

Effect of Mixing Fine Sand on the Drained Shear Strength of Completely Decomposed Granite Soil.

ABSTRACT

Experimental test results presented in this paper were from a series of triaxial compression tests studied under drained conditions for Completely Decomposed Granite (CDG) soil mixed with fine sand content of (0, 10, 20, 30, and 40%). The CDG soil showed high compressibility during isotropic consolidation, probably due to the use of the moist tamping method and the effect of weathering degree on the soil structure. The tests results produced a unique Critical State Line (CSL) in the e - $\ln p$ plane, and these lines were parallel for each mixture and moved downward with increasing fine sand content. The fine sand content, at which the intergranular void ratio of the CDG-fine sand mixture became equal to e_{max} for plain CDG soil, was named as Transition Fine Sand Content (TFSC), which occurred at 20-30% fine sand content. Normalization of the critical state stresses showed that for the samples with low P/P_c between 0.58 and 0.65 (i.e. the CDG soil mixed with fine sand), the stress paths moved directly towards the critical state without passing through the boundary surface of the soil mixture, which revealed the impact of the fine sand addition to the CDG soil structure, reflecting an improvement in the soil strength behavior by developing a strong interlocking among the particles of the mixture. It was also observed that a small portion of stress paths could pass through the boundary of Hvorslev surface in the case of low fine sand content (10 %) and the boundary of Hvorslev surface observed clearly in the case of plain CDG soil. The friction angle increased at steady state from 28°-32.6°, and the cohesion decreased from 15 to 8.3 kN/m² with increasing fine sand content. A comparison of critical state parameters and strength properties between weathered granite CDG soil from Malaysia and Hong Kong were also made and summarized in this study.

Keyword: Critical state; completely decomposed granite soil; triaxial compression; transition fine sand content.