LAND SLIDE ALONG TARMABER KOMBOLCHA ROAD: CASE STUDY

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ABSTRACT

The Tarmaber - Kombolcha road is a section of the major road that connects the northern part of Ethiopia with the capital city Addis Ababa. During rehabilitation of this road, a major landslide took place at 369 km north of Addis Ababa. Considering the risks that were associated with this slide event, the owner of the road (Ethiopian Road Authority) demanded an in-depth investigation of the problem. The aim of this project work was to study the cause of the landslide, based on the geotechnical, geological and other relevant data that were collected during the field work.

As first approach, the slope stability analysis was carried out using soil parameters and ground water condition from the geotechnical investigation. The factor of safety found from this analysis was 1.83 for the failed slope. This called for back analysis computations to find out reasons for the slope failure, when the FoS was so high. From a series of back analysis it was found that the rise of perched ground water level triggers the land slide. The strength parameters from this back analysis correspond to the standard penetration (SPT) results and the material properties that are described in other geotechnical reports. The amount of precipitation during the period of the slope failure was close to the average monthly rainfall in the slide area, but the presence of uncontrolled surface runoff, development of cracks in the 2 m thick expansive soil and presence of spring contribute to the rise of ground water. All slope stability analyses were carried out using a 2D limit equilibrium software named **SLIDE,** which is a part of the Rockscience package.

