

**U.S. – N.Z. – Japan International Workshop on
“Liquefaction-Induced Ground Movements Effects,”
Berkeley, CA 2-4 November 2016**

OVERVIEW

There is much to learn from the recent earthquakes in New Zealand (NZ) and Japan. The 2010-2011 Canterbury earthquake sequence and the 2011 Tohoku earthquake and its aftershocks produced differing levels of liquefaction-induced ground movements that damaged buildings, bridges, and buried utilities. Along with the often spectacular observations of infrastructure damage, there were also many cases where well-built facilities, which were located in areas of liquefaction-induced ground failure, were not damaged. Researchers are working on characterizing and learning from these observations of both poor and good performance of the ground and the engineered facilities built in and atop of the ground. This workshop provides an opportunity to take advantage of recent research investments following these events to develop a path forward for an integrated understanding of how different engineered systems perform with various levels of liquefaction.

The international workshop will be held 2-4 November 2016 at UC Berkeley. Approximately 55 leading researchers in the field, two-thirds from the United States and one-third from New Zealand and Japan, will participate in the workshop. The U.S. National Science Foundation (NSF) is the primary sponsor of the workshop. Additional support is being provided by the Pacific Earthquake Engineering Research (PEER) Center and the Geotechnical Extreme Events Reconnaissance (GEER) Association. Funding to support participation of New Zealand and Japanese researchers is being provided by organizations within their respective countries.

WORKSHOP OBJECTIVES

Challenges that remain in understanding and assessing the effects of soil liquefaction are:

- I.** development and effects of liquefaction-induced flow slides that are governed by the undrained residual shear strength of liquefied soil;
- II.** development and effects of liquefaction-induced lateral spreading on structures and lifelines; and
- III.** development and effects of liquefaction-induced settlement on structures and lifelines.

Participants will converse with the assumption that liquefaction/cyclic softening/cyclic failure has been triggered. With the assumption that cyclic mobility with large strains or limited strains has developed, participants will focus on the manifestations of liquefaction/cyclic softening/cyclic failure and its effects on structures and lifelines. In this way, the participants will move beyond issues that have received much attention over the last few decades to issues that have received relatively less attention. The effects of soil liquefaction matter most to engineers, city planners, architects, and the public.

The objective of the proposed workshop is to identify which empirical and analytical methods hold the greatest potential for advancing insight on the effects of liquefaction-induced ground movements on structures and therefore should be considered high priority for further research. The workshop will also advance the development of younger researchers through identifying research approaches that appear to be promising, as well as to promote future collaborations among participants.

WORKSHOP PLAN

The selected “*liquefaction effects*” challenge will be addressed by responding to one or more of these prompts:

1. What is the current state-of-the-art for evaluating this problem today?
2. What are the key underlying geologic processes that affect it?
3. What are the primary mechanisms involved in the phenomenon?
4. What are the key challenges to developing better evaluation procedures?
5. What is the best path forward for advancing understanding and procedures to address it?

Each speaker is asked to address one of the three “*liquefaction effects*” challenges by responding to one or more of the five prompts delineated above. A speaker may decide to focus on only one or two of the prompts that she or he thinks are most important. However, presentations and discussions will focus on addressing these five prompts for each of the three “*liquefaction effects*” challenges.

Each speaker should email their presentation slides in PPT format to the Workshop Coordinator: Christine Beyzaei <zbeyzaei@berkeley.edu> no later than Tuesday, 1 November 2016. Christine will merge all talks for each session into one PPT file for efficiency. If an excessive amount of slides are submitted, Christine will only include a maximum of 24 slides for a 15-minute talk, or a maximum of 8 slides for a 5-minute talk. In fairness to all participants, speaking times will be strictly adhered to during the presentation periods of the workshop.

Focused interactive discussion periods are a key part of this workshop. Please come prepared to the workshop to emphasize the key research thrusts for each “*liquefaction effects*” challenge and identify the most promising paths forward toward assessing the effects of liquefaction on structures and lifelines.

After the workshop, the workshop organizers and a few selected participants, who expand the group’s perspectives, will remain in Berkeley one more day. They will distill and synthesize the results of the workshop into a workshop report that will be submitted to the NSF and disseminated to the profession.

WORKSHOP ORGANIZERS

Chairpersons: J. Bray, Univ. of California, Berkeley; R. Boulanger, Univ. of California, Davis; M. Cubrinovski, Univ. of Canterbury; and K. Tokimatsu, Tokyo Institute of Technology.

Advisors: S. Kramer, Univ. of Washington; T. O’Rourke, Cornell Univ.; and E. Rathje, the Univ. of Texas at Austin