

Laboratory Investigation of Compacted Clay-Sand Soils Used for River Dyke Construction

Abstract— For the design and stability analysis of embankments, strength and stiffness properties of compacted clay-sand mixed soils with varying water content and dry unit weight are necessary. A widely applicable linear Mohr-Coulomb strength criterion can be used for the interpretation of the strength of such soils, but the strength parameters, particularly apparent cohesion as a result of dilation in densely compacted specimens produced an uncertainty in the calculation of factor of safety for the shallow slope stability analysis. In this study, a series of constant-volume direct shear tests and unconfined compression tests were performed on the compacted specimens of two different clay-sand mixed soils to investigate the undrained strength behaviour. The undrained effective and total stresses strength parameters were derived, which indicated that the apparent cohesion was significant for the state close to the optimum but decreased gradually towards the wetter side, but the angle of internal friction did not show significant variation between the states. Finally, the unconfined compressive strength and deformation modulus increased with decreasing water content, increasing dry unit weight and increasing degree of compaction (the ratio of in-situ dry density to maximum dry density from the laboratory compaction tests) following power functions.

Keywords— *Compacted Soil, Compaction States, Undrained Strength, Apparent Cohesion, Dilation*