

## Annual Meeting Focuses on Progress and Collaboration

**P**alm trees and alligators collided with passive energy dissipation and investigators as MCEER's 2003 Annual Meeting headed south to Boca Raton, Florida. Held traditionally at the beginning of each research year, the event took place January 23-25.

More than 60 participants, including center investigators, staff, students and industry partners, joined together to strengthen channels of interaction and collaboration, review research progress from the past 12 months, and outline plans and specific activities for the year ahead. Those in attendance seemed to concur that this year's meeting was among the best and most productive ever.



■ *Researchers, industry partners, students and staff pose outside the Embassy Suites Hotel for a group photo.*

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Dr. Aspasia Zerva, recently appointed Program Director of NSF's Earthquake Engineering Research Centers program, also attended. The meeting provided an opportunity for her to meet with MCEER investigators, students and industry partners, and engage them in face-to-face discussions of center research programs and individual tasks.

Presentations by research thrust leaders and center investigators gave attendees a glimpse of progress and deliverables in each of the Center's thrusts – Lifelines, Hospitals, Response & Recovery, Networking and Education– serving as a basis for discussions, and enabling all to gain a greater appreciation of the overall objectives and scope of research, education and outreach endeavors.

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## Tri-Center Collaboration and New Research Initiatives

The three earthquake centers (MCEER, Mid-America Earthquake Center (MAE), and the Pacific Earthquake Engineering Center (PEER)) plan to share their expertise on highway networks and power distribution networks in the coming year. PEER and MAE will contribute to the development of REDARS, a platform for seismic risk assessment of highway systems developed by MCEER as part of its highway project (see article on page 3). They will collaborate on the assessment of post-earthquake traffic demands; determine “link capacity,” i.e., define optimal alternate routes needed due to bridge closings; and bridge repair time.

MCEER and PEER will also merge their efforts on power distribution networks by combining PEER’s research on assessing the seismic performance of substations and components with MCEER’s research on power system performance, seismic evaluation and retrofit of transformers, and fragility curve development, to create a seismic risk methodology similar to REDARS.

A major new initiative in MCEER’s research program is the creation of “Overarching Research Tasks.” These tasks link the coordinated efforts in each thrust area to center-wide measures of resilience. Power and water research data are being merged with an aim toward creating integrated measures and quantitative assessments of the seismic resilience for the two systems, using Los Angeles as a case study. In another effort, researchers are working toward developing the knowledge base needed to create decision support systems for the seismic retrofit of hospitals, that would encompass structural, nonstructural, geotechnical, economic and social factors into an integrated system. ❖

## Annual Meeting

*(Continued from page 1)*

Ten industry partners shared their insights, making presentations on issues, problems, or implementation experiences faced by practitioners in the field. Their viewpoints not only complemented the research presentations by providing an industry perspective, but also in helping to identify additional research needs.

Individual research thrust breakout sessions followed, fostering project specific discussions among researchers, industry partners and students, and enabling participants to coordinate schedules and work plans to achieve system-integrated results over the coming 12 months.



■ Jeffrey Berman, left, discusses his research with industry partners during the student poster session.

At the end of the meeting, MCEER’s Executive Committee met to begin the planning process for Year 7 activities, and to discuss the upcoming NSF site visit to Buffalo June 3- 4, 2003. ❖

## MCEER Contributes to NYS Hazard Mitigation Plan

MCEER was part of a team of professionals assembled by the New York State Emergency Management Office to review, assess and recommend changes to the existing State Hazard Mitigation Plan. The 1995 Plan needed updating to comply with the Disaster Mitigation Act of 2000 and to address recent disasters in the State, including the World Trade Center attack, the 2000-2001 snowstorm in Western New York, and the Au Sable Forks earthquake. As part of this effort, Michel Bruneau was invited by the State Disaster Preparedness Commission to attend a summit October 30-31, 2002, in Albany, New York, where a number of agencies and organizations provided input and advice. Dr. Bruneau presented an overview of the state-of-practice and state-of-the-art in earthquake-resistant design concepts and related them to terrorism-resistant design. He also discussed on-going MCEER research activities and opportunities for new research in this area. His presentation stressed the importance of research as a mitigation tool, as it can often lead to more effective and economical solutions in achieving disaster resilient communities.

Prior to this effort, MCEER participated in the New York State Disaster Preparedness Conference in Niagara Falls, NY on Sept. 18-20, 2002. Michel Bruneau served with Kelly Donoghue, Clinton County Office of Emergency Services, on a panel to discuss earthquakes in New York. Robert Fakundiny, State Geologist, moderated the panel, which provided an overview of the earthquake risk in New York State. Other topics included the seismic history of New York State, the probability of future earthquakes, experiences from the April 2002 Au Sable Forks earthquake, and loss estimations using the FEMA HAZUS model.

