PROBABILISTIC ANALYSIS OF SHALLOW TRANSLATIONAL SLIDES

Thesis submitted in partial fulfillment of the requirements for the Degree of Master of Engineering in Geotechnical Engineering

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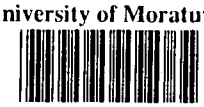

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ABSTRACT

Slope instability is a major environmental hazard, which is widely researched by Geotechnical engineers in the world. In general, there is a vast range of different mechanisms of slope failures. Shallow translational mode of slope failure is one such important mode.

This thesis concentrates on shallow translational form of slope failures. Analysis of shallow translational form of failure is carried out deterministically as well as probabilistically. The probabilistic analysis gives due consideration to the uncertainty of soil strength parameters and pore water pressures.

Analysis are carried out under both saturated soil mechanics theories and unsaturated soil mechanics theories. Two hypothetical examples representative of natural lateritic slopes in Sri Lanka are analysed deterministically and probabilistically.

Finally, the influence of rainfall and wetting front propagation are analysed. The corresponding changes of the probability of failure of the previously unsaturated slope is highlighted. The transition of slope from unsaturated situation to saturated situation with the propagation of wetting band thickness, and the resulting changes in the factor of safety and probability of failure are discussed.

A method of evaluating the overall probability of failure is suggested for further research.

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