Seminar lecture by

Prof. Kyle M. Rollins, Ph.D.

Professor of Civil & Construction Engineering
Civil and Environmental Engineering Department
Brigham Young University

Politecnico di Torino

DISEG

LIQUEFACTION-INDUCED DOWNDRAG IN PILES

Thursday, October 27th
4:30 PM
Albenga Room
DISEG Door 1, Second Floor
Light refreshment follows

To improve our understanding of downdrag on deep foundations in liquefied soil, Prof. Rollins has conducted a series of full-scale tests using blast induced liquefaction. Full-scale tests have involved 30 cm driven steel pipe piles in Vancouver, Canada; 60 cm Augercast piles in New Zealand; a 25 cm micropile in Italy, three 45 cm driven piles in the US, and a group of piles in Italy. Liquefaction induced settlements ranged from 5 to 27 cm. In contrast to some theories, measured negative skin friction in the liquefied sand was not zero. As the liquefied sand reconsolidated, the sand exerted negative friction on the piles that was about 50% of the positive skin friction before liquefaction. In contrast, within non-liquefied layers, significant negative skin friction developed that was approximately equal to the positive skin friction prior to liquefaction. Pile settlement was reasonably well predicted using the neutral plane approach. The toe resistance vs. displacement curve played a key role in determining the pile settlement which was often much less than the soil settlement. Piles within the groups experienced reduced downdrag forces. Static pile load tests conducted before and two months after liquefaction showed that side friction in liquefied layers requires significant time to regain its strength. Prof. Rollins will show videos of blast-induced liquefaction, sand boil formation, and pile performance.

Bio: Kyle Rollins received his BS degree from Brigham Young University (BYU) and his Ph.D. from the University of California at Berkeley. After working as a geotechnical consultant, he joined the Civil Engineering faculty at BYU in 1987 following his father who was previously a geotechnical professor. His research has involved geotechnical earthquake engineering, gravel liquefaction, lateral pile group interaction, bridge abutment behavior, collapsible soils, and soil improvement techniques. He has supervised more than 130 graduate students and published over 220 papers. ASCE has recognized his work with the Huber research award, the Wellington prize, and the Wallace Hayward Baker award. He was the Cross-Canada Geotechnical lecturer for the Canadian Geotechnical Society. He received the Osterberg Award for innovation in foundation engineering from the Deep Foundations Institute.