**BEL-147-25.88, PID 118147**

**Wall Design/Notes**

**8/2/2023**

**Existing conditions**

I am proposing a drilled shaft retaining wall here, approximately 260’ long to connect to an existing soldier pile wall to the east. The shoulder is wide and flat enough for the majority of the proposed wall to consider a plug pile wall for the entire length. There is very evident head scarp cracking which extends beyond the CL of 147. It’s hard to tell if it extends all the way across both lanes, but I’ll “let it” fail somewhere between CL and the south edge line of the road and see what the model shows.

**Geotech Exploration**

We took 3 soil borings here in May of 2023. They are all pretty consistent with shallow bedrock (12-15’ deep), very weak shale, and no major concerns with soft/wet soils just above bedrock. I’m sure I’ll need to model an artificially soft layer to make it fail to top of rock.

**Model**

I cut three sections using Lidar and the surveyed sections from the consultant (for the road and shoulder area). The lidar matches the topo very well. All sections are similar in slope, so I can get away with one design section. I’ll use section “B” for the ground line and B-003 for the soil profile due to slightly deeper bedrock.

**Gstabl Analysis**

For my “unadjusted” initial run, I didn’t utilize the soft rock layer.

Table

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Graphical user interface, chart, line chart

Description automatically generated

The unadjusted F.S. = 1.168 which is slightly lower than I expected, so I shouldn’t have to drop the “soft rock” layer strength much to get a F.S. = 1.00. Dropping c’=105psf and φ’ to 16°, I backcalculated a F.S. = 1.00.

**Downslope Analysis**

Checking the stability of the slope below the proposed wall to know how much passive resistance to account for. “Failing” the lower slope to 6’ from the top of proposed wall, the F.S. = 1.234. Dropping it to 8’, F.S. = 1.310, so I’ll ignore passive resistance for the top 8’ of the proposed wall and ensure my plugs extend at least that deep.

Graphical user interface, chart

Description automatically generated

**UAslope Analysis**

Assuming a wall (beam) offset of 20:

Beam Spacing Load (lb)

3.5’ 26,890

4.0’ 30,731

4.5’ 34,573

5.0’ 38,414

**Lpile Analysis**

My inital “layout” for the wall design will be utilizing 24” king shafts (20’ offset) @ 4’ spacing, and 30” plugs (18’-9” offset).

Final Design:

|  |  |
| --- | --- |
| Wall type | Plug Pile |
| Wall Length/Limits |  |
| King Diameter | 24” |
| Shaft Spacing | 4’ |
| King Offset | 20’ assumed |
| Beam Size | W-16x40 |
| Plugs | 30” diameter, 10’ deep, 18.75’ offset |
| Rock Socket | 10’ minimum |
| Beam Length | Varies. Top-of-rock to be provided @ stage 1 review |

Other acceptable beam sizes:

W-16x45

W-16x50

W-14x53