News of the Institute

EERI Sends Team to Japan

An EERI reconnaissance team joined Japanese colleagues in investigating the damaging earthquake sequence outside Niigata, Japan, on October 23, 2004.

The team was led by Charles Scawthorn, professor of lifeline engineering at Kyoto University, and included Scott Ashford, University of California San Diego; Jean-Pierre Bardet, Geotechnical Engineering Earthquake Reconnaissance (GEER) Working Group and the University of Southern California; Charles Huyck, ImageCat Inc.; Robert Kayen, GEER Working Group and the U.S. Geological Survey; Scott Kieffer, Colorado School of Mines; Yohsuke Kawamata, University of California San Diego; and Rob Olshansky, University of Illinois Urbana/Champaign and visiting professor, Kyoto University. Paul Somerville (URS Corporation) and Jim Mori (Kyoto University) covered the seismological aspects but were not part of the field investigation. The team was assisted by numerous Japanese colleagues, including senior advisor to the team Prof. H. Iemura of Kyoto University, and Profs. M. Hamada, Waseda University; K. Ishihara, Tokyo University; I. Susumu, Kyoto University; and H. Yamakawa, Nagaoka Technical University. The team represented the areas of seismology, geotechnical engineering, engineering geology, structural engineering, lifelines engineering, GIS and remote sensing, and emergency response and relief. This is the first major reconnaissance effort in Japan since the new collaborative agreement between EERI and the Japan Association for Earthquake Engineering (JAEE) was signed in 2003. EERI greatly appreciates the assistance provided by JAEE.

Team members traveled with high-tech tools, including satellite imagery and LiDAR (Light Detection and Ranging), a scanning-laser that can create high-resolution, three-dimensional, digital terrain models of earthquake-related ground, structural, and lifeline deformations. The team spent a week in the field, collecting data and documenting observations.

Japanese residents in the area surrounding Niigata endured five large earthquakes (the largest Mw 6.6), which occurred within a 24-hour period on Saturday, October 23. According to the Japanese Meteorological Agency, this is the first time on record in Japan that four earthquakes measuring 6 on the Japanese seismic intensity scale occurred in one day. There were hundreds of aftershocks. At least 38 people were killed, 2,900 injured, 2,800 homes destroyed or damaged, and 395 other buildings destroyed and 3,473 damaged in Niigata Prefecture. Widespread ground failure caused significant damage to lifelines and residences. The sudden vertical and horizontal shocks caused houses to collapse, roads to cave in, and a Shinkansen bullet train to derail for the first time in its history. About 60,000 households lost power. Several bridges and rail lines were damaged; hundreds of landslides and eight fires occurred; and several gas, water, and power lines were damaged in the prefecture.

The seismic source (determined from the distribution of aftershocks) was approximately 30 km long and 15 km wide with 1.2 m vertical displacement. No surface expression has been found, but seismologic evidence indicates the unmapped fault plane to have a strike of about 40 degrees and a dip of 55 degrees. Strong motion recorded 1 g or greater in several locations. Most of the damage and dramatic landslides were in relatively rural hilly or mountainous areas.

The major landslides in the upland epicentral area caused several natural dams to form, blocking streams and creating new lakes. These dams are very unstable, and there is great concern that they will fail at any time, causing greater destruction downstream. The Japanese authorities have mounted a major effort to drain the lakes, and are
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slowly succeeding as of this writing. There was widespread destruction of an upland aquaculture community of several thousand residents, almost exclusively due to ground failures. Surprisingly, given that liquefaction was “discovered” in this region in the 1964 M7.5 Niigata earthquake, there was only sporadic liquefaction in this current event, related ground settlements, and cracking in rice paddies in the region. There were failures of reinforced concrete bridge piers of two major bridges crossing the Shinano River, but no collapse or large permanent displacements. Damage to several tunnels occurred at and near portals; one was blocked by a rockslide. Levees in general sustained minor damage for several kilometers along the Shinano River, and none appeared to have failed.

Relief workers and troops in cars and helicopters were slowed in their efforts to get emergency supplies to isolated hamlets and overcrowded evacuation centers because roads were either destroyed or jammed with traffic. At the peak, 100,000 persons were being housed in shelters throughout the prefecture, and 60,000 remain in shelters as of this writing. The government immediately set up a task force and sent an 11-member advance team to Niigata Prefecture to precede a visit by disaster management minister Yoshitaka Murata. The Emperor and Empress visited the region on November 6, and the Japan Society of Civil Engineers has formed a 50+ member investigating team.

After the EERI team returns, their findings will be published in a future Newsletter. For more than thirty years, with funding from the National Science Foundation, EERI has managed the Learning from Earthquakes Program, and has sent researchers to investigate damaging earthquakes around the world.

Obituary

Robert Park (1933-2004)

Bob Park passed away on November 3, 2004, at the age of 71 in Christchurch, New Zealand, ending a long, active career in the civil engineering and earthquake engineering fields that made him well known around the world.

Park did his undergraduate work at the University of Canterbury and returned in 1965 to join the faculty of the Department of Civil Engineering, following his Ph.D. from the University of Bristol. He left a lasting impression on a large number of undergraduate and graduate students. In particular, his Ph.D. students, including Nigel Priestley and David Hopkins, continue to carry forward his influence, with the total exceeding twenty by the time of his retirement in 1999.

In the field of reinforced concrete structural design, Park is well known for his voluminous research output (over 150 technical papers) and his classic 1975 textbook, co-authored with his colleague and friend Tom Paulay, Reinforced Concrete Structures. He also co-authored with William Gamble another often-used text, Reinforced Concrete Slabs.

He played a key role in the development capacity design, an important innovation with regard to reinforced concrete structures and more broadly a notable development in the overall history of earthquake engineering. At the time of his death, Park was active as leader of a committee of the FIB (Fédération Internationale du Béton) at work on the task of increasing the unification of the world’s reinforced concrete code procedures.

He was often chosen as the leader of New Zealand engineering committees to study pressing structural design issues. These committees in effect wrote the national building code provisions for earthquake engineering and for reinforced, precast, and prestressed concrete.

Park’s influence extended internationally via his building code development work and his teaching in Latin America, Europe, Japan, the United States, and Asia. He was a member of the Royal Academy of Engineering in the United Kingdom, and was made an Officer of the Civil Division of the Most Excellent Order of the British Empire (OBE).

Honorary memberships or medals were conferred on him by the International Association of Earthquake Engineering, the American Concrete Institute, Fédération Internationale de la Précontrainte, and the international reinforced concrete society, the FIB.

EERI is in the process of preparing an oral history volume on Bob Park and Tom Paulay that will be jointly published with the New Zealand Society for Earthquake Engineering in 2005.

Dr. Park is survived by his wife Pauline and six children: Robert, Brendon, Tony, Moira, Jackie, and Jeff.