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International Team Conducts Earthquake Simulation Experiments on Gas Pipelines

As part of an international effort supported by Tokyo Gas Co., Cornell University, MCEER and the National Science Foundation (NSF) through its U.S.-Japan Cooperative Research Program in Urban Earthquake Disaster Mitigation, researchers at Cornell are conducting large scale testing of the behavior of under-ground pipelines subjected to earthquake loads. The experimental facility, located at Cornell's Winter Laboratory, is the largest of its kind ever constructed. The tests

simulate ground rupture effects on welded steel pipelines with 90-degree bends, made in Japan for use in Tokyo streets. Ground rupture offsets over 1 m long are generated by the relative displacement of a large test basin containing between 60 and 70 tons of sand. The results of the experiments will be used to develop earthquake-resistant design codes for gas pipelines in Japan.

Thomas O'Rourke, professor of civil and environmental engineering at Cornell, and a member of MCEER's Research Committee, is the principal researcher on the experiment. Masanori Hamada, professor of civil engineering at Waseda



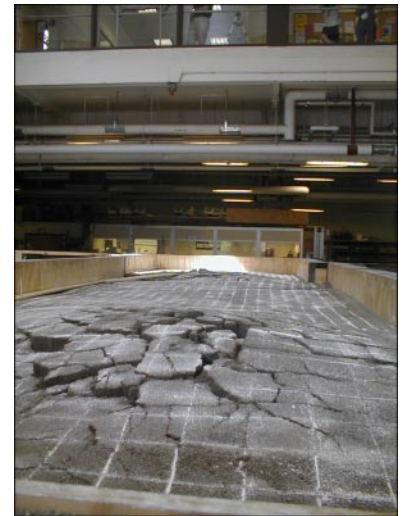
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■ An overhead view of the experimental set up in Cornell's Winter Laboratory.

University, leads a consortium of Japanese universities including Kyoto University, Yamaguchi University, and the University of Tokyo. Other partner institutions include the University of Cambridge in the UK, Rensselaer Polytechnic Institute and the University of Southern California.

This effort has evolved from a long-standing U.S. - Japan partnership led by Professors O'Rourke and Hamada. Since 1988, the two have conducted seven international workshops on soil liquefaction, ground deformations and the performance of lifelines during earthquakes. Two case history volumes, providing an in depth analysis of the most important factors influencing lifeline performance during ten recent earthquakes, were published in 1992. Proceedings from these workshops and the case histories are available from MCEER publications.

For more information about the project, see <http://www.news.cornell.edu/releases/Aug00/quake.facility.deb.html> and Tokyo Gas Company: http://www.tokyo-gas.com.jp/technol/index_e.html. Additional information will be posted on MCEER's users network in the near future. ❖



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■ In the first test on gas pipelines, the surface of 60 tons of shearing sand buckled and fissured, resembling typical surface distortions following an earthquake.