

Message from the Director

New Team in Place to Ensure Continued Success Beyond Year 10

As MCEER enters its 18th year as a national earthquake engineering center, it finds itself at a strategic juncture with a promising future. Strong from the leadership of its past directors, and in particular of George C. Lee, MCEER has pioneered multidisciplinary earthquake engineering research and a culture of coordinated large-scale integrated research projects. These, in turn, have led to many advances in knowledge and accomplishments that have had a tangible impact on practice. This legacy enables MCEER to tackle the new challenges ahead, with a positive outlook toward the future.



Michel Bruneau

One important reason for this optimism is the re-authorization of the National Earthquake Hazard Reduction Program (NEHRP), established in 1977 and funded at \$100 million per year since, and which has played a major role in reducing seismic hazards throughout the United States. The establishment of a National Center for Earthquake Engineering Research (NCEER) from 1986-97, and of three earthquake engineering research centers since (including NCEER becoming the Multidisciplinary Center for Earthquake Engineering Research) would likely not have been possible in absence of this legislation. Those who have witnessed and actively contributed to the enormous advances in earthquake engineering over the past decades can only welcome with enthusiasm the news that re-authorization of

NEHRP is being considered at a higher funding level, the first such increase since its enactment.

Given the track record of accomplishments by the earthquake engineering community, we are confident that the NEHRP re-authorization will be successful, and will provide, among many things, the major infusion of funds needed to fully utilize the capabilities of the George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES). Yet, amidst this good news, many concerns have been raised by members of the earthquake engineering community on the future of earthquake engineering research centers, particularly considering the 10-year limit on NSF's funding of centers administered by its Engineering Education and Centers (EEC) division, and the NEES as a possible overwhelming presence in the earthquake engineering field.

While fully aware of these concerns, MCEER remains committed and determined to continue its work for decades to come. On one hand, the Center fully embraces the NEES endeavor. Currently, all institutions with large-scale experimental testing capabilities and affiliated with MCEER are hosting NEES equipment sites (see <http://mceer.buffalo.edu/research/nees/default.asp>). Thus, MCEER foresees becoming a major user of the NEES facilities as well as a facilitator of multi-institution

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Success Beyond Year 10

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research projects using these facilities. However, NEES is just one component of MCEER's future. We plan to remain active in our other areas of research, including the highway project, and to expand into new endeavors for which our unique multidisciplinary systems-approach is well-suited.

A substantial amount of work will be required to achieve growth beyond the NSF-ERC Year 10 funding, but MCEER is well positioned to succeed in this key transition. MCEER's management is being restructured to tackle the new challenges while ensuring continuity in its ongoing activities and a seamless transition. As part of this effort, Andre Filiatrault has been named Deputy Director, and several new positions have been created and staffed as follows: Special Task Director, George Lee; Strategic Operations Director, Thomas Anderson; and Diversity Program Director, Makola Abdullah.

MCEER's extensive network of industry partners and collaborators is also a powerful basis on which to build future successes. Our track record in being able to spearhead and/or embrace innovative ideas and nurture them from initial fundamental research to implementation through the efforts of high caliber affiliated researchers and partners, is another valuable asset that strengthens MCEER's positive outlook on the future.

In the above perspective, through teamwork efforts of its researchers, partners and management, MCEER intends to continue serving the NEHRP mission for many years to come.

—Michel Bruneau, Director

Deputy Director: Andre Filiatrault

MCEER extends a very warm welcome to our new deputy director, Andre Filiatrault. A leading expert on shake-table testing of structural systems and nonstructural building components, Andre joined the MCEER team in September. He will be responsible for coordinating MCEER's nationwide research program in advanced technology applications. He is also professor of civil, structural and environmental engineering at the University at Buffalo. Andre was formerly a professor of structural engineering at the University of California - San Diego (UCSD), president of the Consortium of Universities for Research in Earthquake Engineering (CUREE), and project manager for testing and analysis for the CUREE Caltech Wood Frame Project, a federally-funded effort to develop reliable and economical methods of improving wood frame building performance in earthquakes. Prior to joining UCSD, he was a professor of civil engineering at Ecole Polytechnique in Montreal. He continues to serve on the scientific board and faculty of the Rose European School for Advanced Studies in Reduction of Seismic Risk at the University of Pavia in Italy, and is a member of the Earthquake Engineering Research Institute and the American Society of Civil Engineers.

Andre moved to Buffalo with his wife, Louise, and two daughters, Lou-Anne and Sydney.



