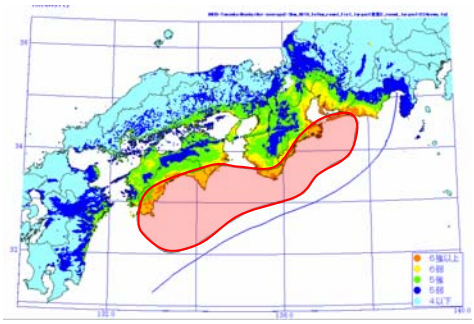
UJNR Panel on Wind and Seismic Effects

Panel Update

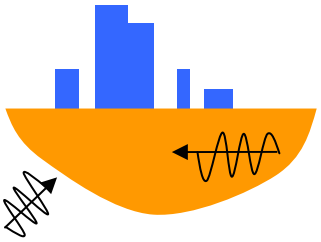
Volume 5, Number 3, October 2007

DEVELOPMENT OF BRI LARGE STROKE SHAKING TABLE FOR SIMULATING EARTHQUAKE RESPONSE OF HIGH-RISE BUILDINGS

After the oil storage tank fires in 2003 from the Tokachi-oki Earthquake, the effects of long period earthquake ground motions has been a topic of public attention in Japan. Many seismologists conducted simulations of long period earthquake ground motions at Tokyo, Osaka, and Nagoya in the event of Tokai, Tonankai, and/or Nankai Earthquakes. Long period components of earthquake ground motions may amplify the response of large structures with long natural periods such as high-rise buildings, long-span bridges, and oil storage tanks.



Tokai/Tonankai/Nankai Earthquake

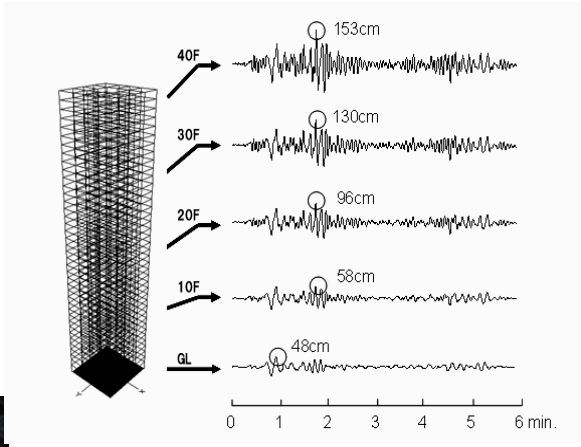


Long period earthquake ground motions may occur in Tokyo, Nagoya, Osaka, and other cities.

To examine the safety of the living space in high-rise buildings, a new shaking table called "BRI Large Stroke Shaking Table" was developed in the Building Research Institute. Using this shaking table, residents' evacuation planning and their pllacement of furniture inside rooms of high-rise buildings are examined to determine the safety criteria for high-rise building designs. This shaking table amplifies the movement of a dynamic actuator 13 times on the shaking table using a pulley system.

Max. Displacement ±2.5 m
Max. Acceleration 1.5G

BRI Large Stroke Shaking Table



Simulation of high-rise building response

Movement of furniture

Evacuation action

Contact: Dr. Taiki Saito, Chief Research Engineer, International Institute of Seismology and Earthquake Engineering, BRI, tsaito@kenken.go.jp

THE NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM (NEHRP)

The National Earthquake Hazards Reduction Program (NEHRP) was established in 1977 by the U.S. Congress under the Earthquake Hazards Reduction Act of 1977 with its mission "to reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program." NEHRP is the US Federal government's coordinated long-term nationwide program to reduce risks to life and property in the United States that result from earthquakes. The four basic NEHRP goals are:

- Develop effective practices and policies for earthquake loss reduction and accelerate their implementation.
- Improve techniques for reducing earthquake vulnerabilities of facilities and systems.
- Improve earthquake hazards identification and risk assessment methods, and their use.
- Improve the understanding of earthquakes and their effects.

The four primary NEHRP agencies are:

- Federal Emergency Management Agency (FEMA) of the Department of Homeland Security,
- National Institute of Standards and Technology (NIST) of the Department of Commerce (NIST is the lead NEHRP agency),
- National Science Foundation (NSF), and
- United States Geological Survey (USGS) of the Department of the Interior.

NEHRP activities are designed to develop effective measures for earthquake hazard reduction; promote the adoption of earthquake hazards reduction measures by government agencies, standards and codes organizations, and others involved in planning and building infrastructure; improve the understanding of earthquakes and their effects through interdisciplinary research; and, develop, operate, maintain the Advanced National Seismic System (ANSS) and the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) and support development and application of performance-based seismic design (PBSD).

An Advisory Committee on Earthquake Hazards Reduction under NEHRP assesses scientific and engineering trends; program effectiveness ; and program management, coordination, and implementation. NEHRP's Interagency Coordinating Committee (ICC) provides oversight to NEHRP planning, management, and coordination and for developing and updating the NEHRP strategic plan. The ICC is composed of the directors of the four primary program agencies, the White House Office of Science and Technology Policy (OSTP), and the Office of Management and Budget (OMB). The NIST Director chairs the ICC.

For more detailed information about NEHRP go to its web site http://www.nehrp.gov.

Contact: Dr. Jack Hayes, Director, NEHRP, NIST 301-975-5640 john.hayes@nist.gov