

## Slope Stability Analysis and Evaluation of Road Cut Slope in Case of Goro to Abagada Road, Adama

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**Abstract :** Slope failures are among the common geo-environmental natural hazards in the hilly and mountainous terrain of the world causing damages to human life and destruction of infrastructures. In Ethiopia, the demand for the construction of infrastructures, especially highways and railways, has increased to connect the developmental centers. However, the failure of roadside slopes formed due to the difficulty of geographical locations is the major difficulty for this development. As a result, a comprehensive site-specific investigation of destabilizing agents and a suitable selection of slope profiles are needed during design. Hence, this study emphasized the stability analysis and performance evaluation of slope profiles (single slope, multi-slope, and benched slope). The analysis was conducted for static and dynamic loading conditions using limit equilibrium (slide software) and finite element method (Praxis software). The analysis results in selected critical sections show that the slope is marginally stable, with FS varying from 1.2 to 1.5 in static conditions, and unstable with FS below 1 in dynamic conditions. From the comparison of analysis methods, the finite element method provides more valuable information about the failure surface of a slope than limit equilibrium analysis. Performance evaluation of geometric profiles shows that geometric modification provides better and more economical slope stability. Benching provides significant stability for cut slopes (i.e., the use of 2m and 3m bench improves the factor of safety by 7.5% and 12% from a single slope profile). The method is more effective on steep slopes. Similarly, the use of a multi-slope profile improves the stability of the slope in stratified soil with varied strength. The performance is more significant when it is used in combination with benches. The study also recommends drainage control and slope reinforcement as a remedial measure for cut slopes.

**Keywords :** slope failure, slope profile, bench slope, multi slope

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