Fig. 1: View of the Slide Area

TYPICAL RESULTS OF THE PROJECT

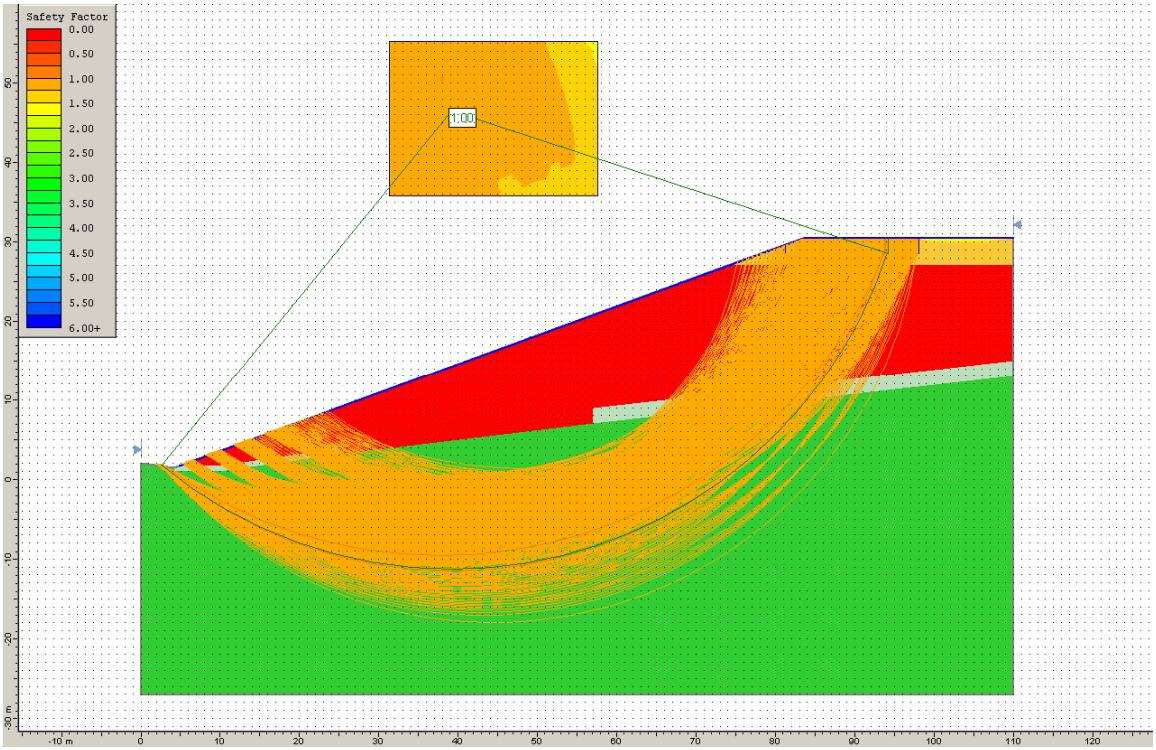

Fig. 2: Back Analysis - Some of the slip surface analyzed

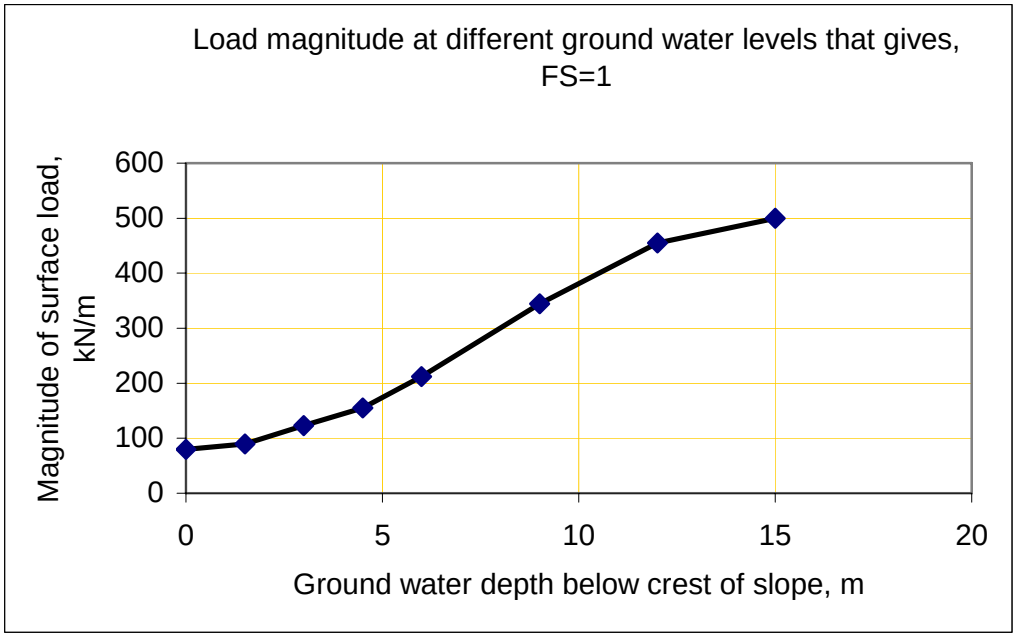

Fig. 3: Back Analysis - Magnitude of surface load that gives unit factor of safety at different ground water table