MCEER’s Information Service hosted an exhibit and demonstration during the conference, which attracted over 400 emergency management and public safety professionals, from both public and private sector organizations. ❖

## IAB Input Advances MCEER Programs

MCEER's Industry Advisory Board (IAB) continues to play an integral role in the center's progress.



This year's annual meeting featured an IAB-organized "Industry Session," during which 10 members presented views on research needs and interests.

Presentations covered perspectives on: planning for post-earthquake water delivery; seismic retrofit of California hospitals; codes and standards for nonstructural systems; seismic risk mitigation of non-structural components; and public-private partnerships in emergency management.

These presentations provided center investigators with an enhanced understanding of the challenges faced by practitioners. The session concluded with discussions led by IAB Chair, Dr. Gary Hart. Center investigators, students and IAB members later joined in breakout sessions to shape plans for each research thrust. Consequently, MCEER will investigate specific issues related to the seismic performance of hospitals.

The IAB also met to complete its annual SWOT Analysis, advising center leadership of perceived Strengths, Weaknesses, Opportunities and Threats. The IAB Executive Committee and MCEER's Executive Committee also met in joint session for further industry input.

Luncheon roundtable discussions and a pre-banquet poster session provided additional opportunities for student-IAB interactions. ❖

## Caltrans to Provide Feedback on SRA Software

*The seismic risk analysis of highway systems has been an ongoing research component of MCEER's Highway Project, funded by the Federal Highway Administration (FHWA), for the past decade. This is the second article to feature activities on this task. The first article appeared in the Summer 2001 issue of the MCEER Bulletin (Vol. 15, No. 2).*

In mid-December, MCEER highway project researchers met with representatives from Caltrans and other interested parties to discuss REDARS (Risks due to Earthquake Damage to Roadway Systems), a software package under development to assess the seismic performance of highway systems. Participants provided feedback to the developers and discussed coordinating related seismic risk analysis efforts.



■ *Seismic risk analysis meeting with Caltrans*

REDARS is a user-friendly, PC-based software program that contains a formal set of methodologies and procedures for conducting a seismic risk assessment of highway networks and systems. It incorporates data and methodologies pertaining to engineering issues (structural, geotechnical, and traffic capacity), repair and reconstruction, system network and risk analysis, and



■ *Traffic control center at Caltrans*

socioeconomic considerations for impacts resulting from system damage. A mechanism to estimate system-wide direct and indirect losses due to reduced traffic flows and/or increased travel times will also be provided.

REDARS development is part of MCEER's Highway Project, funded by the Federal Highway Administration. The project team is led by Stuart D. Werner, Seismic Systems & Engineering Consultants and includes Craig E. Taylor, Natural Hazards Management Inc., Jean-Paul Lavoie and Chip Eitzel, Geodesy, James E. Moore II, University of Southern California, Jon S. Walton, City of San Jose and Sungbin Cho, Charles Huyck, and Ron Eguchi of ImageCat Inc. ❖

**MCEER's Highway Project is a multi-year effort focused on reducing the seismic vulnerability of the national highway system. Its Research Committee recently met in Reno, Nevada on March 3-4 to review progress on current research tasks and plans for future research activities. A meeting of the Highway Seismic Research Council (HSRC), who serve as an oversight committee for the project, is scheduled for May 28-29 in Buffalo. For more information, check out the research section of our web site at <http://mceer.buffalo.edu/research/HighwayPrj/094/default.asp>.**

## Update on MCEER Consortium NEES Activities

*This is the next installment in a regular series of articles on the progress of the MCEER-related George E. Brown, Jr. Network for the Earthquake Engineering Simulation (NEES) program. Previous articles have appeared in Vol. 15, Nos. 1 and 3.*

### UNR and RPI Early Adopter Sites for NEESgrid

The University of Nevada, Reno and Rensselaer Polytechnic Institute are two of three early adopter sites of NEESgrid, a network infrastructure that will link earthquake engineering sites across the United States and create a national virtual earthquake engineering laboratory. Oregon State University in Corvallis is the third site. The sites were chosen because they are home to the three main types of equipment used: centrifuges (RPI), shake tables (UNR) and tsunami wave tanks (OSU).

The sites will test capabilities of the NEES grid as they are developed and help NEES researchers create a common infrastructure that can be used across sites and for all NEES applications. They will test collaboration tools, local storage systems and data repositories, streamlining and video services and tele-operations of experimental equipment. The ultimate goal of the NEESgrid is to allow earthquake engineers to conduct experiments with colleagues around the country using distributed experimental equipment, operate experimental equipment remotely, run computer simulations on remote high-performance computers, and access repositories of earthquake engineering data for analysis and comparison to simulations and field data.

