

Case Study: West River Parkway Slope Failure

CEEn 544 – Seepage and Slope Stability

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Background

On June 19, 2014 around 7 pm a landslide occurred in Minneapolis, MN near the Mississippi River. Luckily, there was no casualties; however, the slope failure caused a safety risk for the hospital that lies on top of the hill and to other citizens that could use the road below the slope. This slope failure lasted for 3 seconds sending about 4000 cubic yards of debris down the slope, over the road, and into the Mississippi River. This slide caused the road to be closed for almost 2 years as a permanent repair was implemented.

In order to fulfill the repairs, 2 companies were hired: Barr Engineering, and Veit and Company. Barr Engineering was hired to investigate the failure and design temporary and permanent designs while Viet oversaw carrying out the construction.

Analysis

The slope that had failed was a 1:1 slope that was 100 ft. high. It had vegetation covering it but due to the heavy rainfall that had occurred which resulted in oversaturating the soil, most of it slid into the river. The type of failure that had occurred was an infinite slope failure.

Remediation

The remediation was done in steps. First temporary solutions were implemented so the slope would not slide further and cost more damage to the hospital foundations above. The initial momentary solution was to use a light geotextile though this had failed as winter had drawn closer and heavy rains caused further slides causing the geotextile to fail, before a final solution was produced, so the geotextile was replaced with a stronger one while permanent solutions were being made.

The goal of the finalized plans by Barr were to implement a terrace to reduce the slope angle. Other various things were done to reinforce the slope and such as soil nails, updating the drainage system, retaining walls, and micropiles were all used during construction of the permanent solution. The existing slope was changed to a 1.5:1 slope and 5 different retaining walls were put in a different elevations and lengths.

The 3rd retaining wall had many micropiles inserted for increased stability. This wall caused the most trouble as they could not continue construction on the other retaining walls until this one was stabilized, but due to the winter weather coming and freezing the soil they had to postpone construction until the spring.

Conclusion

In conclusion, it took a little over 2 years to complete the construction on the slope as well as reopening the road that runs below the slope. They are hoping that the trees and vegetation planted will help provide further reinforcement helping the retaining walls that were implemented. However, there is now a different concern even with the successful installment of the permanent repair. This repair was only applied to the slope that had failed during the heavy rain, but there is no guarantee that the other slopes that run along that section would not fail. Though for right now this remediation to the slope has been successful and shows no sign of future problems.

References

Minneapolis Park & Recreation Board

https://www.minneapolisparcs.org/park_care_improvements/park_projects/current_projects/west_river_parkway_slope_repair/#group_3_864067

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