WEBINAR INGEO – Prof. Kyle M. Rollins

Venerdì 11 Giugno 2021 – ore 10.00-12.00 "Liquefaction and Lateral Spread"

Link su Teams:
https://teams.microsoft.com/l/meetup-join/19%3a4e11d87697aa4a0685326ec55e49c711%40thread.tacv2/1619283520146?context=%7b%22Tid%22%3a%2241f8b7d0-9a21-415c-9c69-a67984f3d0de%22%2c%22Oid%22%3a%22152a78aa-e098-4ccf-a35f-30795a5c98c5%22%7d

Venerdì 25 Giugno 2021 – ore 10.00-12.00 "Ground Improvement for Earthquake Engineering"

Link su Teams:
https://teams.microsoft.com/l/meetup-join/19%3a4e11d87697aa4a0685326ec55e49c711%40thread.tacv2/1619283553370?context=%7b%22Tid%22%3a%2241f8b7d0-9a21-415c-9c69-a67984f3d0de%22%2c%22Oid%22%3a%22152a78aa-e098-4ccf-a35f-30795a5c98c5%22%7d

Kyle Rollins Bio-Sketch

Kyle Rollins received his BS degree from Brigham Young University 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 after his father who was previously a geotechnical professor. His research has involved geotechnical earthquake engineering, deep foundation performance, bridge abutment behavior, collapsible soils and soil improvement techniques. He has supervised more than 130 graduate students and published over 190 papers. His work typically involves full-scale testing to evaluate and improve performance of bridges and buildings. The American Society of Civil Engineers has recognized his work with the Huber research award, the Wellington prize, and the Wallace Hayward Baker award. In 2009, he was the Cross-Canada Geotechnical lecturer for the Canadian Geotechnical Society. More recently, he received the Utah Governor's medal for science and technology and the JorjOsterberg Award from the Deep Foundations Institute.

Presentation Abstract - Liquefaction and Lateral Spread

Liquefaction of loose saturated sand results in significant damage to civil infrastructure in nearly every earthquake event. Liquefaction and the resulting loss of shear strength can lead to landslides, lateral spreading, loss of vertical and lateral bearing support for foundations, and excessive foundation settlement and rotation. Direct and indirect economic losses resulting from liquefaction are substantial costs to society.

While liquefaction was thought to be restricted to sand, a growing number of case histories indicate that gravels can also liquefy. Unfortunately, most common in-situ tests, such as the SPT or CPT, provide erroneous results in gravelly soil. Prof. Rollins will discuss gravel liquefaction case histories, which are particularly important for dams and port facilities along with recent efforts to characterize the gravels at these sites. He will also present the development of new probabilistic liquefaction triggering curves for gravels based on shear wave velocity and a large diameter dynamic cone penetrometer which can penetrate gravelly soils. These curves, which are based on about 150 data points from around the world, provide the ability to directly predict the probability of liquefaction based on field performance of gravel profiles.

Lateral spread displacement is often responsible for much of the damage associated with liquefaction. Lateral spread displacement can be predicted using a variety of techniques. Prof. Rollins will describe some of these empirical and numerical evaluation techniques. He will also discuss typical mistakes and misuse of these analysis approaches and recommend best practices. Finally, Prof. Rollins will discuss the difficulties of applying lateral spread displacement methods to large magnitude earthquakes, such as subduction zone earthquakes.

Presentation Abstract –Ground Improvement for Earthquake Engineering

Ground improvement methods are frequently required to mitigate the hazards posed by liquefaction. These methods include techniques for densification, reinforcement, drainage, cementing the soil. In addition, ground improvement can also be used to increase the lateral resistance of bridges and other structures supported by piles rather than adding more piles or structural elements.

Prof. Rollins will present results of full-scale lateral load tests to investigate the effectiveness of ground improvement techniques for increasing lateral resistance of bridge foundations in soft soils. Tests were performed using nine-pile groups with a variety of ground improvement strategies adjacent to the pile group or around the pile group. These strategies included: soil mixing,jet grouting, replacement with compacted sand and flowable fill, and stone columns. Improvement was substantial and was more cost-effective than adding more piles in many cases. A simplified model for predicting the increased capacity from ground improvement will be presented.

Prof. Rollins will also present results from full-scale testing to investigate the effectiveness of a variety of ground improvement strategies for liquefaction hazard mitigation. These studies have often involved blast-induced liquefaction testing, pioneered by Prof. Rollins, as well as laminar shear box testing on a shake table. Tests results will be presented to demonstrate the effectiveness of stone columns and rammed aggregate piers in reducing liquefaction hazard in sands and silty sand. A series of test results will also be presented to illustrate the effectiveness of prefabricated vertical drains for preventing liquefaction and settlement. Prof. Rollins will also present results from the Christchurch, New Zealand ground improvement trials where 17 ground improvement strategies were compared. He will also show videos of blasting and the development of sand boils.