Multnomah County Land Use Planning Division

Plan Approved

DELVE underground

Technical Memorandum			
Attention	David Peters	cc:	Mark Graham, Stantec
Company	Portland Water Bureau	Address	
Project	Bull Run Filtration Projects: Filtration Facility	Job No.:	6084.0
From	Yuxin "Wolfe" Lang, PE		
Date:	May 8, 2023		
Subject:	Stability of Permanent Steep Slope		

For permitting purposes Delve Underground (Delve) has been asked to review the stability of the steep and tall slopes at the Portland Water Bureau Filtration Facility site. These slopes specifically include permanent, final state slopes steeper than 3 horizontal to 1 vertical (3H:1V) and/or more than 4 feet in height. Please note that this document addresses permanent slopes built as cut or fill during construction and does not address temporary slopes build during construction and slopes near the site that will not be disturbed by construction, such as the Sandy River Valley slopes on the northeast property boundary.

There are 6 areas on the site that have slopes that exceed the outlined criteria. The attached drawing is a marked-up version of Sheet Number 00-LU-506 of the 90% Civil Drawing set dated 09/2022 (Revision C). It is Delve's understanding that this drawing represents the current grading plan. The drawing presents slopes that are steeper than 3H:1V in red, and slopes that are 3H:1V or less but taller than 4 feet in green. The following paragraphs summarize these slopes:

1. Overflow Basins: The two proposed Overflow Basins are 12 feet deep with side slopes at 2H:1V. These basins will be cut into native soil.

2. Stormwater Ponds: At four locations there are proposed stormwater ponds that are 6 to 12 feet deep with side slopes at 3H:1V. These slopes will be cut into native soil.

3. Landform Slope Areas: At two locations there are proposed berms with slopes up to 3H:1V and with maximum heights of 5 and 20 feet. These slopes will be constructed with compacted backfill from soil that has been excavated on site.

A limit equilibrium slope stability analysis was performed using the software SLIDE by Rocscience for the side slopes around the Overflow Basins. The most critical slope cross-section

at the basins consists of the condition where the primary slope is 12 feet high, at 2H:1V, with a back slope above the basins at 7H:1V.

Please reference the Geotechnical Engineering Report (Delve 2/28/2023) for detailed information about the methods used to perform the slope stability analysis, including the seismic parameters, soil parameters, limit equilibrium methods, and groundwater conditions. The static stability was evaluated for short-term conditions using undrained shear strength soil parameters and for long-term conditions using a friction angle and minimum effective shear strength soil parameters. For the seismic cases a pseudo-static, horizontal coefficient of acceleration of 0.288g was used. This acceleration is equal to 1/2 of the PGA for the 2,475-yr seismic event.

The recommended minimum factors of safety (FOS) for static, seismic, and post-seismic limit equilibrium loading cases are, typically, 1.5, 1.1 and 1.1, respectively. The estimated FOS based on the analyses for the static short-term and long-term loading conditions is 6.2 and 2.8, respectively. For the seismic and post-seismic loading cases the estimated FOS is 2.5 and 4.6, respectively. These results indicate that the slopes surrounding the overflow basin are stable for static and seismic conditions.

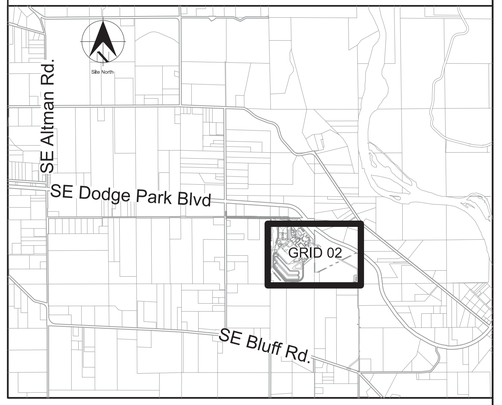
The side slopes of the stormwater ponds and landform berms have soil properties that are expected to be equal to or better than the soil parameters used for the overflow basin slope stability analysis discussed above. Additionally, the slopes are less steep (less than 3H:1V), do not have a backslope above the primary slope, and have more favorable groundwater conditions. The factors impacting the slope stability of these slopes are more favorable than those at the Overflow Basins and are considered stable by inspection.

Based on the results of our subsurface investigations, laboratory testing, and slope stability evaluations detailed here and in the Geotechnical Engineering and Data Reports the permanent slopes in the areas discussed above are considered safe, stable, and will not endanger or disturb neighboring properties.

Exp 12-31-2024

Yuxin "Wolfe" Lang, PE, GE, P.Eng
Principal Engineer
Delve Underground

KEY PLAN



General Sheet Notes

1. See 00-LU-507 for stormwater plan.
2. See 00-LU-508 for landscape plan.
3. Limit of Disturbance is 1ft fro Geohazard line, property line, or SEC-WR line. Temporary Silt Fence is placed at Limit of Disturbance.

Sheet Keynotes

1. Protect Fence. Maintain Temporary Silt Fence minimum 1ft from existing fence.

Legend

- Major Contour
- Minor Contour
- Existing Major Contour
- Existing Minor Contour
- SEC Zone
- Geohazard
- Limit of Disturbance
- Deciduous Tree
- Evergreen Tree
- Existing Water Line
- Existing Fence
- Existing Gas Line
- Existing Overhead line
- Existing Structure
- Existing Edge of Vegetation
- Property Line
- Right-of-Way
- Easement
- Ditch
- Water Valve
- Utility Pole
- Sanitary Maintenance Hole
- Edge of Gravel
- Fire Hydrant
- Site Boundary
- Silt Fence
- Tree Protection Fence
- Inlet Protection
- Cut
- Fill

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0 120 240
SCALE IN FEET

No	Date	Description	Appd
C	09/2022	Second Intermediate Design and BCOE Review - 90% Submittal	MRG
B	01/2022	Intermediate Design - 60% Submittal	MRG
A	07/2021	Initial Design - 30% Submittal	MRG

Revision

Survey

Stantec

Designed By	JSL	Program Mgr	DVP
Drawn By	BYS	Const Mgr	TG
Checked By	LCS	Const Supvr	RM
Project Mgr	MRG	Date	01/03/23

Warning
0 ½ 1
If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683

Date

CITY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility

Civil

Erosion Control Grading Plan
Filtration Facility

SAP Project No
W02229
1/4 Section
3765 / 3766
Sheet No
00-LU-506
of

Plot Date: 9-NOV-2022 20:26 User: stanpw11-pw-svc File: W02229_FF_00-LU-506.dgn Model: 00-LU-304 ColorTable: bw_JPlot.ctb DesignScript: PWB_PenTable.pen PlotScale: 0.083333:1