

INFLUENCE OF SWELL ON SHEAR STRENGTH OF EXPANSIVE SOILS

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ABSTRACT

This study experimentally investigates the change in shear strength of expansive soils with the amount of swell. Series of swell tests were carried out using a hydraulic triaxial stress path cell on expansive shale samples having different initial water contents and subjected to different confining pressures. The soil samples were sheared under strain controlled loading using a motorized screw control cylinder connected to the triaxial apparatus. For each value of confining pressure, five shear tests were performed. In the first test, the soil sample was sheared without allowing for swell to take place (i.e. 0% swell) which is considered as a reference test. In the second test, shearing was conducted after the sample was allowed to swell until the vertical swell ceased (i.e. 100% swell). In the third, fourth, and fifth tests, the samples were sheared when the vertical swell reached, respectively, 25%, 50%, and 75% of the ultimate vertical swell measured in the second test. The ratios of the shear strength of the swelled samples to the shear strength of the sample in which no vertical swell was allowed were calculated. Test results have shown a significant influence of the amount of swell on the measured shear strength of the tested soil. In particular, the average value of the shear strength for samples allowed to reach ultimate vertical swell was only about 10% of that for samples that were sheared before swelling.

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