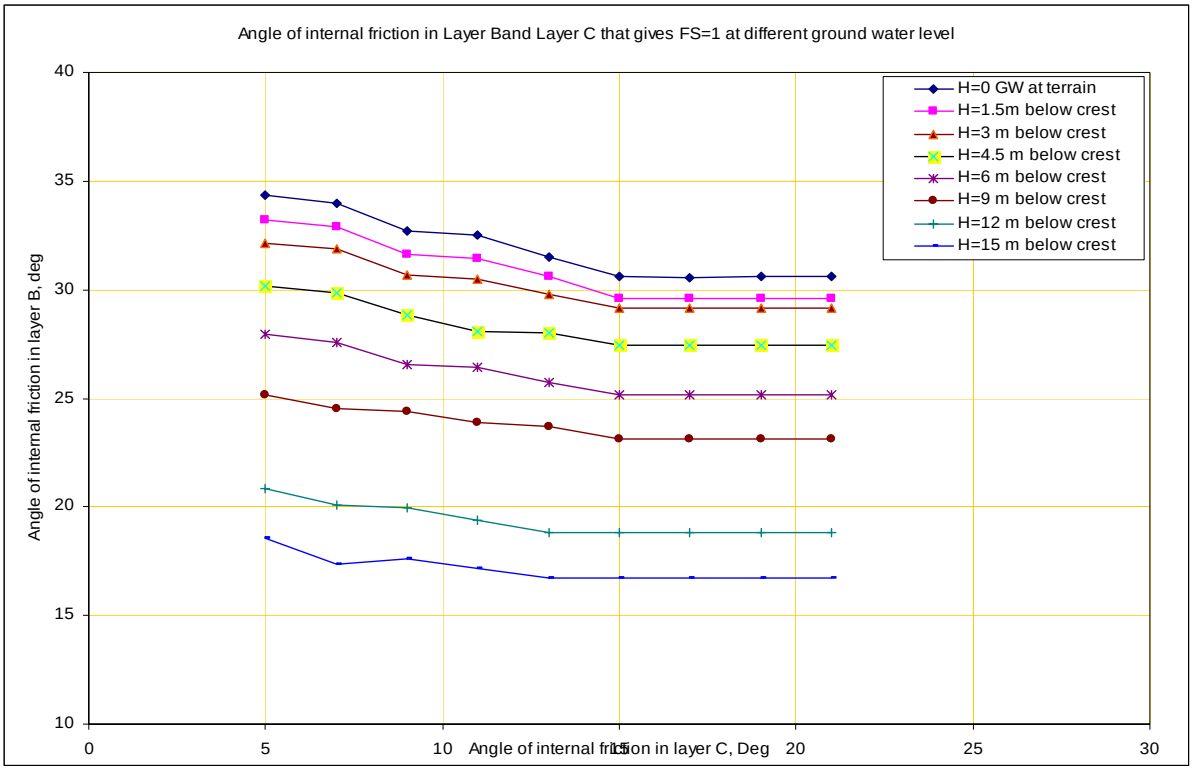

Fig. 4: Back Analysis - Strength parameters that give unit factor of safety at different ground water level

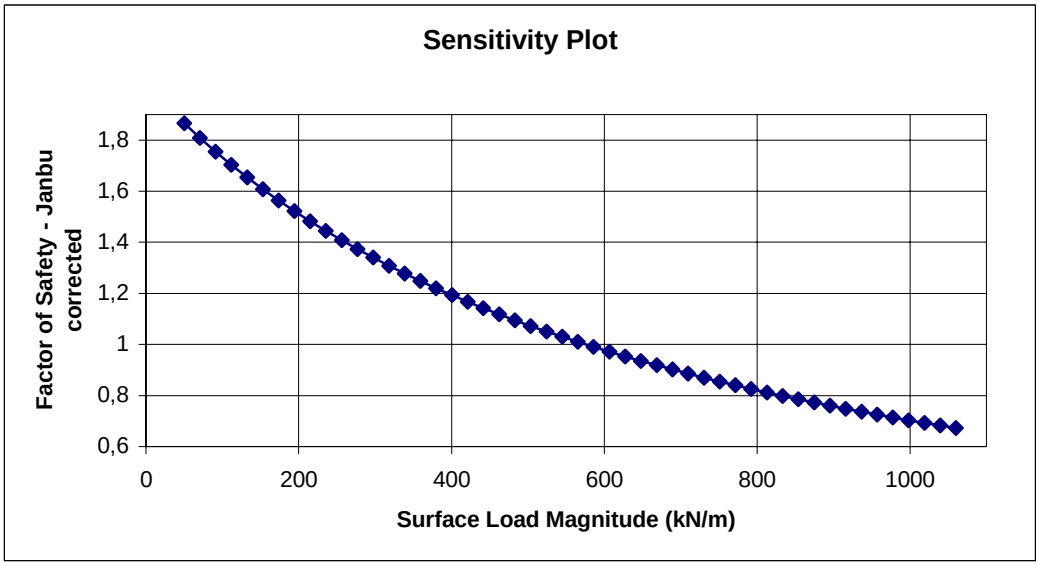

Fig. 5: Analysis results using measured strength parameters - Estimation of surface load that could trigger slide