1st WORKSHOP ON GEOTECHNICAL EARTHQUAKE ENGINEERING

Liquefaction Evaluation, Mapping, Simulation and Mitigation

Organized by the Earthquake Engineering Research Institute (EERI) San Diego Chapter

Friday, September 12

8:30am – 5:00pm

Speakers:

1) Dr. Gonzalo Castro (GEI Consultants, Inc.)
2) Prof. Ahmed Elgamal (UC San Diego)
3) Prof. Kevin Franke (Brigham Young University)
4) Prof. I.M. Idriss (Prof. Emeritus, UC Davis)
5) Prof. Geoffrey Martin (University of Southern California)
6) Dr. Mitsuo Nozu (Fudo Construction)
7) Dr. Peter Robertson (Prof. Emeritus, University of Alberta)
8) Prof. Jonathan Stewart (UC Los Angeles)

Chair of Organizing Committee:

Dr. Jorge Meneses (President, EERI San Diego Chapter; GEI Consultants, Inc.)

PURPOSE:

Presenters, distinguished leaders of the geotechnical earthquake engineering community, will discuss current procedures to evaluate liquefaction occurrence and consequences, map liquefaction hazards, mitigate liquefaction consequences, and numerically model the phenomenon. Target audience includes geotechnical engineers, engineering geologists, researchers, agencies officials and students. Two panel discussions will promote exchange of ideas and clarification.

This workshop intends to be the first of a series on annual workshops on the topic of geotechnical earthquake engineering and will be announced nationwide and internationally.

PROGRAM

8:30-9:00 am	Registration
9:00-9:15 am	Introduction
9:15-9:45 am	"Simplified Performance-Based Liquefaction Triggering Assessment in San Diego" Prof. Kevin Franke
9:45-10:15 am	"Liquefaction Mitigation Effects and Its Advanced Technology in Japan" Dr. M. Nozu
10:15-10:45 am	"Next Generation Liquefaction Project – Objectives and Preliminary Site Characterization Results" Prof. Jonathan Stewart
10:45-11:15 am	Break
11:15-12:00 noon	Panel Discussion
12:00-1:00 pm	Lunch break
1:00-1:30 pm	"Seismic Response of Stratified Sites and Implications for Foundation Systems" Prof. Geoffrey Martin and Prof. Ahmed Elgamal
1:30-2:00 pm	"Post-Earthquake Strength, How to Evaluate It If Field Index Tests Do Not Apply" Dr. Gonzalo Castro
2:00-2:30 pm	Break
2:30-3:00 pm	"Evaluating Soil Liquefaction Using the CPT-Practical Considerations" Dr. Peter Robertson
3:00-3:30 pm	"TBA" Prof. I.M. Idriss
3:30-4:00 pm	Break
4:00-5:00 pm	Panel Discussion

VENUE

University of California San Diego Campus
Center Hall, Room 115
9500 Gilman Dr., La Jolla, CA 92093
For driving directions and parking information:
http://ucsd.edu/explore/maps/index.html

REGISTRATION

Registration includes pdf files of the presentations, breakfast, and refreshments during morning and afternoon breaks. Lunch will not be provided as the Price Center with a great variety of food and costs is a walkable distance.

Early-Bird Registration (if received by August 31, 2014)
EERI members $ 150
EERI non-members $ 170
Students $60

Registration from September 1, 2014
EERI members $ 170
EERI non-members $ 190

Students $70

Please RSVP Tan Cao, our Secretary/Treasurer, at tca@deainc.com by September 10.

Payment Options

Make checks payable to:

EERI San Diego
c/o Tan Cao
David Evans and Associates, Inc.
401 B Street, Suite 410
San Diego, CA 92101
USA

Contact Tan Cao for online credit card registration.

Payment by Cash, Check, or Credit Card will also be accepted at the door but should RSVP to tca@deainc.com by September 10.

Co-sponsor

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ABSTRACTS AND BIOS OF PRESENTERS

Presentation Title: Simplified Performance-Based Liquefaction Triggering Assessment in San Diego

Abstract: Research has shown that the manner in which seismic loading is represented in a simplified empirical liquefaction triggering assessment significantly influences the predicted liquefaction hazard. Because probabilistic methods of ground motion prediction typically offer multiple possible seismic loading scenarios, it can be difficult for engineers to select which scenario is appropriate for use in liquefaction analysis. Recently-developed performance-based liquefaction triggering methods overcome this challenge by considering all possible seismic loading scenarios across a wide range of return periods. However, performance-based analysis methods are quite involved and difficult for engineers to implement without specialized tools. Fortunately, researchers have developed simplified map-based methods to closely approximate performance-based liquefaction triggering results at a targeted return period. This presentation will introduce such a method that has recently been created for the Boulanger and Idriss (2012, 2014) probabilistic triggering model. The potential application of the method for liquefaction assessment in San Diego will be explored. Benefits and limitations of simplified performance-based methods will be briefly discussed.