The principal investigator for the NEESgrid is Dan Reed, director of the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign. ♦

### Cornell-RPI Experimental Facility Receives Award Under NEES Phase 2

As part of NEES Phase 2, Cornell University, in partnership with Rensselaer Polytechnic Institute, is developing advanced experimental facilities at both full-scale and centrifuge-scale for testing, evaluating, and analyzing soil-structure-foundation interaction (SFSI) in critical lifeline facilities. Professors H. Stewart and T. O'Rourke of Cornell and M. O'Rourke and T. Abdoun of RPI are co-PIs in the development of a large displacement soil-structure interaction facility for lifeline systems at Cornell, supplemented by centrifuge equipment at RPI.



■ *Cornell's facility will allow large scale testing of underground lifelines*

In this unique world-class resource, to be implemented between 2002 and 2004, the response of underground lifelines to ground deformation will be comprehensively tested both in prototype scale and in small-scale centrifuge tests, with the less expensive centrifuge experiments

used to define the parameters for the full-scale tests as well as to extend them through parametric evaluations. For more information, please contact Prof. Harry Stewart, via e-mail at [hes1@cornell.edu](mailto:hes1@cornell.edu) or check out the web site at <http://www.nees.cornell.edu>. ♦

### UB Facilities Update

At the University at Buffalo, the NEES facility is proceeding on track, on time and on budget for completion in September of 2004. The construction is underway and can be monitored via web cam at <http://nees.buffalo.edu/webcam.html>. It is anticipated that the building will be complete in October 2003, and construction of the new shake table will begin at that time. Development and design of the LAN systems and the development of hybrid testing controls have been completed using simulators. For the latest information on progress, see the web site at <http://nees.buffalo.edu>.

Evaluations from the recent NSF Site Visit, held February 10-11, 2003, were very positive, with the site team especially noting the team's progress to date, and their leadership effort and involvement in NEES activities on the national level. ♦



■ *This conceptual drawing shows a cut away view of the dual shake table configuration planned for the UB facility*

## RPI Facilities Update

The NEES centrifuge upgrade and networking plan at RPI is proceeding on schedule. The subcontracts for the in-flight 2D shaker, in-flight robot and centrifuge modification have been awarded and will be commissioned in 2003. A bonus arising from the centrifuge modification will be a 50% increase in capacity from 100 to 150 g-ton, which will allow testing of larger models.

The development of the networking and tele-participation capability is also on schedule, helped by the selection of RPI as one of the three early adopter sites. A new state-of-the-art wireless data acquisition system is already operational and two rooms are being remodeled to create a state-of-the-art tele-participation facility. Additional hardware is being acquired and connected to the NEES electronic grid, and software is being developed to start a pilot project (in cooperation with the U. of California at San Diego) at the end of 2003. It is anticipated that the pilot project, which will include both faculty and students at RPI and UCSD, will make maximum use of the new tele-participation capability and in-flight robot at the RPI centrifuge site.

Additional developments in instrumentation, advanced sensors and centrifuge test visualization are also underway. A high speed camera was acquired and commissioned, collaborative work is proceeding on MEMS sensors with the NEES centrifuge team at the U. of California at Davis, and other sensor technologies are being evaluated for use in centrifuge experiments. An increasing number of visualizations have been conducted of dynamic centrifuge tests on liquefaction, lateral spreading, and their effect on the response of pile foundations and quay walls, on the basis of the corresponding recorded sensor information. These visualizations are available on the RPI centrifuge web site at <http://www.ce.rpi.edu/centrifuge>. ❖

## UNR Facilities Update



■ A demonstration of the NEESgrid system used this model of a long span bridge supported on two shake tables.

The University of Nevada, Reno (UNR) NEES facility successfully completed the construction of three biaxial shake tables and system acceptance tests on October 30, 2002.

UNR, as one of the three early adopter sites, has provided assistance to the System Integrators (SI) of NEES in the development, installation and evaluation of NEESgrid software and services including LabView DAQ VIs, NEES Streaming Data Server (NSDS) and drivers, Grid Services, tele-presence software and analysis tools. As part of the NEES awardees meeting, held in Reno on November 14-15, 2002, researchers demonstrated a preliminary, prototype version of the NEESgrid system. The demonstration involved real-time collaboration between the equipment site (UNR) and remote users; setting up of experimental parameters of shake table experiments on a model of a long-span bridge supported on two shake tables, real-time biaxial testing and data/video streaming; and post analysis of experimentally recorded data. More information is posted on the web site at <http://bric.ce.unr.edu/nees>.

