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Strength Mobilisation of Rock Masses in Relation to Deep Seated Landslide

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Almost any form of analysis used in the design of slopes, foundations and underground excavations in rock requires reliable estimation of the strength and deformation characteristics of rock masses. The Hoek-Brown Failure Criterion, which was developed in the late 1970s, suggests that rock mass strength is dependent primarily on lithological type, fracture spacing and intact rock strength relative to the in-situ stress level.

This criterion is applicable to fractured rock masses where the potential for simple kinematical failure along individual discontinuities is not possible. In other words, it should not be applied to the analysis of structurally controlled failures. A fundamental assumption of the Hoek-Brown criterion is that the rock mass to which it is applied is homogeneous and isotropic. Thus, the simple hypothesis to be tested is: *Does the Hoek-Brown (HB) Failure Criterion adequately characterise the strength of slopes in rock masses?*

The rock mass strength of material from failures in rock slopes was examined. Standard rock mass classification, GSI, was employed during fieldwork and intact samples were tested for strength. Back analysis was employed using limit equilibrium and finite element methods to conduct slope stability analyses and determine the likely rock mass strength and the HB characteristics. The research revealed that the HB criterion overestimated the cohesion but is accurate in estimating the friction angle. It was also noted that the GSI value obtained from back analysis is not representative of the rocks' properties in the field. The GSI criterion needs adjustment in order to increase its applicability and to characterise materials with discontinuities that control the strength.

The results of this research will assist engineers and engineering geologists to have a better understanding in selecting reliable estimates of the strength and deformation characteristics of rock masses in the analysis of the design of slopes.