McMILLEN JACOBS ASSOCIATES

Memorandum

To:	Mark Graham, PE, Stantec Consulting	Project:	Bull Run Filtration Projects – Filtration Facility
From:	Wolfe Lang, PE, GE Jeff Quinn, PE	cc:	Project File
Date:	June 23, 2022	Job No.:	6084.0
Subject:	Gravel Road – Emergency Vehicle Support		

1.0 Introduction

This memorandum has been prepared to document that the gravel access road can support emergency vehicles and is therefore in compliance with the Gresham Fire District's requirement that the "roadway must support fire apparatus weighing 75,000 pounds". The subject gravel road accesses the Filtration Facility from the south via SE Bluff Road and is referred to as "Road B" on the 60 percent civil drawings for the Bull Run Filtration Facility project.

2.0 Roadway Design

McMillen Jacobs Associates (McMillen Jacobs) provided design recommendation for the proposed asphalt pavement and gravel roadways at the Filtration Facility site in the March 2022 report entitled *Geotechnical Engineering Report, Bull Run Treatment Projects, Filtration Facility*. Recommendations presented therein are based on the American Association of State Highway and Transportation Officials (AASHTO) *1993 Guide for Design of Pavement Structures* and the Oregon Department of Transportation (ODOT) *2019 Pavement Design Guide*.

The following gravel roadway sections were recommended for the Filtration Facility site:

- *Overexcavation & Replacement of Unsuitable Subgrade*: 20 inches of base aggregate. A separation geotextile should be placed over the exposed subgrade prior to placement of base aggregate materials.
- *Cement-Modified Subgrade Conditions*: 6 inches of base aggregate.
- *Reinforced Subgrade Conditions*: 8 inches of base aggregate. It should be noted that reinforced subgrade conditions consist of a minimum 6-inch-thick foundation stabilization layer over a filtration/separation and reinforcing geotextile (e.g., an overall 14-inch-thick imported crushed rock section).

The AASHTO design approach calculates the road cross sectional thickness required to withstand the applied loads over its lifespan based on the strength of the road subgrade soils and other factors. The applied loads, referred to as Estimated Single-Axle Loads (ESALs), express the equivalent damage from

each type of vehicle as compared to an 18,000-pound axle load. McMillen Jacobs calculated the proposed roadway design would be able to accommodate 41,000 ESALs over the 20-year design life of the roadway.

3.0 Conclusion

Assuming that one fire truck will drive on the gravel road per month and using the above-referenced VLF of 8 results in 96 annual ESALs. This corresponds to about 1,920 ESALs over the 20-year design life of the roadway, which is less than 5 percent of the 41,000 ESALs used in our design calculations. Due to the anticipated low-volume nature of the subject gravel road, we believe that the ESAL estimates used for the roadway design are conservative. Therefore, we believe that the design sections presented above for the gravel road can accommodate the monthly fire truck.

If there are any questions regarding this memorandum, please contact the undersigned.

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