UNDRAINED SHEAR CHARACTERISTICS OF A SRI LANKAN RESIDUAL SOIL IN THE UNDISTURBED AND REMOULDED STATES

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'A Residual soil is a soil-like material derived from the in-situ weathering and decomposition of rock which has not been transported from its original location'; would be a reasonably general definition for a residual soil as there is none universally accepted.

In Sri Lanka, more than 90% of the land is made up of highly crystalline rocks belonging to the South Indian Shield. The tropical weathering environment accelerates the formation of residual soils, which are found almost everywhere in the island. However, these local residual soils have received little attention mainly because of their inhomogenity, anisotropy, difficulties of sampling and testing, and often being unsaturated.

The present study concentrates on a series of undrained triaxial compression tests performed on a residual soil collected from a weathering profile located in Kandy to investigate the essential differences in shear behaviour of a residual soil in the undisturbed and remoulded states.

Block samples were extracted with exceptional care to produce undisturbed specimens, while reconstituted specimens were prepared from slurry.

All specimens were sheared under isotropically normally consolidated conditions. In addition some tests on the remoulded specimens were carried out at a higher rate than that obtained following the standards to identify the effect of the rate of loading. An attempt was made to predict the behaviour of the soil considering the soil specimen to be a single element using the Modified Cam-Clay model.

Through the experimental and analytical results it is found that the residual soil in the undisturbed state behaves as if overconsolidated showing dilatory behaviour while the remoulded soil exhibits a contractive behaviour. It is also observed that the remoulded soil produces geometrically similar undrained stress paths when a rate of axial strain, obtained following the standards, is adopted in testing. Consequently, that behaviour of residual soil in the remoulded state is predicted reasonably well by the Modified Cam-Clay Model up to the critical state. However, the characteristics of the remoulded soil after reaching the critical state is beyond the descriptions that can be made through the Modified Cam–Clay model. Moreover, the stress ratio q/p′ at failure remain almost the same for the residual soil irrespective of the disturbance, consolidation pressure, and the rate of axial strain thus plotting a unique critical state line for the soil.