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BEHAVIOUR OF KESWICK CLAY UNDER TRIAXIAL COMPRESSION CONDITIONS

by

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ABSTRACT

Expansive soils are characterised by total suction which is composed of matrix and osmotic suction whose changes result in a different stress-strain response. In the field, rain water, or gardening water; and in the laboratory triaxial tests use of distilled water as pore water changes the concentration and the type of ions in the soil pore water.

This research project investigates the relation between total suction and effective stress when applied simultaneously to the sample under triaxial conditions, and their effects on the measured shear strength and stress-strain behaviour of the samples. Consolidated, and unconsolidated triaxial tests, were conducted on "undisturbed" soil samples of Keswick Clay from Adelaide parklands. Tests included "high" pressure tests in which the cell pressure exceeded the in-situ total suction, as well as "low" pressure tests where the cell pressure was less than the in-situ total suction. Changes in total suction during the test were measured and compared to the applied effective stresses.

The results show that in UU tests, the change in total suction was depended on the initial total suction of the sample, the initial degree of saturation and the confining pressure. In CIU tests, the change in total suction was related with the change in effective stress and the initial total suction of the sample. The total suction measured after CIU triaxial tests was found to be directly proportional to the effective consolidation pressure. This linear trend was also found to apply for UU triaxial tests if the samples were allowed to reach uniform value of suction throughout the sample.

The undrained shear strength in UU triaxial tests, normalised with respect to either equivalent effective stress or total suction did not result in unique relationship, possibly due to stress history effects. Prediction of the in-situ overconsolidation pressure (OCR) using the modified Cam Clay model resulted in similar ratios to those found in previous tests on remoulded Keswick Clay. However, the variation of Bishop's pore pressure coefficients A_f, or A_r with OCR was found to lie above the established ranges of the experimental data. In CIU triaxial tests the undrained shear strength of the sample was directly proportional to both effective consolidation pressure and total suction of the samples after test.

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