Bio: Kevin W. Franke, Ph.D., P.E. is an Assistant Professor in the Department of Civil and Environmental Engineering at Brigham Young University. Kevin's principal research focus relates to geotechnical/earthquake engineering. Kevin and his students are currently developing performance-based (i.e., probabilistic) methods for dealing with soil liquefaction and its associated hazards. Additionally, Kevin is an investigator in the Center for Unmanned Aircraft Systems (C-UAS), which is currently the only NSF-sponsored research center for unmanned aerial vehicles (UAVs or "drones.") Kevin's research focus in the Center deals with new and improved applications of small unmanned aerial vehicles (sUAVs) in monitoring infrastructure and performing post-disaster reconnaissance.

Prior to his current position at BYU, Kevin worked for 6 years as a professional civil engineering consultant for Kleinfelder, Inc. and URS Corporation. Kevin contributed to multiple significant projects throughout the western and central US including Kennecott Utah Copper tailings impoundment, facilities at Los Alamos National Labs, California High Speed Rail, North Torrey Pines Bridge seismic retrofit, I-15 Corridor Reconstruction in Utah County, Sacramento Area Flood Control Authority Levee Evaluations/Improvements, Levee improvements in New Orleans, Roscoe Wind Farm, Legacy Parkway, and multiple schools and hospitals throughout CA, OR, and WA.

Kevin received his BSCE from Utah State University in 2004, is MSCE from University of Washington in 2005, and his Ph.D. from Brigham Young University in 2011. He and his wife of 13 years, Ruby, have 6 young children.

Presentation Title: Liquefaction Mitigation Effects and Its Advanced Technology in Japan

Abstract: In this presentation, at first the liquefaction mitigation effects for Sand Compaction Pile and other techniques against past huge earthquakes in Japan will be introduced. In particular, the impressive effects in Urayasu-City for 2011 Tohoku earthquake are explained in detail. In addition, it is depicted some derivative effects such as initial stress change and unsaturated condition due to sand compaction pile installation. Finally, one advanced technology named 'SAVE-SP' method, in which the liquid sand flow is sent through the grout pump into the ground to compact it with the static expansion effect.

Bio: Major: Design, construction and quality control of Ground improvement works such as Deep Soil Mixing, Dynamic Compaction, Vertical drain, Sand compaction pile, and Jet grouting / Countermeasures against Liquefaction / Numerical analysis for deformation using Elasto-Plastic constitutive model (Cam-clay model), Seismic analysis incl. Liquefaction and

Seepage analysis / Vibration Isolation works of Trains & Road with special gas-filled wall. *Qualifications:* Registered Consulting Engineer from Japanese government, 1990; Dr. Eng. from Nagoya University, 1995; APEC Engineer, 2001

Work Experience: 1984-2014: FUDO CONSTRUCTION Co., Ltd.; 1985-1988: Civil Engineer, Yanbu Medical Center foundation construction site, Saudi Arabia*;* 1996-1999 JICA project team member for ground improvement of Highway in Thailand*;* 2002-2014 Part-time lecturer of Nagoya University*;* 2005 Regional Reporter in Asia, Deep Mixing 2005, International conference in Stockholm, Sweden; 2005 Session secretary in ISSMFE Osaka conference*;* 2006-2014 International Department of Fudo Tetra Corporation*;* 2005 QC & Design Engineer of Test trial for Off-shore SCP in South Korea*;* 2006 QC & Design manager of Omon Thermal Power Plant, Vietnam*;* 2007-2008 QC & Design manager of SP-PSA Container Terminal, Vietnam*;* 2007-2012 General manager of International Department*;* 2008-2009 QC & Design manager of New Orleans Levee Improvement Project, U.S.*;* 2009-2010 QC & Design manager of Thi-Vai Container Terminal, Vietnam*;* 2012-2014 QC manager of Fort Lauderdale Airport Expansion Project, Florida, U.S. *Education:* 1978-1982: Nagoya University, Major: Geotechnical Engineering (Prof. A. Asaoka); 1982-1984: Graduate school (ditto).