Andre Filiatrault

Special Tasks Director: George C. Lee

Former Director George C. Lee has been appointed as MCEER's first Special Tasks Director. In this position, George will continue to lead the Federal Highway Administration-sponsored Highway Project, "Seismic Vulnerability of Highway Systems," coordinate international activities, especially the US-PRC cooperative research project, and assist in the development and improvement of MCEER's graduate-level research-education interface activities, including restructuring the implementation of the M.Eng degree in Earthquake Engineering. He will also continue to be a researcher in both NSF and FHWA funded projects.



George C. Lee

George, who is also Samuel P. Capen Professor of Engineering at the University at Buffalo, will have an expanded role in the development of new initiatives for the Dean of the School of Engineering and Applied Sciences.

Diversity Program Director: Makola Abdullah

Professor Makola Abdullah of the Department of Civil Engineering of Florida A&M University/Florida State has been named MCEER's first Diversity Program Director. In this new and important role, Makola will oversee and continue the development of MCEER's diversity efforts. This will involve developing programs that support the Louis Stokes Alliances for Minority Participation (LSAMP) and Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) initiatives, by reaching out to underrepresented groups, introducing them to earthquake engineering and assisting them in earning degrees in engineering so that they can become future professionals in their communities.



Makola Abdullah

Makola has a strong history with MCEER, having been funded for the last three years to engage in research and education tasks working with K-12 students and teachers, and also with university students in an Earthquake and Wind Engineering course.

He and his wife Ahkinyala have two children, Mikaili and Sefiyetu.

"I have a strong personal commitment to diversity. I have been fortunate enough to be mentored by some powerful people, and want the opportunity to give back to others."

—Makola Abdullah

Strategic Operations Director: Thomas Anderson

Dr. Thomas L. Anderson has been appointed MCEER's Strategic Operations Director. In this newly created position, Tom will assist MCEER in informing and educating mission agencies and corporate groups about the capabilities of MCEER and its Strategic Partners. He will participate in MCEER's strategic planning process in anticipation of graduation from the NSF ERC program, and long-term growth opportunities.



Tom Anderson

Tom served on the MCEER (then NCEER) Oversight Committee from 1992 to 1997 and was Chair of the Center's Implementation Advisory Committee in 1999. He most recently was a program officer with the National Science Foundation NEES Program. Previously, he spent 27 years with Fluor Daniel, one of the world's largest engineering and construction companies, where he held a variety of executive positions. While on sabbatical leave from Fluor Daniel, he completed a two-year postdoctoral fellowship at RAND's Critical Technologies Institute in Washington, D.C., where he contributed to analytic support for science and technology policy formulation in the Executive Office of the President of the United States.

Tom will be based in Washington, D.C. He and his wife, Sunny Ann, reside in Arlington, Virginia, and have five children.

"I'm very excited about this opportunity to work closely with MCEER and its Strategic Partners as they transition beyond the NSF ERC program over the next few years. MCEER is clearly well positioned for success in achieving this vision, and I'm honored to have been asked to contribute to this exciting effort."

--Tom Anderson

2004 Annual Meeting Focuses on Engaging Community, Enlisting Opinion and Attaining Resilience

Under the theme of "Engaging Community ... Enlisting Opinion ... Attaining Resilience," MCEER's 2004 Annual Meeting was held January 15-16 in Los Angeles, California. The meeting provided a setting for MCEER's researchers, students, and Industry Advisory Board (IAB) members to engage West Coast practitioners and stakeholders to help shape the Center's research plan for the coming year. In all, more than 150 people attended the event, including more than 40 practicing architects, engineers, planners, owners, emergency managers, policy makers, and public officials.

The meeting was held in Los Angeles, at the invitation of the city's Emergency Preparedness Department; Ellis Stanley, Sr., general manager, helped preside over a number of annual meeting activities, beginning with an Icebreaker Reception. The reception provided an opportunity for practitioners to informally interact with MCEER researchers, students and industry partners. The annual meeting included:



IAB Vice-Chairman Ellis Stanley, LADWP, welcomed participants to the Icebreaker Reception.

MCEER's Annual Meeting provides researchers, partners, practitioners and students with an opportunity to meet, share ideas, and plan future projects together.

