

August 24, 2021

JN 21151

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via email: dkoneru@gmail.com

Subject: **Geotechnical Feasibility of Watercourse Restoration**
Proposed Property Redevelopment
6610 East Mercer Way
Mercer Island, Washington

Greetings:

We have been requested to assess the geotechnical feasibility of removing the culvert and restoring the watercourse that currently crosses the northwestern corner of the site. Based on the provided information, a 3-foot-diameter corrugated metal culvert crosses the northwest corner of the property beneath the driveway and several sizable trees. The culvert extends onto the site from beneath the western neighbor's driveway. The portion of this culvert located within the property boundaries is only approximately 30 feet in length, and it then continues onto the adjacent northern lot extending to Lake Washington to the east.

From a geotechnical perspective, removing the on-site portion of the culvert and restoring the watercourse with an open channel is infeasible for the following reasons:

1. The alluvial soils encountered in our borings beneath the entire site are fine-grained and have a very low strength. As a result, the sideslopes of an open channel would have to be inclined at 3:1 (Horizontal:Vertical) for stability and scour protection. Assuming the channel would have to be 3 to 4 feet in depth, the total channel width would then be at least 18 to 24 feet in width. This is impossible without removing: 1) the existing driveway, and 2) the trees growing over the culvert. It would likely then be necessary then to build a bridge across the open channel to restore access to the site.
2. The necessary broad channel width extends onto the northern neighbor's property and impacts their driveway. Additionally, it could endanger existing utilities, such as the sewer and gas line located to the north of the existing culvert.
3. The short section of restored channel would be highly susceptible to erosion, due to the fine-grained, low strength of the alluvial soils. Erosion of the channel bottom would occur over time, and this would carry sediment to Lake Washington. Also, the erosion of the channel could undermine the integrity of the inlet structure and culvert on the northern property, which could easily migrate to causing sinkholes alongside the neighbor's house.
4. The earthwork associated with restoring this short section of watercourse would cause siltation of Lake Washington, regardless of the temporary erosion control measures taken.
5. The culvert would have to remain as-is on the adjacent western and northern properties. This would require the installation of a tailwater structure at downstream end of the western property line and an inlet structure at upstream end of the culvert at the north property line. The loose alluvial soils would not be stable in temporary cuts to construct these structures, requiring the use of temporary shoring, such as driven wide-flange beams.

Please contact us if you have any questions regarding this letter, or if we can be of further assistance.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.



08/24/2021

Marc R. McGinnis, P.E.
Principal

cc: **JMK Homes** – Jed Murphey
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MRM:kg