Practical Deep Foundation Design and Construction for Seismic and Lateral Loads

August 5-6, 2015 | Los Angeles Airport Marriott | Los Angeles, CA

- TECHINCAL PROGRAM -

WEDNESDAY, AUGUST 5, 2015

2:00 PM-5:00 PM	**Exhibitor Set-Up |** Suite D
4:30 PM-6:00 PM	**DFI Seismic and Lateral Loads Committee Meeting** | Philadelphia
6:00 PM-7:00PM	**Networking Reception and Exhibition |** Suite D

THURSDAY, AUGUST 6, 2015

7:00 AM-7:30 AM — **Speaker Preparation |** Suites E/F

7:00 AM-8:00 AM — **Registration and Networking Breakfast and Exhibition**

8:15 AM-8:30 AM — **Welcome and Introductions**
Kwabena Ofori-Awuah, P.E. | DFI Seismic & Lateral Loads Committee Chair
KCI Technologies, Inc.

8:30 AM-9:15 AM — **Deep Foundation Design for Seismic and Lateral Loads – An Overview**
Kwabena Ofori-Awuah, P.E. | KCI Technologies, Inc.
The design of the deep foundations for seismic and lateral loads should consider both inertial and kinematic loads. Kinematic loads include loads due to ground shaking as well as resulting from seismic hazards such as liquefaction and lateral spreading. This presentation will provide an overview of different kinds of inertial and kinematic loads and approaches to incorporate them in the analyses.

9:15 AM – 10:00 AM — **Pile Foundations in Liquefied and Laterally Spreading Ground: Design Guidelines and Case History Evaluation**
Scott Brandenburg, Ph.D. | University of California
Pile foundations have been damaged by liquefied and laterally spreading ground in many past earthquakes around the world, and this loading condition often controls the design of deep foundations in seismic regions susceptible to liquefaction. Significant advancements in our understanding of the behavior of pile foundations in liquefied soils have been made in the past few decades using case history evaluation, physical modeling studies, and numerical simulations. A recently developed Caltrans guidance document provides a simplified method for accounting for the effects of liquefaction on pile foundations, including p-y behavior in liquefiable soils, loads from nonliquefied spreading crusts, and liquefaction-compatible inertia demands. These guidelines will be presented in this seminar, including an explanation of the motivation for various portions of the approach. This will be followed by analysis of several case histories of bridges that exhibited various performance levels during liquefaction and lateral spreading. Case histories include: the Showa Bridge and a railroad bridge in Mexico that collapsed as a result of liquefaction and lateral spreading, the Landing Road Bridge and a highway bridge in Mexico that exhibited moderate structural damage, and the Leuw Mei Bridge that suffered no measurable permanent foundation displacement. The guidelines are shown to accurately predict the performance of each bridge using a uniform approach to setting the input parameters and loading conditions.

