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Project Summary

Organization
Tierra Group

Project Objectives

- To solve a complex slope stability project in highly variable soil conditions.
- To analyze the corner of an earth dam retaining structure using 3D technology.

Products Used

PLAXIS[®] LE, PLAXIS[®] Designer

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Tierra Group Turns to 3D Analysis to Resolve Complex Slope Stability Project

PLAXIS[®] Designer Creates Conceptual Model of Tailings Impoundment Facility

Tierra Group, a provider of geotechnical, water resources, civil, environmental, and geological hazards engineering, recently made use of the 3D capabilities of Bentley's PLAXIS LE (formerly SVSLOPE) software to analyze the corner of an earth dam retaining structure. Several issues made using 2D analysis applications difficult to implement in this scenario. First, the structure of a corner or a turn in the earth dam needed to be incorporated into the analysis. There is also the difficulty of varying geo-strata beneath the foundation of the engineered earth dam structure. The combination of these two aspects made applying 2D analysis extremely difficult.

Therefore, 3D analysis was performed using the PLAXIS LE software package. The data was first imported into Bentley's PLAXIS Designer to manage the pinch-outs from the collected real-world data. PLAXIS Designer helped the team to develop a properly formed 3D conceptual model of the site. With the 3D model built, the analysis of the stability portion of the dam could proceed in the PLAXIS LE software. Tierra Group identified the slip direction close to the corner, which produced the minimum factor of safety by using the orientation analysis in PLAXIS LE. The resulting analysis also highlighted the interplay between the engineered structure and the geo-strata in the foundation, which had the potential to affect the factor of safety calculation in 3D.

"Tierra Group needed a 3D slope stability analysis to solve a complex slope stability project in highly variable soil conditions. We were able to quickly develop the conceptual 3D model with PLAXIS Designer and PLAXIS LE using topographic data, borehole logs, and 2D geologic cross-sections. Once the conceptual model was built, Tierra Group was able to analyze multiple potential failure locations and orientations in excellent time. The Bentley team responded quickly to questions and spent as much time as was necessary to help. We highly recommend this software for analyzing similar projects."

— Justin Knudsen, P.E. Senior,
Civil/Geotechnical Engineer, Tierra Group

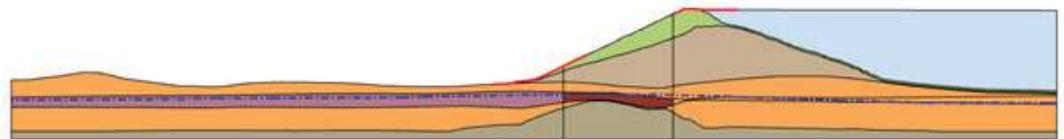


Figure 1 - Cross section of lithology, tailings dam, and tailings.

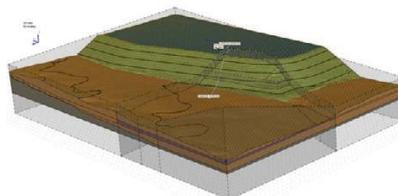


Figure 2 - Geometry of tailings dam.

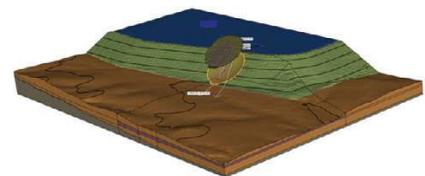


Figure 3 - Example of computed 3D ellipsoidal slip surface.

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