Rock slope stability assessment using the limit equilibrium method and kinematic analysis on the Tena – Baeza road, sub-andean region of Ecuador

Abstract structure

Road-cut-slope landslides are problems that cause infrastructure damage and fatalities around the world. Here, we assess the stability of 14 rock slopes in the Tena – Baeza road section. The study area lies in the subandean zone of Ecuador, an area with hilly relief and heavy rainfall. We use two analysis techniques: Global Slope Stability and Kinematic Analysis. We computed the safety factors in Slide 2D using two Limit Equilibrium Methods (Bishop simplified and Spencer) and three saturation conditions (dry, 50% saturated and completely saturated). In order to account for the influence of seismic activity on global stability, pseudostatic conditions were considered into the analysis. Kinematic analysis showed that 11 rock slopes have potential of wedge and planar failures. Saturated water table was the main triggering factor for instability and seismic activity did not decreased the safety factors. The slopes were unstable in nearly all the stations under medium and high water saturation conditions. Low Geological Strength Index values indicates that weathering was responsible for the poor quality of rock masses. Slopes S5 S8, S12 are structurally instable and require installing triple torsional mesh.

Key words:

Rock slope stability; Geological strength index (GSI); Kinematic analysis; Limit equilibrium method; rock mass.