10:00 AM – 10:15 AM — **Networking Break and Exhibition | Suite D**

10:15 AM – 11:00 AM	**Effect of Soil-Foundation-Structure Interaction on Site-Specific Response Spectra – Case History Perspective** *Ramin Golesorkhi, Ph.D., P.E., G.E. | Langan Engineering and Environmental Svcs.* The talk will present the result of the development of site-specific response spectra for high-rise structures for the purpose of performance based seismic design. The effect of soil-foundation-structure interaction (SSI) on the site-specific response spectra will be presented. These effects were evaluated using non-linear SSI computer program FLAC for three levels of ground shaking. The selection and development of ground motion time series using the concept of Conditional Mean Spectra will be discussed and presented.
11:00 AM – 11:45 AM	**Analysis of Laterally and Axially Loaded Group of Shafts and Piles Using CGI-DFSAP to include Liquefaction and Lateral Spreading** *J.P. Singh, Ph.D., P.E., G.E. | JP Singh & Associates* Risk Targeted Performance Based Engineering approaches for design require inclusion of proper representation of Soil-Foundation-Structure-Interaction (SFSI) issues in the computer models. This presentation outlines analytical foundation modeling considerations in developing the proper SFSI handshake parameters for use in analyses of performance based design of structures. This presentation includes discussion of available computer software to assess the three-dimensional displacement/rotational nonlinear spring stiffness (various springs of the foundation stiffness matrix) of isolated piles and shafts as well as stiffness of pile and shaft groups with/without cap. The assessment of foundation stiffness springs accounts for soil (including effects of soil liquefaction and lateral soil spreading on pile/shaft foundations) as well as pile/shaft properties (including pile moment-curvature-bending stiffness relationships; pile head fixity; and pile cross-section shape).
11:45 AM – 1:00 PM	**Networking Lunch and Exhibition | Suite D**
1:00 PM – 1:45 PM	**Liquefaction Effects on Piled Bridge Abutments: Centrifuge Tests and Numerical Analyses** *Ross Boulanger, P.E., Ph.D. | University of California Davis* Earthquake-induced deformations of piled bridge abutments in approach embankments underlain by liquefied soils may be reduced relative to free-field deformation values by the restraining forces from the piles and bridge superstructure. Three dynamic centrifuge model tests demonstrating pile pinning effects in approach embankments were numerically simulated using two-dimensional finite difference models. Each centrifuge model was composed of two identical embankments underlain by liquefiable soil, one with a pile group and the other without. Agreement between the numerical simulations and centrifuge model results were assessed through comparison of accelerations, pore water pressures, displacements, and pile bending moments for both the piled and non-piled embankments. The capabilities and limitations in the numerical modeling procedures for the seismic evaluation of piled and non-piled bridge approach abutments are discussed.
1:45 PM – 2:30 PM	**Local Southern California Case History** *Marty Hudson, Ph.D. | AMEC Foster Wheeler*
2:30 PM – 3:15 PM	**Liquefaction and Lateral Spreading Mitigation by Ground Improvement** *Lisheng Shao, Ph.D, PE, GE. | Hayward Baker* Ground improvements have been widely used to mitigate soil liquefaction and lateral spreading. In relatively clean sands, vibro stone columns provide a very cost-effective treatment through densifications, and Earthquake Drains can reduces the soil pore water pressure ratio through drainage. Combining stone columns and EQDrains can significantly enhance the liquefaction mitigation in silty sands. In fine grain soils, soil mixing panels, cells and blocks can be used under hospitals, schools, bridge abutments and levees to prevent soil liquefaction, lateral spreading, and to reduce static settlement. This presentation provides the ground improvement outlines in the design, installation, and QA/QC for liquefaction mitigations, through examples of stone column, EQDrain, and soil mixing projects.
3:15 PM – 3:30 PM	**Networking Break and Exhibition | Suite D**

3:30 PM – 4:15 PM

Practical Application of Liquefaction Assessment for Foundation Design

Kwabena Ofori-Awuah, P.E. | KCI Technologies, Inc.

This is a practical application of soil-structure interaction of a project. The presentation will discuss the fundamentals of liquefaction and soil-structure interaction as applied in lateral load environment.

The presentation will illustrate how the interaction between soil, foundation, and structure affect the dynamic response of the structure. It will answer the question on how foundations can safely transmit the inertial load into the ground without the structure experiencing any excessive deformation.

4:15 PM – 5:00 PM

Wharf/Backlands Redevelopment Phase1, Stage 1

John Compagnone | Condon-Johnson & Associates, Inc.

The Port of Long Beach, as part of a master plan to increase container handling capacity and facilitate the navigation of larger container vessels, required the widening and deepening of one of its existing slips within the middle harbor. The slip widening was accomplished with the construction of a reinforced concrete bulkhead wall and dredging a 1.6h: 1v slope in front of the wall to the bottom of the slip. The seismic performance of the temporary cut slope was of concern due to the expectation that liquefaction would result in significant lateral displacement. Ground improvement, achieved using jet grouting, provided the necessary stability of the slope in the interim condition between dredging and final placement of rock on the dredged slope.

3:30 PM

Exhibitor Break-down | Suite D

subject to change