

Characterization of Liquefaction Resistance of Aged Soils

A research team consisting of Clemson University, the University of South Carolina, and S&ME has recently been awarded funding from the National Science Foundation (NSF) to study the liquefaction resistance of aged soils. Dr. Ron Andrus, Associate professor of Civil Engineering at Clemson University is the principal investigator. Professors Sarah Gassman and Pradeep Talwani of the University of South Carolina and Mr. Billy Camp of S&ME are co-principal investigators. The objective of the 3-year study is to gain a better understanding of the effect of soil age on liquefaction resistance as well as the effects of age on penetration resistance and shear wave velocity. These factors are the common parameters used to evaluate liquefaction potential.

Liquefaction is the loss of soil strength due to ground shaking generated by an earthquake. This loss of strength can cause building foundations, utilities and other structures to fail due to large lateral soil displacements and excessive settlement. Because the cost of protective measures against liquefaction can be high, a reliable evaluation of a soil's liquefaction potential is important when choosing a building site and making foundation recommendations.

Current evaluation procedures for liquefaction are most often based on the observed performance of soils less than a few thousand years old. However, there is some evidence that older soils are more resistant to liquefaction. The current study seeks to shed significant new light on evaluating liquefaction potential in older soils by evaluating existing case histories with respect to age, conducting cyclic triaxial tests and micrograph analyses on undisturbed soil samples of various ages, and characterizing the *in situ* properties of six (three paleoliquefaction and three no-liquefaction) sites of various ages in the South Carolina Coastal Plain (SCCP). The SCCP is an ideal location for site studies for this project, because most of the South Carolina coastal plain consists of soils much older than ten thousand years.

The study will provide the basis for additional field-work and research using the NSF-sponsored Network for Earthquake Engineering Simulation (NEES) equipment (e.g., large-scale mobile shakers), blast-induced liquefaction studies, and pile load tests.