A Marie Sklodowska-Curie Project

ReStructure 2.0 Webinar Series

5pm March 17, 2022 (Time Zone: Europe/Rome)

Influence of Soil-Structure Interaction on Ground Failure

Abstract: Ground failure due to liquefaction and/or cyclic softening is generally performed for free-field conditions due to vertically propagating shear waves. Shear stresses on horizontal and vertical planes are therefore utilized to characterize demands. However, stress paths beneath structures are more complicated and involve principal stress directions that may differ significantly from direct simple shear, and soil-structure interaction may therefore significantly contribute to ground failure potential. This webinar will present a ground failure evaluation methodology that extends traditional free-field procedures by incorporating stresses induced on soil by shallow strip footings. A new invariant-based cyclic stress ratio is formulated to incorporate SSI demands, which are computed using elasticity theory. The new approach is used to evaluate the results of centrifuge models with structures resting on low plasticity fine-grained soils, and factors of safety beneath the structures are shown to be significantly lower than in the free-field. The proposed method produces predictions that agree better with observed settlements and rotations. Although this presentation focuses on shallow strip footings, the method is fundamentally extensible to other loading conditions.

Presenter Bio-Sketch: Scott J. Brandenberg is a Professor in the Civil and Environmental Engineering Department at the University of California, Los Angeles. His research expertise lies primarily in geotechnical earthquake engineering, with focus on soil-structure interaction, multi-hazard reliability of levee systems, the response of deep foundations to liquefaction-induced lateral spreading, seismic earth pressures acting on earth retention systems, and cyberinfrastructure projects, including development of community databases for liquefaction assessment. He has authored over 100 technical papers, and received the 2015 Walter L. Huber Award, 2013 Shamsher Prakash Research Award, and 2010 Arthur Casagrande Professional Development Award. He earned his PhD and MS in 2005 and 2002, respectively, from the University of California, Davis, and his BS in 2000 from Cal Poly, San Luis Obispo. He served as the Associate Dean for Diversity and Inclusion in the UCLA Samueli School of Engineering from 2017 through 2020.

Subscription form