6th Annual Web Conferences 2020
Technical Committees

Live Streaming Daily – Technical Case Studies

December 6 – 10, 2021

The Geo-Institute Earthquake Engineering and Soil Dynamics Technical Committee will live-stream the session *"Practical Implications of Recent Advances in Earthquake Engineering and Soil Dynamics"* on Wednesday, December 8 at 11 AM EST. The topics include:

"Liquefaction Assessment of Gravelly Soils in the Laboratory and Field - A Case-Study", **Adda Athanasopoulos-Zekkos**, Ph.D., M.ASCE

Two of Cephalonia's main ports, Lixouri and Argostoli, were impacted by the liquefaction of gravel-size fills and experienced significant lateral displacements (up to 1.5 m), following the sequence of two major earthquakes with moment magnitudes of 6.0 and 6.1 that hit the island in Greece in 2014. The performance of these ports during the two earthquakes has been documented in detail as part of a GEER post-earthquake reconnaissance effort. This presentation will focus on the characterization of the gravelly earthfills using the Dynamic Penetration Test (DPT) with energy measurements and the Multi-Channel Analysis of Surface Waves (MASW) technique to measure shear wave velocity (V_S) at several locations in each of the two ports. The DPT and V_S measurements are then used to evaluate the liquefaction potential of these materials. Additionally, numerical analyses using the Finite Difference method were performed to evaluate the seismic performance of the port quay walls and the results are compared to the observed response. Three commonly used constitutive models (PM4Sand, UBCSand, and URS/ROTH), calibrated based on in-situ site investigation data, were considered in modeling the liquefiable earthfills, and the results will be discussed.

"*Practical Considerations for using Probability of Liquefaction in Design*", **Kevin W. Franke**, Ph.D., P.E., M.ASCE

Based in part on recent liquefaction model developments and on conversations with numerous engineering practitioners, two troubling trends in the common application of probabilistic liquefaction triggering models in design have been identified. First, many engineers employ only model uncertainty in probabilistic liquefaction triggering analyses, which may significantly underestimate the actual uncertainty and hazard involved in an analysis. Second, many engineers apply a factor of safety "buffer" to already-conservative deterministic liquefaction triggering curves defined from probabilistic studies. This combination may result in significant (and unintended) over-conservativism in a triggering analysis. When considered jointly with the conditional probabilities associated with unacceptable liquefaction hazard (e.g., design ground motions, triggering, and consequences), it appears that we, as a profession, often over-predict the actual risks from liquefaction-related effects. Perhaps it's time for our profession to shift the paradigm.

"*From Post-Earthquake Reconnaissance to Empirical Methods and Practical Application*", **Christine Z. Beyzaei**, Ph.D., P.E., M.ASCE

Post-earthquake reconnaissance provides the opportunity to observe full-scale geotechnical effects in the field that cannot be replicated in the lab. Observations are documented in case histories, which are then used to develop or evaluate empirical methods for practical application. Laboratory testing, physical modeling, and numerical modeling are used to investigate specific aspects of field observations that cannot be isolated and understood based on field observations alone. New tools and technologies have allowed for the collection of unprecedented quantities of data but translating the data into meaningful case histories requires careful curation and subsequent research. This presentation will discuss how case histories are developed and how they inform the advancement of empirical methods, focusing on liquefaction observations from recent earthquake events. Research efforts following the 2010-2011 Canterbury earthquake sequence will be presented to demonstrate case history development and integration in global databases, the evaluation of currently established CPT-based liquefaction assessment procedures, and investigation of practical considerations related to thinly layered soil deposits.