



Title: Relationship Between Shear Strength and Soil Water Characteristic Curve of an Unsaturated Granitic Residual Soil

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Abstract: Shear strength parameters are crucial for stability analyses of slopes against slope failures and landslides. The three shear strength parameters that are required to define a failure envelope of an unsaturated soil are c' (apparent cohesion), Φ' (effective angle of friction) and Φ_b (shear strength change with change in matric suction). A soil-water characteristic curve (SWCC) that relates the water content of a soil to matric suction is another important relationship for the unsaturated soil mechanics. The SWCC essentially shows the ability of an unsaturated soil to retain water under various matric suctions. This study concentrates on the shear strength-SWCC relationship that has been carried out on an unsaturated granitic residual soil. It is observed that the failure envelope of an unsaturated soil is non-linear due to the non-linear soil water characteristic curve (SWCC). At low matric suctions, where the suction is lower than the air entry value of the soil, the soil is at or near saturation condition and behave as though it was saturated. Consequently an increase in matric suction produces the same increase in shear strength as does an increase in net normal stress. However, at matric suctions higher than the air entry value of the soil, the soil starts to desaturate. The increase in shear strength with respect to matric suction becomes less than the increase with respect to the net normal stress.