UNR also provided assistance and resources to the NEES system integrators for similar demonstrations at the Supercomputing Conference in Baltimore on November 16-22, 2002. ❖

## Workshop Explores Information Needs of NEES

On January 23-24, 2003, earthquake information providers and users of earthquake data and information were invited to a workshop to discuss and suggest future directions for information provision. Convened by the National Information Service for Earthquake Engineering (NISEE-Berkeley) and funded by the National Science Foundation, the workshop included researchers, engineering practitioners, librarians, and other information professionals. Dorothy Tao, Information Service, and Jane Stoye, Publications, represented MCEER at the workshop.

The first speakers focused on earthquake reconnaissance. Charles Scawthorn, ABS Consulting Engineers, and Keith Porter, the George C. Housner Fellow at Caltech, proposed a distributed earthquake experience database that would act as a repository for a multitude of varied types of reconnaissance data. They proposed establishing a National Earthquake Experience Database (NEED), which would curate, maintain, and enhance access to the various types of data collected from earthquake-stricken regions. NEED would include geologic, seismological, geotechnical, strong motion, and teleseismic data, as well as other data from the natural and built environments.

Speaking for NEES were Robert Reitherman and Robert Nigbor from the Consortium for Universities in Earthquake Engineering (CUREE), who provided background on the mission of NEES, its organization, and timetables for NEES development. Reitherman and Nigbor also discussed the types of data and experimental information NEES intends to collect and share, as well as the probable infrastructure that will support such activities. Cherri Pancake, Oregon

*(Continued on page 10)*

## Student Leadership Council Activities

The MCEER Student Leadership Council (SLC) actively participated in a number of events in the six months following its third annual retreat, including the 2002 National Science Foundation Student Retreat at the Engineering Research Centers Annual Meeting, the MCEER Annual Meeting, and the EERI Annual Meeting.

### National Science Foundation Student Retreat

Planning for the 2002 National Science Foundation's Student Retreat, which was part of the 2002 Engineering Research Centers (ERC) Annual Meeting, in Washington, D.C., began in September. The SLC organizers (Jeff Berman, President, Rory Connell, Vice President, and Benedikt Halldorsson, Activities Coordinator) worked closely with NSF representatives to create an informative day for all participants, which included student representatives from all 18 Engineering Research Centers. The retreat began with a social breakfast and poster session, followed by a welcome from Jeff Berman, MCEER SLC President. It was a unique opportunity to share ideas, some of which will be implemented by the MCEER SLC, including an online analysis of MCEER's strengths, weaknesses, opportunities and threats (SWOT). A review was included in the Fall issue of the *Bulletin*.

### MCEER Annual Meeting

SLC members Jeff Berman (University at Buffalo), Cadgas Kafali (Cornell University), Benedikt Halldorsson (University at Buffalo), Darren Vian (University at Buffalo), Terri Norton (Florida A&M), Wanlong He (City University of New York), and Mike Astrella (University at Buffalo) were appointed by their faculty PIs to attend the MCEER Annual Meeting in Boca Raton, Florida, January 22-25,



■ Benedikt Halldorsson, left, discusses his work with MCEER Industry Partner Paul Senseny of FM Global Research (right) at the Annual Meeting.

2003. During the first day, at a special closed session for the SLC, president Jeff Berman outlined this year's tasks and activities. Plans were made to create a photo guidebook for new MCEER-funded students, to introduce them to MCEER and help them see where they fit in this large and collaborative research center. It was also decided that this year's SLC Retreat will be held at Cornell University. Web page updating, preparing the SLC column and selecting a student for the Student Spotlight column for the next *Bulletin* were also discussed at this meeting. The next day, Jeff Berman gave a presentation on last year's SLC activities, providing an overview to the PIs and industry partners. At the Icebreaker Reception, the SLC members exhibited and discussed posters highlighting their MCEER research.

### EERI Annual Meeting

Four SLC members, Jeffrey Berman, Benedikt Halldorsson, Gordon Warn and Michael Pollino, all students at the University at Buffalo, attended the 2003 EERI Annual Meeting in Portland, Oregon, February 5-8. They participated in the Tri-Lateral Earthquake Engineering Re-

search Center's (EERC) SLC meeting, where PEER, MAE and MCEER SLC representatives met. Each SLC gave an update of its current and most recent activities. The discussions made it evident that the three earthquake engineering research centers have similar SWOTs, and ways to deal with them were considered. How to attract students to earthquake engineering and the SLC was also discussed, and a trilateral SLC retreat in the same format as the individual retreats was suggested. At the Icebreaker Session, MCEER representatives Gordon Warn and Michael Pollino presented posters on their research.

### Seminar Series/Web Site

On February 28, 2003. Dr. F. Michael Bartlett, associate professor in the Department of Civil & Environmental Engineering, University of Western Ontario, London, Canada presented "Testing Full-Scale Houses Subjected to Simulated Extreme Wind Loads." This seminar is available online at <http://civil.eng.buffalo.edu/WebCast> as part of the ongoing Seminar Series.

