**Slope Stability Analysis of Sitio Cabading, Antipolo, Philippines Incorporating Unsaturated Shear Strength Formula**

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**Extended Abstract**

The Philippines, considering its tropical climate and mountainous topography, is very prone to earth disasters and typhoons. Rainfall-induced landslides are common phenomena in sloped areas under heavy rainfall. Rainfall-induced landslides are cause by the infiltration of water in the soil surface, which increases the pore water pressure of the soil and consequently reducing its effective stress holding the soil mass together. To study the risk posed by this earth disaster, slope stability analysis should be employed. Classic slope stability analysis generally uses the saturated shear strength of soils as basis for computations of factor of safety. The effects of the unsaturated region in the soil are simplified and are considered negligible due to the relative complexity of this aspect of soil mechanics. However, unsaturated soils contribute to the strength of the slope for it exhibits matric suction. The additional shear strength of unsaturated soils were incorporated in the slope stability analysis in this study. A site surrounding Cabading Elementary School, Antipolo, Rizal was investigated. The rainfall event during the Habagat last August 2013 was simulated for transient seepage as the triggering factor. Generalized limit equilibrium (GLE) method was employed to analyze circular slip surfaces. All computations used the software Slide 6.0 by Rocscience to perform seepage groundwater conditions and slope stability analysis by finite element method. A parametric study was done to relate the shear strength parameters to slope stability: dry unit weight, effective internal angle of friction, effective cohesion, unsaturated shear strength angle, and air entry value. The parametric study observed that the effective internal angle of friction and the unsaturated shear strength angle have the most influence in the factor of safety of slopes. The dry unit weight of the soil has an inverse relationship with factor of safety. Moreover, unsaturated shear strength provide great effect in the stabilization of slopes for initially dry soils. The site specific study tested the site for failure without antecedent rainfall (Case 1) and with antecedent rainfall (Case 2). For dominantly dry soils, the unsaturated shear strength greatly augments the stability of slope, increasing the factor of safety to over 1 and having computed minimum surfaces as deep as around 5 meters. For slopes with a high initial water table, the factors of safety with unsaturated strength incorporated approach those that considers saturated strength only. Use of unsaturated shear strength function in slope stability depends on the pore pressure distribution profile and the assumptions of the analysis method. Slopes that dissipate positive pore pressures rapidly can take advantage of the additional soil strength provided by the unsaturated soils.

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