

Effect of Fines on Liquefaction Susceptibility of Sandy Soil

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Abstract : Investigation of liquefaction susceptibility of materials that have been used in embankments, slopes, dams, and foundations is very essential. Many catastrophic geo-hazards such as flow slides, declination of foundations, and damage to earth structure are associated with static liquefaction that may occur during abrupt shearing of these materials. Many artificial backfill materials are mixtures of sand with fines and other composition. In order to provide some clarifications and evaluations on the role of fines in static liquefaction behaviour of sand sandy soils, the effect of fines on the liquefaction susceptibility of sand was experimentally examined in the present work over a range of fines content, relative density, and initial confining pressure. The results of an experimental study on various sand-fines mixtures are presented. Undrained static triaxial compression tests were conducted on saturated Perth sand containing 5% bentonite at three different relative densities (10, 50, and 90%), and saturated Perth sand containing both 5% bentonite and slag (2%, 4%, and 6%) at single relative density 10%. Undrained static triaxial tests were performed at three different initial confining pressures (100, 150, and 200 kPa). The brittleness index was used to quantify the liquefaction potential of sand-bentonite-slag mixtures. The results demonstrated that the liquefaction susceptibility of sand-5% bentonite mixture was more than liquefaction susceptibility of clean sandy soil. However, liquefaction potential decreased when both of two fines (bentonite and slag) were used. Liquefaction susceptibility of all mixtures decreased with increasing relative density and initial confining pressure.

Keywords : liquefaction, bentonite, slag, brittleness index

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