In March, SLC member Diego Lopez-Garcia, a Ph.D. candidate at the University at Buffalo, will report on his participation in the NSF funded Tri-Center (MCEER, MAE, PEER) Field Mission, which took place in Taiwan in May of 2002. This presentation will take place in Buffalo and will be available on the SLC web site. Both seminars will be reviewed in the next issue of the *Bulletin*.

The MCEER-SLC webpage <http://MCEER.buffalo.edu/SLC> is newly revamped thanks to Benedikt Halldorsson. Members are encouraged to visit often for new information. A schedule for this year's Seminar Series, guidelines for new MCEER students, and an online SWOT analysis will be available soon. ❖

--Submitted by Cadgas Kafali, Cornell University

## Student Spotlight

Terri Norton is in the second semester of her doctoral program in civil engineering at Florida A & M University, where her research focuses on damage estimation and hazard mitigation. Her current research is a continuation of her Master's studies, also at Florida A & M, entitled "An Earthquake Analysis of an Existing Structure in the Southeast Region of the United States." Her adviser is Professor Makola M. Abdullah.

When asked how she became interested in earthquake hazard mitigation, Terri explains, "Growing up in Florida, I am very familiar with natural hazards and their impacts on communities. However, it wasn't until the senior year of my undergraduate career that I learned that earthquakes can and do occur in the Eastern and Central United States, and that the damage area can be larger than in California. Therefore, I believe that it is really important that the eastern region begin to evaluate their seismic provisions to insure that communities will be protected should a major earthquake occur."

Last summer, Terri participated in the Natural Hazard Mitigation in Japan Program and the NSF Summer Program in Japan. She spent 10 weeks as a visiting researcher. During the first two weeks, she toured Japanese research laboratories and made site visits to design, construction, building, and bridge sites in different areas of Japan. In the remaining eight weeks, she worked at the University of Tokyo, where Dr. Yozo Fujino was her host. Terri said that, "The trip was a great experience, I learned a lot and met a lot of interesting people."

Terri hopes "to one day become a professor and inspire students the way that many of my professors and mentors have inspired me." She is expecting to graduate in the fall of 2004.

As a former student athlete, Terri likes all kinds of sports, including track and football. She was a member of the track and field team at Florida State University, where she received her bachelor's degree. Her hobbies include exercising, reading, and photography. ❖

**Editors Note:** Terri contributed a paper on her research topic to MCEER's Student Research Accomplishments: 2001-2002, available at [http://mceer.buffalo.edu/publications/sp\\_pubs/02-SP09/default.asp](http://mceer.buffalo.edu/publications/sp_pubs/02-SP09/default.asp).



■ Terri Norton poses in the observation hall of Kansai International Airport, Osaka, Japan.

## Research Experiences for Undergraduates Program Seeks Applicants

Once again, applicants are being recruited for NSF's Research Experiences for Undergraduates (REU) program. The program, in its fourth year at MCEER, involves undergraduate students in Center research activities through summer internships. Fellow earthquake Centers MAE (Mid-America Earthquake Center) and PEER (Pacific Earthquake Engineering Center) also participate in the program.

Pending confirmation of funding, up to eight applicants will be selected at each



Center and will receive a \$5,000 stipend. Additional details and requirements can be found on our web site at <http://mceer.buffalo.edu/education/reu/default.asp> or by contacting Andrea Dargush at [dargush@buffalo.edu](mailto:dargush@buffalo.edu). The deadline for letters of interest is March 31, 2003.

In previous years, MCEER's REU students have been involved in a variety of different projects, including seismic design and testing, public sector approaches to mitigation, risk and reliability in seismic design, seismic hazard characterization of the New York

City area, application of remote sensing technologies for earthquake recovery, and performance of soils under earthquake-induced deformation.

This year's participants will attend an Earthquake Engineering Symposium in Sun River, Oregon in August. The symposium will provide REU participants with an opportunity to present the results of their research, meet other students from around the country and faculty members from a wide variety of disciplines, and relax and unwind in a resort setting. ❖

## US and Japanese Researchers Hold Eighth Cooperative Workshop on Liquefaction and Lifeline Facilities



■ Participants at the 8<sup>th</sup> U.S.-Japan workshop pose for a group photograph.

Tokyo, Japan was the setting of the 8<sup>th</sup> US-Japan Workshop on Earthquake Resistant Design of Lifeline Facilities and Countermeasures Against Liquefaction held on December 16-18, 2002. The workshop was attended by over 25 U.S. and 70 Japanese participants. It was sponsored by the Japanese Ministry of Education, Culture, Sports, and Technology; National Science Foundation and MCEER. Professors J.P. Bardet, University of Southern California, M. Hamada, Waseda University, and T.D. O'Rourke, Cornell University, served jointly as co-chairs of the event.

