November 4, 2016 to explore the general subsurface conditions at the project site. The approximate test pit locations were taped from existing site features and are indicated on Figure 2. The infiltration pits were excavated to depths of about 3 feet below the existing ground surface using an excavator owned and operated by Kelly Excavating of Pacific, Washington.

The exposed soil conditions encountered in the in the infiltration pits IT-2 and IT-3 consisted of medium dense to very dense silty sand with gravel, which we interpret as glacial till and are in

general agreement with the test borings previously advanced at the site. However, the soil conditions encountered in infiltration pit IT-1 encountered medium dense, disturbed, fine sandy silt with gravel, which we interpret as glacial till fill, probably sourced on site from previous development.

In general, glacial till consists of a dense to very dense glacially over-consolidated soil deposit that is sometimes referred to as “hardpan”. The soil typically consists of a heterogeneous mixture of sand, silt and gravel, and exhibits high strength properties and low compressibility, and very poor drainage characteristics (i.e., low infiltration rates).

### INFILTRATION TESTING RESULTS

As discussed above, three Small Pilot Infiltration Tests (PIT) were performed to determine a field infiltration rate for the onsite soils. Based on the surface area of the pit, the measured volume of water per hour needed to maintain the constant head, and the time to drain during the falling head period, we calculated the field infiltration rates presented in Table 1 below.

<b>Table 1. Field Infiltration Test Data</b>					
<b>Test Location/Depth</b>	<b>Pre-Soak Duration (hours)</b>	<b>Test Type</b>	<b>Test Duration (hours)</b>	<b>Field Results (inches/hour)</b>	<b>Comment</b>
IT-1 @ 37 inches	6	Constant Head	2	< 0.0625	Tested in disturbed glacial till (fill) / No infiltration observed during pre-soak period
		Falling Head	N/A	N/A	
IT-2 @ 36 inches	6	Constant Head	2	0	Test in native Glacial Till / No infiltration observed during pre-soak period
		Falling Head	N/A	N/A	
IT-2 @ 38 inches	6	Constant Head	2	0	Test in native Glacial Till / No infiltration observed during pre-soak period
		Falling Head	N/A	N/A	

In summary, the site is underlain by glacial till, consistent with the mapped geology. Based on experience with similar soils, it is our opinion that the infiltrate rates of the site soils are

negligible and infiltration if surface runoff at the site is not appropriate. The test results as indicated above are consistent with our experience with similar soils.

### LIMITATIONS

We have prepared this report for Gray & Osborne, Inc., the Mukilteo Water and Wastewater District, and the project design team. Recommendations contained in this report are based on a site reconnaissance, a subsurface exploration program, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

Within the limitation of scope, schedule and budget, PanGEO engages in the practice of geotechnical engineering and endeavors to perform its services in accordance with generally accepted professional principles and practices at the time the Report or its contents were prepared. No warranty, express or implied, is made.

We appreciate the opportunity to be of service.

Sincerely,



Nicholas T. Weikel, E.I.T.  
Staff Geotechnical Engineer



Siew L. Tan, P.E.  
Principal Geotechnical Engineer

### Enclosures:

- Figure 1 Vicinity Map
- Figure 2 Site and Exploration Plan

## REFERENCES

*Minard, J. P., 1982, Distribution and description of geologic units in the Mukilteo quadrangle, Washington: U.S. Geological Survey Miscellaneous Field Studies Map MF-1438, 1 sheet, scale 1:24,000.*

*Washington State Department of Ecology, Stormwater Management Manual for Western Washington, Volume III, 2012.*

*WSDOT, (2016). Standard Specifications for Road, Bridges, and Municipal Construction.*