Presentation Title: Next Generation Liquefaction Project – Objectives and Preliminary Site Characterization Results

Abstract: This presentation will describe the objectives and scope of the Next Generation Liquefaction (NGL) project being organized through the Pacific Earthquake Engineering Research Center. The project is working towards development of an international community database of ground failure case histories, including cases of liquefaction triggering, non-ground failure cases, and case histories of measured ground deformations. Ultimately we envision multiple modeling teams working with the common data set, and benefitting from a number of supporting studies, to develop next-generation models for liquefaction triggering, post-liquefaction residual strength, and deformation effects.

Bio*:* Jonathan P. Stewart is Professor and Chair of the Civil & Environmental Engineering at UCLA. He joined UCLA as an Assistant Professor in 1997, advancing to tenure in 2003 and full Professor in 2007. He has served previously as the CEE Vice Chair for Undergraduate Studies (2005-2007) and as the CEE Graduate Advisor (2007-2012).

Professor Stewart's technical expertise is in geotechnical earthquake engineering and engineering seismology, with emphases on seismic soil-structure interaction, engineering characterization of earthquake ground motions, seismic performance of levees and other embankments, and seismic ground failure. His research involves: interpretation and analysis of earthquake strong motion records to gain insight into soil-structure interaction effects, site effects, regional variations of ground motions, and other effects; cyclic field testing and analysis of full-scale foundation components including mat foundations, drilled shafts, and bridge abutment walls; advanced dynamic laboratory testing and development of material models for engineering application; and detailed case studies of seismic ground failure at sites in California, Taiwan, Turkey, Japan, Chile, Greece, Italy, and India. Results of work by his research group are widely utilized in engineering practice, including the NEHRP Provisions, ASCE-7, and ASCE-41. He is co PI of the nees@UCLA field testing site and has led major multi-investigator research efforts related to ground motion characterization (NGA and GEM projects, via PEER center) nonlinear site response analysis (with PEER center), soil-structure interaction (with Applied Technology Council), and seismic ground failure (NGL project, via PEER center).

He is a former Chief Editor for the ASCE Journal of Geotechnical and Geoenvironmental Engineering and is the current Editor of Earthquake Spectra. His research team has produced 20 Ph.D. graduates since 2001 and over 70 journal articles since 1995. He has been recognized for his research contributions by ASCE (Casagrande Award, Huber Award, election to Fellow grade), EERI (Outstanding Paper Award), NSF (Career Award), and the U.S. State Department (Fulbright Fellowship). He has received numerous teaching awards from UCLA (including the Distinguished Teaching Award in 2012), where he teaches courses in Soil Mechanics, Foundation Engineering, and Earthquake Engineering. He has also taught advanced graduate courses at the Rose School in Pavia Italy and at the University of Rome.

Presentation Title: Post earthquake Strength, How to Evaluate it if Field Index Tests do not Apply

Abstract: The presentation will deal with actual cases for which field index tests do not apply because the soils have unusual properties, because the soils are intensely stratified or are too gravelly. The methods used to for the case histories will be presented.

Bio: He is a geotechnical engineer with over 45 years of experience in the practice of geotechnical engineering. Dr. Castro's professional experience has been primarily as the engineer in charge of the geotechnical aspects of major civil engineering projects as a principal of GEI Consultants. His contributions to the practice of geotechnical engineering have been principally in the understanding of the behavior of soils during earthquakes and its application to the seismic safety of dams. Elected to the National Academy of Engineering for contributions to geotechnical earthquake engineering, soil dynamics and the seismic safety of dams, Dr. Castro is also a Fellow of the American Society of Civil Engineers (ASCE), and Honorary Member of the Boston Society of Civil Engineers. He received his doctorate in Soil Mechanics at Harvard University and specializes in the behavior of soils during earthquakes.

Presentation Title: Evaluating Soil Liquefaction Using the CPT – Practical Considerations

Abstract: Evaluating the potential for soil liquefaction and the resulting consequences is often a major design issue for many geotechnical projects in seismic areas. This presentation will provide some brief background on the available methods and present examples to illustrate some key points. Practical issues that influence the results will be discussed and presented.