- A "Practitioners Day Forum," involving presentations and discussions by and with guest practitioners and Industry Advisory Board (IAB) members, and focusing on earthquake resilience challenges faced in practice;
- A full day of **Strategic Research Planning** during which MCEER industry partners, students and researchers met to integrate practitioner concerns into the Center research thrusts for the coming year. These are: Seismic Evaluation & Retrofit of Electric Power & Water Systems; Seismic Retrofit of Hospitals/Acute Care Facilities; and Earthquake Response & Recovery



Students present posters at the MCEER Annual Meeting. Photo at left: Mike Pollino; Above, MCEER PI Makola Abdullah (left) with students Terri Norton (center) and Marlon Hill (right).



- Presentation of the "MCEER Best Student Article," by Michael Pollino. Pollino, a civil engineering graduate student at the University at Buffalo, presented his article titled, "Seismic Retrofit of Bridge Steel Truss Pier Anchorage Connections." He was selected as the winner of the inaugural competition, by a panel of distinguished judges from MCEER's Industry Advisory Board (IAB), and was presented with an award in recognition of his achievement (see page 10);
- **Student Posters and Industry Exhibits**, which were on display throughout the Annual Meeting, helped to foster further interaction between MCEER students, industry partners, researchers, and others in attendance;
- "10 Years Since Northridge: A Special Event for Movers and Shakers," a commemorative luncheon hosted jointly by MCEER, the Southern California Earthquake Center (SCEC) and the Business and Industry Council on Emergency Preparedness (BICEPP) -- the luncheon was attended by more than 130 people and featured presentations by representatives of the U.S. Geological Survey (USGS), Federal Emergency Management Agency (FEMA), National Science



NSF Program Director Joy Pauschke addresses attendees at the Northridge commemorative luncheon.



George C. Lee poses with his wife, Grace, two sons, Kelvin and David, and his MCEER family, A. Filiatrault, T. O'Rourke, J. Pauschke, M. Bruneau, A. Reinhorn, K. Tierney and M. Shinozuka at the Annual Meeting banquet.

Foundation (NSF), California Department of Conservation, National Center for Crisis and Continuity Coordination (NC4), SCEC and MCEER. It was sponsored by FEMA and NC4.

On the evening of Thursday, January 15, an **Annual Meeting Banquet** honored the leadership of former MCEER director, George C. Lee. Dr. Lee recently decided it was time to step down as director to focus on his own research and education

interests. He is serving as MCEER's Special Tasks Director (see page 2) and is continuing to lead MCEER's Highway Project. He has held the post of MCEER director since 1992.

The *Annual Meeting* convened with the Center's Executive Committee and Industry Advisory Board Executive Committee meeting in joint session, to review and further discuss past research progress and plans made for the coming year.



MCEER researchers and students toured the new Westwood Campus of UCLA's Medical Center.

The day before the Annual Meeting, MCEER investigators and graduate students involved in the MCEER Hospital Project visited the new Westwood Campus of the UCLA Medical Center, which is currently under construction. The visit was guided by IAB member Mr. Chris Tokas from the Office of Statewide Health, Planning and Development (OSHPD). The group had the opportunity to learn about typical hospital construction, as well as observe a wide variety of nonstructural components included in an acute care facility.

To read more about the *2004 MCEER Annual Meeting*, visit the MCEER web site at <http://mceer.buffalo.edu>.

Following the Annual Meeting on January 17, 2004, MCEER staff and students participated in a day-long awareness and outreach event on the CalTech campus in Pasadena entitled *Northridge Earthquake 10th Anniversary: Learning from the Past, Planning for the Future*. Caltech, the U.S. Geological Survey, and the Earthquake Country Alliance hosted a day of lectures, movies, displays and activities for the whole family. Designed as a family-friendly event, several earthquake experts were on hand to present talks on topics ranging from "Can We Predict Earthquakes Yet?," to "Will High Rise Buildings Collapse?," and "Can We Catch Quakes with New Technology?," as well as an afternoon "Ask the Experts" panel.

In addition, three short earthquake films, "Quakes in Space: Studying Earthquakes in the Satellite Age," "Masters of Disasters," and "Written in Stone: Earthquake Country – Los Angeles" were shown continuously in nearby Beckman Institute Auditorium.

MCEER was one of more than 20 exhibitors to display useful earthquake information, and to demonstrate MCEER's wealth of educational and informational resources. Other exhibits and displays showcased fault rupture animations, working seismographs, the history of California's earthquakes, an Earthquake Kid Zone Display, and many more topics, presented by other exhibitors such as Federal Emergency Management Agency (FEMA), the American Red Cross, the Southern California Earthquake Center, the Earthquake Engineering Research Institute and many others. Several hundred people attended the event.



