APPLICATION OF UNSATURATED SHEAR STRENGTH PROPERTIES IN SLOPE STABILITY ANALYSIS

Master of Engineering

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DECLARATION

The work included in this thesis in part or whole has not been submitted for any other academic qualification at any institution.

Signature of the Candidate

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ABSTRACT

It is very important to study applications of unsaturated soil properties in slope stability analysis due to the additional shear strength an unsaturated soil possesses. Shear strength of an unsaturated soil is strongly related to the amount of water in the voids of the soil, and therefore to the matric suction. It is postulated that the shear strength of an unsaturated soil should also bear a relationship to the soil-water characteristic curve.

In this thesis, the effect of unsaturated shear strength properties on stability of slopes is investigated by analysing for the stability of hypothetical cut slopes.

The effect of the position of water table below the failure surface of hypothetical cut slopes were analysed using Slope/w software for different water table positions for three different cut slope angles.

For this work, analyses were done by replacing the cohesion by the apparent cohesion values. Apparent cohesion values were increased by increasing the depth of water table and increasing the effect of negative pore water pressure. Different apparent cohesion values corresponding to the different percentage of negative hydrostatic pressures were utilized.

Spreadsheets prepared by a previous research were used to analyse the hypothetical cut slopes by the Modified Janbu's Method of slices for unsaturated soils. The negative pore water pressure could be directly taken into account in this method, and the Factors of Safety (FOS) derived by this method are compared with the results from SLOPE/W software.

Variation of FOS with slope angle and position of water table are investigated. The parametric study done here gives an insight into the problem of landslides. Lowering of the Water Table is been to increase the FOS against sliding failure, as expected.

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