

GEOTECHNICAL EVALUATION OF LONGTERM STABILITY OF MODIFIED SLOPES: CASE STUDIES FROM KANDY DISTRICT, CENTRAL SRI LANKA

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Constructions in slopes are widespread in the hilly areas of Kandy District, Sri Lanka. Suitable pre-geotechnical modeling of slopes during the site preparation, and their stability during and after the construction period will assist safe buildings in slopes. The present study attempts to overcome the instability problems against recent developments in slopes considering two locations in Kandy, Sri Lanka.

SLOPE/W software was used for slope stability analysis. A correlation between 'M' value of Mackintosh test and 'N' value of SPT was used for the interpretations and engineering properties were obtained through soil testing on undisturbed samples. Effective shear strength parameters were assigned to each layer, to obtain more realistic and accurate critical slip surface for the long-term stability. Laboratory and apparent geotechnical parameters were assigned to each stratum logically correlating the laboratory test values. Realistic pore water pressure was not used for the study, but the ground water table was considered at the shallow depth considering the worst situations. Several sections were tested for the stability and the stability was analyzed using Spencer, Bishop Semi-Rigorous, and Morgenstern and Price (M-P method) limit equilibrium methods. The critical failure surfaces corresponding to the minimum Factor of Safety was obtained using the SLOPE/W software.

The soils of location 1 and 2 were classified to be clayey sand and sand respectively. Both case study locations are marginally safe at present conditions according to the stability results. Critical slip surface during the site preparations and after building construction was obtained. Most suitable mitigation methods were provided with the help of analytical methodologies based on the position of critical slip surface before and after constructions.

Though there are several limitations at the PMT such as its low penetration to the subsurface as well as the usage of it in hard clay or soils containing gravel or cobbles are arguable still the study has used it due to its convenience operating system in a limited budget. Most of the decisions regarding the non engineered constructions are given in qualitative base. Therefore, slope stability process can be used as a qualitative method in decision making process. In that case, SLOPE /W software can be effectively used as a tool for the decision making. Further, among the methods used for the analysis all the methods gave nearly same values, because all methods satisfy both moment and force equilibriums.