Vancouver Geotechnical Society
A Local Section of the Canadian Geotechnical Society

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NOTICE OF UPCOMING TECHNICAL PRESENTATION
Wednesday, 8 December 2021

TOPIC: **The effects of soil gradation on the liquefaction triggering and deformation response of embankments**

SPEAKER: **Trevor J. Carey, Ph.D. – Assistant Professor, Department of Civil Engineering, The University of British Columbia.**

Trevor Carey Ph.D. is an Assistant Professor of Geotechnical Engineering at the University of British Columbia. Before joining the Department of Civil Engineering at UBC in July 2021, he was a Postdoctoral Scholar at the University of California at Davis. He has degrees in Geotechnical Engineering (UC Davis, Ph.D. 2019), Structural Engineering (Oregon State University (OSU), M.S. 2014), and Civil Engineering (OSU, B.S. 2012). His work focuses on the development and the use of system-level experiments to mitigate the impacts of natural or anthropogenic hazards on the built environment. He has experience designing experiments to elucidate specific system-level behaviors, to better understand these behaviors, or validate numerical tools. Dr. Carey was selected as one of the 2018/2019 recipients of the EERI/FEMA NEHRP earthquake hazard reduction graduate student fellows. He is also the recipient of the 2019 I.M. Idriss award for Excellence in Geotechnical Engineering.

CONTENT: The liquefaction case-history database was primarily established from observations at sites consisting of relatively clean, poorly graded sands. These case histories serve as the basis for design practices but do not represent all liquefiable soil gradations found in the built environment. This has led to the use of poorly graded sand-based analysis procedures during the design and retrofit of embankments, which are typically constructed with well-graded soils. A poorly graded sand-based design procedure ignores the lower void ratios and higher peak strengths of well-graded soils. There is also an implicit assumption that the pre-and-post-liquefaction triggering behaviors of well-graded soils are the same as poorly graded sands.

Described in this presentation is a centrifuge test program undertaken to investigate how sand gradation affects the system-level performance of embankments subjected to strong shaking. The experiment design consisted of two identically instrumented submerged 10-degree embankments positioned side-by-side in the same model container. One of the embankments was constructed with poorly graded sand, representative of the sand in the case-history database, and the other with well-graded sand. The embankments were dry pluviated to the same relative density, but the absolute densities of the sands were different. Results showed that embankments constructed at equal relative densities would both liquefy (i.e., the excess porewater pressure ratio (r_u) reach 1.0). However, the post-triggering consequences were less severe for the embankment constructed of well-graded sand. Greater resistance to the generation and faster dissipation of excess porewater pressures coupled with stronger dilatancy of the well-graded sand increased stability, curtailing deformations. This work demonstrates that soil gradation properties should be accounted for in the liquefaction evaluation procedures to improve the accuracy of deformation predictions, required for performance-based design.

DETAILS: **Technical Presentation: 5:30 p.m. to 6:30 p.m.**
Link: https://attendee.gotowebinar.com/register/3318968001931358887