USE OF PROBABILISTIC CONCEPTS IN THE ANALYSIS OF CUT SLOPES FOR HIGHWAYS IN RESIDUAL SOILS

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requirements for the Degree of Master of Engineering in
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Abstract

Slope instability is a major engineering and environmental hazard, which is widely researched by geotechnical engineers in the world. Instabilities in manmade cut slopes for different development needs such as Hydro-Power Projects, Highways etc. have become more important in addition to the natural slopes.

Most of these slopes are made of residual soils and vast ranges of different failure mechanisms are possible depending on the weathering profiles and presence of relict discontinuities. The infiltration of water in to the usually unsaturated soils, make the behaviour further complex.

This thesis concentrates on the assessment of the stability of cut slopes and taking decisions regarding the appropriate stabilization measures conducting the analyses in a probabilistic frame work.

Analyses are carried-out for both saturated and unsaturated soil conditions. For this aspect 3 selected cut sections in Southern Transport Development Project (STDP-ADB section) are used for the analyses. Different scenarios are considered to take into account the effects of rain water infiltration, loss of matric suction and increase of pore water pressures. Details from available bore hole investigations and piezometric data monitored under STDP-ADB section are used to obtain the necessary parameters for the analyses.

Considering the complex nature of the possible failure mechanisms in residual soils analyses were carried out for both Circular and Non-Circular modes of failures.

Analyses based on the Monte Carlo probabilistic approach were conducted using the Slope-W- 2003 software.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES