

CHARACTERIZATION OF GRAVELLY SOILS FOR LIQUEFACTION ASSESSMENT

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ABSTRACT

Liquefaction is a leading cause of significant damage to civil infrastructure in nearly every earthquake resulting in substantial direct and indirect economic losses. Although techniques for evaluating liquefaction in sandy soil are well developed, the field is less mature when it comes to gravels and gravelly soils. A significant number of gravel liquefaction case histories have occurred during more than 27 earthquake events over the past 130 years, however assessing the potential for liquefaction of gravelly soils in a reliable, cost-effective manner has always posed a great challenge for geotechnical engineers. The large particle size of gravels can lead to artificially high penetration resistance values when using traditional in-situ investigation methods such as the CPT and SPT tests. Liquefaction assessment is particularly important for older dams that were constructed on gravelly foundations or with poorly constructed (sometimes without any deliberate compaction) gravel and rockfill zones before the potential for gravel liquefaction was recognized. Likewise, many ports around the world have been constructed of gravelly soils using poor construction methods, which were once believed not to be susceptible to liquefaction. However, gravel liquefaction has caused significant damage to ports in Japan, Greece, Chile, Ecuador, and New Zealand. Recently, significant efforts have been made to improve methods for liquefaction assessment in gravels and to develop direct correlations based on field case histories. Larger penetrometers such as the Becker Penetration (BPT) and the dynamic cone penetrometer (DPT) are being correlated with gravel liquefaction resistance. Likewise, a variety of geophysical techniques, including non-invasive techniques such as SASW, MASW, crosshole, and suspension logging methods, are being used to evaluate gravel liquefaction based on the shear wave velocity. These advancements are occurring in countries around the world including China, Japan, the US, New Zealand, Chile, Greece, Croatia, and South Korea. This mini-symposium would highlight recent research advancements as well as case histories, and presentations by dam and port safety agencies. This mini symposium will facilitate a discussion among academics and practitioners and catalyze the dissemination of new procedures and knowledge.