There were over 50 presentations and papers prepared for the workshop. Top-

ics covered included pipeline response and design for permanent ground deformation, rehabilitation of lifelines, liquefaction hazard mapping, fault rupture effects on structures, seismic performance of lifelines, characteristics of liquefiable soils, pile behavior in liquefied ground and ground motion characteristics at sites subject to liquefaction. There was also a special session on the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES), with short presentations by many recipients of Phase I and II NEES awards. The proceedings of the workshop will be published by MCEER later this year.

The workshop series began in 1988, and since that time, has served as a major instrument for collaboration and cooperative exchange. Cooperative research between Japanese and U.S. earthquake engineers has resulted in significant new findings about liquefaction and its effects on lifeline facilities, assessment of liquefaction potential, modeling of liquefaction-induced large ground displacements, performance of lifeline facilities and foundations, dynamic response of underground structures, and countermeasures and earthquake resistant design against liquefaction. ❖

### Recent Events...

August 1, 2002 - February 28, 2003

**August 2 - 4, 2002**

Student Leadership Council  
Retreat  
Buffalo, New York

**August 8 - 11, 2002**

Research Experience for  
Undergraduates Symposium  
Keystone, Colorado

**August 15 - 20, 2002**

International Conference on  
Advanced and New Challenges  
in Earthquake Engineering  
Research  
Harbin and Hong Kong, China

**August 30 - 31, 2002**

Highway Project Research  
Committee Meeting  
San Francisco, California

**September 20, 2002**

Seminar by Andre Filiatrault  
Development of Post-Tensioned  
Energy Dissipating Connections  
for Steel Moment Resisting  
Frames  
Buffalo, New York

**October 7 - 10, 2002**

PRC-US Workshop on Seismic  
Analysis and Design of Special  
Bridges  
Shanghai, China

**October 12, 2002**

Earth Science Day  
Buffalo, New York

**October 28, 2002**

Seminar by Reginald DesRoches  
Seismic Retrofit Using Shape  
Memory Alloys  
Buffalo, New York

**November 2-5, 2002**

ERC Annual Meeting-Student  
Retreat  
Washington, DC

**November 7-8, 2002**

Highway Seismic Research  
Council Meeting  
Washington, DC

**December 16-18, 2002**

8th U.S.-Japan Workshop on  
Earthquake Resistant Design of  
Lifeline Facilities and Countermea-  
sures Against Liquefaction  
Tokyo, Japan

**January 23-25 2003**

MCEER 2003 Annual Meeting  
Boca Raton, Florida

**February 28, 2003**

Seminar by F. Michael Bartlett  
Testing Full-Scale Houses Subjected  
to Simulated Extreme Wind Loads  
Buffalo, New York  
Webcast address:  
<http://civil.eng.buffalo.edu/webcast>

## UB-MCEER-EERI Seminar Series

The EERI student chapter of the University at Buffalo (UB-EERI), the MCEER Student Leadership Council, the Networking and Education Programs of MCEER, and the University at Buffalo's Department of Civil, Structural and Environmental Engineering jointly sponsor a series of seminars on a variety of topics related to earthquake hazard mitigation. The purpose of the seminar series is to widen accessibility to timely, technical presentations by students, researchers, visitors and affiliates of MCEER. Previous seminars have been broadcast over the Internet in real-time, and can be viewed anytime at <http://civil.eng.buffalo.edu/webcast>. However, due to new NEES construction at Ketter Hall, this seminar could not be webcast.

## Seismic Retrofit Using Shape Memory Alloys

Dr. Reginald DesRoches, Georgia Institute of Technology

Reginald DesRoches, School of Civil and Environmental Engineering, Georgia Institute of Technology, presented a seminar entitled "Seismic Retrofit Using Shape Memory Alloys," as part of the ongoing seminar series on earthquake engineering. The seminar at UB was held on October, 28, 2002, and unlike previous seminars, could not be webcast due to construction on the NEES facility.

Dr. DesRoches began by explaining the unique characteristics of Shape Memory Alloy (SMA) including, Young's modulus-temperature relationships, shape memory effects and high damping characteristics. Dr. DesRoches explained that the shape memory alloys (SMAs) used in the research for seismic retrofit have been used for various medical applications for several years. These applications include medical stents and dental brace wire. In the past, use of SMA for seismic application was prohibitively expensive, however, in recent years, the cost of the material has decreased significantly, making it a viable alternative for seismic retrofit of buildings and bridges.

Dr. DesRoches presented two applications of SMAs for seismic retrofit. The first uses the shape memory effect of the material implemented in partial-re-

strained beam-column connections in building applications. Because of the shape memory characteristic of this material, large residual deformations in the connection due to earthquake induced loading can be recovered by heating the material. Two full-scale connections were tested using the SAC loading protocol. The connection exhibited high levels of energy dissipation without significant strength degradation during the testing, and subsequently recovered large post-experiment residual deformations by heating the SMA bars in the partially restrained connection.

