Return...

New MCEER Technical Reports

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Development of Measurement Capability for Micro-Vibration Evaluations with Application to Chip Fabrication Facilities

by G.C. Lee, Z. Liang, J.W. Song, J.D. Shen and W.C. Liu, 12/1/99, MCEER-99-0020, 129 pages, $25.00

In this project, MCEER researchers conducted vibration tests at a site in West Seneca, New York to determine its suitability for attracting and supporting a ChipFab facility. ChipFab, a short name for a semiconductor chip fabrication facility, is a high-tech manufacturing facility where the electronic chips for items ranging from computers to cellular phones to automobiles are manufactured. The industrial park site (North American Park) is located near a railroad, a major expressway and an active mining operation. The level of micro-vibrations of ground motion is critical for this type of facility.

Several locations were instrumented within the industrial park. Three direction acceleration components were measured at each location, during the period between November 1 and December 1, 1998. These acceleration data were subsequently converted into RMS velocity (one-third-octave band) through specially derived analytical relationships. It was found that the proposed ChipFab site in the northern section of the industrial park was suitable for the manufacturing facility.

The measurement system used to conduct this testing was developed specifically for this project. This report describes the measurement system in detail, including its sensory system, data acquisition and recording, sensor installation and distribution of the measurement locations. The procedure to obtain measurements, data evaluation, and results and analyses related to the West Seneca site are also described in the report.

Design and Retrofit Methodology for Building Structures with Supplemental Energy Dissipation Systems

by G. Pekcan, J.B. Mander and S.S. Chen, 12/31/99, MCEER-99-0021, 196 pages, $30.00

The study described in this report focuses on fundamental issues related to the design and use of supplemental damping devices in building structures. The principle objective is to develop a generic/practical analysis and design methodology for structures that considers structural velocities and equivalent viscous damping of the devices. These two issues are explored in depth. Tools to transform the spectral velocity to an actual relative structural velocity are provided, and a simple design procedure which incorporates power equivalent linear damping based on actual structural velocities is presented. The effectiveness of the design methodology is demonstrated with a retrofit design example using a supplemental load balancing tendon configuration.

Proceedings of the MCEER Workshop for Seismic Hazard Mitigation of Health Care Facilities

Edited by G.C. Lee, M. Ettouney, M. Grigoriu, J. Hauer and J. Nigg, 3/29/00, MCEER-00-0002, 134 pages, $25.00

The purpose of the *MCEER Workshop for Seismic Hazard Mitigation of Health Care Facilities* was to develop and consider the possible scope and emphases for MCEER's hospital project. The workshop brought representatives from academia, industry, government and emergency management together to discuss issues and identify barriers to seismic rehabilitation. The major observations and recommendations are:

- Establish unified guidelines for mitigation of seismic hazards for health care facilities in the eastern U.S.,
- Emphasize the protection of buildings as well as contents by using advanced technologies,
- Integrate mitigation and emergency response consistent with MCEER's overall vision, and
- Coordinate with the current FEMA project carried out at the University of Southern California that concentrates only on nonstructural hospital elements.

The expected outcome of this workshop is the development of a guideline to identify requirements of seismic mitigation efforts for health care facilities in the eastern U.S.

Summary information about this workshop is available from the "Publications" section of our web site at *http://mceer.buffalo.edu/publications/default.asp#spubs*.

Return...

The Marmara, Turkey Earthquake of August 17, 1999: Reconnaissance Report

Edited by C. Scawthorn with major contributions by M. Bruneau, R. Eguchi, T. Holzer, G. Johnson, J. Mander, J. Mitchell, W. Mitchell, A. Papageorgiou, C. Scawthorn and G. Webb, 3/23/00, MCEER-00-0001, 202 pages, $35.00

Early in the morning of Tuesday, August 17, 1999, a magnitude 7.4 earthquake struck along the Anatolian fault in the northwestern region of Turkey. Within days, MCEER dispatched several researchers to the region - three of them simultaneously serving as part of the Earthquake Engineering Research Center (EERI) reconnaissance team - to examine the earthquake's impact. Their initial observations and impressions are reported in two publications, *MCEER Response* by M. Bruneau, J. Mander, W. Mitchell, A. Papageorgiou, C. Scawthorn and N. Sigaher, and in a *Preliminary Report* by C. Scawthorn. Both reports can be accessed from the "Research" section of our web site at *http://mceer.buffalo.edu/research/turkeyeq/default.asp*.

MCEER sponsored a second reconnaissance trip to Turkey together with the Earthquake Disaster Mitigation (EDM) Research Center in Miki, Japan. Team members visited Turkey from September 28 to October 4 to conduct high level reconnaissance using satellite imagery, differential global positioning systems and in-field GPS-GIS interfaces. In addition, restoration activities already underway were observed and documented.

This report includes observations from both these reconnaissance trips. It is the product of many authors representing several disciplines and, while not a final assessment of the topics addressed, represents an interim earthquake engineering evaluation of the natural, built and social environments. As noted by several of the authors, the analogies between the North Anatolian Fault Zone in Turkey and the San Andreas Fault in the United States are strikingly similar. The observations and conclusions herein form a springboard for future collaborative research efforts, which will advance society's ability to better withstand the destruction caused by earthquakes throughout the world.