Bio: Dr. Peter Robertson has more than 40 years' experience as an educator, researcher, consultant and practitioner specializing in the areas of in-situ testing and site investigation, earthquake design of geotechnical structures, and soil liquefaction. Peter is recognized as an expert both nationally and internationally in the areas of in-situ testing and soil liquefaction. He has been a consultant to various clients in many countries for projects involving liquefaction evaluation for major structures, stability of on-shore and off-shore structures, landslides, stability of natural slopes and tailings dams, and use and interpretation of in-situ tests. He is a co-author of the primary reference book on Cone Penetration Testing (CPT). He has also authored or coauthored over 250 publications as well a popular CPT Guide that is freely available via several websites. With support from Gregg Drilling & Testing Inc., Peter has also assisted in the development of several inexpensive CPT-based interpretation software programs (*CPeT-IT* and *CLiq*) and has presented a series of free webinars on the CPT in an effort to enhance education and practice. Peter continues to provide private consulting to a wide range of clients world-wide.

Presentation Title: Seismic Response of Stratified Sites and Implications for Foundation Systems

Abstract: Dominated by shear excitation, lateral seismic site response is dictated by the pertinent characteristics of the involved near-surface soil strata. Assessment of stratified ground seismic response by nonlinear computational codes has been underway with continued enhancement over the years (e.g., the DESRA-MUSC program with its high fidelity pore-pressure generation model, and the CYCLIC/OpenSees model). Inclusion of such procedures within a multi-dimensional fully-coupled effective stress analysis tool allows for a more realistic assessment of ground deformations and the resulting displacement demands imposed on foundation systems. To Illustrate the significance of employing such advanced techniques, relevant scenarios will be presented and discussed.

Prof. Geoffrey Martin Bio: Dr. Geoffrey Martin has more than 40 years of experience in civil and geotechnical engineering. He is nationally and internationally recognized for his expertise in the field of geotechnical earthquake engineering, particularly as related to the stability of earth structures, liquefaction, ground improvement, and the

seismic design of foundations. He has authored or co-authored over 100 papers on these topics, and received the 2012 ASCE H. Bolton Seed Medal for his contributions to geotechnical earthquake engineering.

Dr. Martin received his M.S. in Civil Engineering from the University of Auckland, New Zealand in 1962 and his Ph.D. in Geotechnical Engineering from the University of California, Berkeley, in 1965. Following a 12-year career as a Professor of Civil Engineering at the University of Auckland, New Zealand, he joined the Earth Technology Corporation, Long Beach in 1977, as manager of Earthquake Engineering. Subsequently, as Vice President for Engineering, he was responsible for the technical direction of major geotechnical projects, particularly those related to earth dams, port facilities, offshore structures and bridges. He also directed the company's research activities in earthquake engineering.

In 1990 he returned to academia as a Professor in the Department of Civil Engineering at the University of Southern California (USC) where he focused his research interests on liquefaction related ground stability and the seismic design of foundations and retaining structures. He has a strong interest in technology transfer and has contributed to several seismic design guidelines or codes of practice. He is a contributing author to the "FEMA 273/274 Guidelines for the Seismic Rehabilitation of Buildings (1997)," the "Recommended LRFD Guidelines for the Seismic Design of Highway Bridges" (2001), the FHWA Seismic Retrofitting Manual for Highway Structures, Part 1-Bridges (2006), NCHRP Report 611 on the Seismic Analysis and Design of Retaining Walls. Buried Structures, Slopes and Embankments (2008), and the Port of Los Angeles Seismic Code for Container Wharves (2010).

He is currently Professor Emeritus with the USC Department of Civil Engineering, having retired from academia in 2009. He remains active as a independent consultant and serves as a Tunnel Advisory Panel Member for the Los Angeles Metropolitan Transportation Authority and is a member of the Seismic Advisory Board for the California Department of Transportation.

Prof. Ahmed Elgamal Bio: Ahmed Elgamal Chaired the UC San Diego Department of Structural Engineering from 2003 to 2007. In 1984, he received his Ph.D. from Princeton University. He joined UCSD in 1997 as Professor after a Post-doctoral appointment at the California Institute of Technology, and Faculty positions at Rensselaer Polytechnic Institute and Columbia University. His areas of research interest include large-scale Geomechanics soil-structure experimental and computational simulation (http://soilquake.net , http://cyclic.ucsd.edu , http://cyclic.ucsd.edu/openseespl , http://peer.berkeley.edu/bridgepbee), Sustainability in Geomechanics, and IT system-identification and data mining applications. He served earlier as PI of the US NEES IT project and as Thrust Area Leader of the UC Berkeley PEER Center. He is author and co-author of over 250 Technical Publications, and currently serves as Editor-in-Chief of the Journal Soil Dynamics and Earthquake Engineering. Over the years, he has consulted and provided professional services in the general areas of Geomechanics and Geotechnical Engineering for a number of national and international organizations.