The second application proposed by Dr. DesRoches utilizes the super-elastic characteristics of the material to improve the seismic resistance of bridges. The SMA material was used in restrainer bars connecting a bridge superstructure to its piers. This device limits relative displacement and prevents unseating of the bridge superstructure during an earthquake event. Dr. DesRoches investigated the effectiveness of the SMA restrainer using nonlinear response-history analysis. The concept proved to be viable, and Dr. DesRoches is planning a full-scale experimental study of the SMA restrainer bars in bridge application in the near future. ♦

--Submitted by Gordon Warn  
UB-EERI secretary

## Applicants Sought for Field Mission to Italy

Graduate students in earthquake engineering are invited to apply to this year's Field Mission Fellowship Program. The field mission will take place in Italy, where participants will visit the University of Pavia, laboratory facilities at the University of Naples, the Disaster Management Center near Naples and the site of the recent Puglia earthquake. They will also engage in a hands-on field assessment exercise. The trip is scheduled for May 17-24, 2003.

Graduate students from MCEER will join their peers from the Mid America Earthquake Center and the Pacific Earthquake Engineering Research Center on the trip. Last year's participants visited Taiwan. A seminar about the experience, presented by University at Buffalo Ph.D. candidate Diego Lopez Garcia, is available at <http://civil.eng.buffalo.edu/webcast>.

Contact Andrea Dargush, e-mail: [dargush@buffalo.edu](mailto:dargush@buffalo.edu), for an application packet. The deadline is April 15, 2003. ♦

In the next *Bulletin*, the following seminars from the UB-EERI Seminar Series, which are currently available at <http://civil.eng.buffalo.edu/webcast>, will be reviewed: F. Michael Bartlett, University of Western Ontario, "Testing Full-Scale Houses Subjected to Simulated Extreme Wind Loads;" Diego Lopez Garcia, University at Buffalo, "Tri-Center Field Mission 2002: Taiwan;" Thomas D. O'Rourke, Cornell University, "Lessons Learned from the World Trade Center Disaster for Critical Infrastructure;" and Douglas Taylor, Taylor Devices, "The Millennium Bridge Project, London, England."

## NEES Information Needs

(Continued from page 5)

State University, and Anke Kamrath, UC San Diego, spoke about the role of information technology in the NEES project. According to Pancake, advanced IT will enable researchers to control and observe experiments from remote sites, reduce requirements for on-site presence, and much more. However, creating such a system is a major challenge. Many issues remain, such as defining standards and formats for metadata, establishing conventions for future retrieval of both experimental data and reports, data collection procedures, and so on.

Other speakers included Roger Borchardt, U.S. Geological Survey, and chair of the EERI publications committee, who described the transformation of EERI's *Earthquake Spectra* from a hard copy journal to an online, interactive publication, which links, through the aegis of the American Institute of Physics (AIP), its publisher, to a wealth of related references. Marjorie Greene, EERI, provided an overview of advances in the collection and dissemination of earthquake reconnaissance information, including the use of PDA's in data collection and tracking field researchers by Global Positioning Systems (GPS). Roy Tennant, UC Berkeley, discussed **E-Scholarship**, an electronic scholarly publishing initiative of the California Digital Library at <http://www.cdlib.org>, which aims to change the paradigm of online scholarly publishing, as distinguished from commercial scholarly publishing.

The two day meeting provided participants with a comprehensive and highly pertinent overview of existing and state-of-the-art initiatives in information technology. The workshop also highlighted the many issues and challenges in the provision of earthquake information now and in the future and provided insight for possible new directions. ❖



## Kudos

☆ **Lynn Preston**, Deputy Division Director of NSF's Engineering Education and Centers Division, was recently honored as the NSF Engineer of the Year. She received this honor at the annual awards ceremony for engineers in government sponsored by the Society of Professional Engineers, held February 20, 2003. In an email to ERC colleagues, Lynn wrote, "This is a treasured award for me because of its recognition of my contributions to engineering; but what it really recognizes are the contributions of the ERCs to the advancement of engineering knowledge and technology and the development of engineers who are so much more effective in practice because of the experiences they have had in your centers." MCEER thanks Lynn for acknowledging the ERCs and congratulates her on this award. ❖

☆ **Tom O'Rourke**, **Harry Stewart** and **Sang-Soo Jeon** won the 2002 Trevithick Prize from the British Institution of Civil Engineers (ICE) for the paper "Geotechnical Aspects of Lifeline Engineering," published in the January 2001 issue of *Geotechnical Engineering*. The prize is awarded every three years for an outstanding paper published by ICE. The awards ceremony was held on November 5, 2002 in London.

