

## ESTABLISHMENT OF SOIL WATER CHARACTERISTIC CURVES FOR SRI LANKAN RESIDUAL SOILS

Ranasingha R.H.A.T.D.\* and Kulathilaka S.A.S.

Department of Civil Engineering, University of Moratuwa, Moratuwa

The water content in an unsaturated soil is a function of the suction present in the soil. This relation between soil water content and suction could be represented by the soil-water characteristic curve, which is a plot of volumetric water content vs suction. SWCC is a fundamental characteristic for forecasting other soil characteristics such as permeability characteristics and unsaturated shear strength of the soil. As a result, SWCC plays an important role in identifying the engineering characteristics of a soil.

Rain induced slope failures are a major challenge faced by Sri Lankan Geotechnical Engineers. As most of the slopes in Sri Lanka are formed by residual soils, establishment of Soil Water Characteristic Curve - SWCC for Sri Lankan Residual soils is very useful in predicting rain induced slope failures. Soil Water Characteristic Curve (SWCC) is necessary to model the loss of matric suction caused by rainfall infiltration into a soil.

Pressure plate apparatus method and Method of continuous measurement are two methods used to derive the curve experimentally. These methods are accurate but time consuming and expensive. There are also empirical methods of deriving SWCC using particle size distribution and plasticity limits. However, to gain confidence in using them, results obtained by the two techniques should be compared. In this research study, empirical methods by Arya & Paris (1981), Zapata (1999), Fredlund & Xing (1994) and Van Genuchten (1980) are compared with experimental methods.

Series of tests were done on different types of Sri Lankan Soils. Manufactured sand (Fine) and a lateritic soil were used in this research. Manufactured sand obtained from crushing of rock and rock particles were sieved through 0.425mm size sieve to obtain the test samples and Lateritic Soil was sieved through 10mm size sieve. According to results obtained from this research study SWCC obtained for Manufactured sand using Van Genuchet, Zapata and Fredlund and Xing methods are in close agreement with the results obtained experimentally from the method of continuous measurements. The air entry value for the soil is nearly 7-8 kPa. For Lateritic soil, Van Genuchet and Fredlund and Xing models are in close agreement with the results obtained experimentally from the method of continuous measurements. The average air entry value is nearly 25-30 kPa.

After comparing the results, it could be concluded that the most reliable and appropriate empirical methods to derive the SWCC empirically are Van Genuchet and Fredlund and Xing models. Fredlund and Xing model is more useful as it can be incorporated with SEEP/W software in modelling of permeability curve.

**Keywords: soil water characteristic curve; matric suction; volumetric water content; tensiometer; empirical methods**

\* Correspondence: [thamaridinusha@gmail.com](mailto:thamaridinusha@gmail.com)