The paper summarizes the results of research supported by NSF, MCEER, Gas Technology Institute and New York Gas Group. Tom O'Rourke is the Thomas R. Briggs Professor of Engineering and Harry Stewart is an Associate Professor, both at Cornell University. Sang-Soo Jeon received his Ph.D. from Cornell for GIS-based research on the earthquake performance of water and natural gas distributions networks. He is now the Chief Researcher of the Geotechnical Research Division of the Korea Highway Corp. ❖

## New MCEER Reports

MCEER technical reports are published to communicate specific research data and project results. Reports are written by MCEER-funded researchers, and provide information on a variety of fields of interest in earthquake engineering. The proceedings from conferences and workshops sponsored by MCEER are also published in this series.

MCEER's web site offers a complete list of technical reports, abstracts, and prices. The publications catalog allows users to search the report list by subject, title and author, and to place orders for these reports. Visit the site at <http://mceer.buffalo.edu/publications/default.asp>.

### Proceedings of the MCEER Workshop on Lessons from the World Trade Center Terrorist Attack

Edited by M. Bruneau, 10/18/02; MCEER-02-SP08, 172 pages plus two CD-ROMs, \$35.00

Over 100 experts from a wide variety of backgrounds participated in *Lessons from the World Trade Center Terrorist Attack: Management of Complex Civil Emergencies and Terrorism-Resistant Civil Engineering Design*, held in New York City on June 24-25, 2002. The proceedings summarize the findings from the workshop and include, in digital format (on CD-ROM), the presentations made by most of the speakers. This special format was designed to share, to the fullest extent possible, the visuals and video-clips that constituted an essential part of some presentations and greatly enriched communication of the concepts presented. Complementing these electronic presentations are abstracts and short biographical sketches of most authors. Finally, a few authors volunteered additional longer technical documents, which are included on the CD-ROM.



## Development of Analysis and Design Procedures for Spread Footings

by G. Mylonakis, G. Gazetas, S. Nikolaou and A. Chauncey, 10/02/02, MCEER-02-0003, 268 pages, \$35.00

This report describes a series of numerical analyses that address spread footings under dynamic and seismic loading. These analyses were conducted for a typical idealized pier with a single-column bent founded on a footing on the surface of, or embedded in, a layered soil profile. The report includes charts and tables for computing footing impedances for a variety of soil conditions and vibration modes. The decomposition of seismic response into kinematic and inertial parts is discussed, as are the effects of soil material nonlinearity on the response. A parameter study of the response of bridge piers (without uplift) showed the effect of increased period due to soil-structure interaction on seismic response and the influence of radiation damping. Finally, footing bearing capacity failure, development of pore water pressure, and uplift under seismic conditions are discussed.

## Bare Earth Algorithms for Use with SAR and LIDAR Digital Elevation Models

by C.K. Huyck, R.T. Eguchi and B. Houshmand, 10/16/02, MCEER-02-0004, 128 pages, \$25.00

The study described in this report examines the use of remote sensing technologies in creating building inventories for earthquake loss estimation. A key step in constructing these building inventories using remotely sensed data is to separate the built environment from the ground, i.e., the bare earth. The report describes an approach using SAR to detect the bare earth by employing a series of filters that depend on knowing the general heights of buildings, trees and other physical features on the surface of the earth. The bare-earth algorithm is validated and applied to three study regions in the Los Angeles area. The authors also investigate the efficacy of using LIDAR (light detection and ranging) data in constructing building inventories. LIDAR data is more detailed and accurate than SAR data, and the results from the two technologies were compared. The next report in this series will focus on using the results of the bare-earth algorithm to estimate the building stock.

## Review of Energy Dissipation of Compression Members in Concentrically Braced Frames

by K. Lee and M. Bruneau, 10/18/02, MCEER-02-0005, 216 pages, \$35.00

In this research, experimental data on the behavior of concentrically braced frames (CBF) is reviewed to assess the extent of hysteretic energy achieved by bracing members in compression, and the extent of degradation of the compression force upon repeated cycling loading. The response of single story buildings and other case studies are investigated to observe trends in response and to develop a better understanding of the impact of some design parameters on the seismic response of CBF. This study focuses on quantifying energy dissipation in compression and its effectiveness on seismic performance. Based on the experimental data review from previous tests, the normalized energy dissipation is found to decrease with increasing normalized displacements. The normalized degradation of the compression force envelope depends on  $KL/r$  and is particularly severe for W-shape braces. Based on dynamic analyses of a single story braced frame, a bracing member designed with bigger  $R$  and larger  $KL/r$  results in a lower normalized cumulative energy ratio in both cases.

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# Upcoming Events

**December 8-9, 2003**

**ACI 2003 International Conference: Seismic Bridge Design and Retrofit for Earthquake Resistance**  
■ La Jolla, California

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