Andrea Dargush hosted MCEER's display during Earthquake Awareness Day.

HSRC Meets to Review Progress

On February 6-7, 2004, MCEER's Highway Seismic Research Council (HSRC) convened in San Francisco to review progress and assess the action plan for finishing work on its current Highway Project research. Project Director George Lee and Technical Director Ian Buckle explained the deliverables that will be produced during the last phase of the project, which is scheduled to be completed in December 2005.

Of particular interest to the Council were three major deliverables:

- REDARS Seismic Risk Analysis software and accompanying manuals
- Seismic Retrofitting Manual for Steel Truss Highway Bridges
- Seismic Isolation Manual for Highway Bridges

In addition to these products, there will be a number of technical reports. One example is "Seismic Retrofit Strategies for Long Span Bridges: Case Studies," which will provide bridge engineers with numerous examples of reducing the risk of bridge component failure due to earthquake forces and subsequent displacement.

Additional deliverables are synthesis reports intended to capture a broad range of knowledge in a given area. Expected reports include: Seismic Risk Analysis, Summary Report on Bridge Fragility, Foundation Design for Special Bridges, Liquefaction and Remediation of Silty Soils, and Post Earthquake Non Destructive Evaluation (NDE) of Jack-

eted Reinforced Concrete Bridge Columns.

The HSRC is chaired by John Kulicki, President and CEO of Modjeski and Masters, Inc. Members provide a diverse range of related background from government, industry, state DOT's. Committee members are listed on our web site at <http://mceer.buffalo.edu/research/HighwayPrj/094/committees/HSRC.asp>.

MCEER Hosts PRC-US Workshop on Special Bridges



Participants at the second PRC-US Workshop pose for a group picture.

The PRC-US Workshop on Seismic Analysis and Design of Special Bridges was held December 3-5, 2003 in Buffalo, New York. It was the second in a series of workshops conducted between bridge and earthquake engineering researchers in China and the United States. The first was held in Shanghai, China, on October 8-10, 2002 at Tongji University.

The purpose of these workshops is to share technical information and construction experience in the seismic design and performance of 'special' highway bridges. For the purpose of these meetings, 'special' bridges include major long span bridges as well as those with small to moderate spans with complex geometries or sited on particularly hazardous sites. The long-term objective is to develop a knowledge base, from which guidelines for these unique structures can be developed. The series is coordinated by MCEER's Highway Project, and sponsored by the Federal Highway Administration. The third workshop will be held this fall in China.

Proceedings from the first workshop are available (see review on page 19) and are anticipated from this second workshop in the summer of 2004. Both proceedings are available from MCEER Publications.

19th US-Japan Bridge Engineering Workshop

Eighteen invited engineers and researchers from the U.S. joined their Japanese counterparts October 27-30, 2003 in Tsukuba, Japan for the 19th annual event sponsored by UNJR Panel on Wind and Seismic Effects. It was organized by the Public Works Research Institute's Jiro Fukui, PWRI and David Sanders, University of Nevada at Reno. Chairman of the Japan side was Hiroshi Sato, PWRI and for the U.S., W. Phillip Yen, FHWA.

Though the main focus of the conference was seismic engineering, there were also numerous presentations on bridge maintenance, construction, and materials. Upon conclusion of the plenary sessions, participants were given an opportunity to share experiences and suggest means of future collaboration.

After the formal meetings, a study tour was arranged that allowed U.S. representatives the opportunity to get a close-up inspection of several long span structures, which are a source of great pride for the Japanese. These bridges are a critical part of the transportation system in a country comprised of four separate islands in a highly seismically active region of the world. Both sides anxiously await the 20th anniversary convocation, which will be held in Washington, D.C. in October 2004.



As part of the study tour, participants visited the newly constructed Shin-Kitakyushu Airport Access Road with its 200 m tied arch span (left) and the PWRI's wind tunnel, where aerodynamic testing is being done on a bridge model for a proposed record-breaking span that combines suspension and cable stayed technology (right).

Kinetics and Digitexx Join MCEER Family of Industry Partners

MCEER welcomes two new members to its Strategic Partnerships Network. They are Kinetics Noise Control of Dublin, Ohio, at the "Premier Partner" level, and Digitexx Data Systems, Inc., of Pasadena, California, at the "Partner" level.



Representatives of both companies were introduced and hosted exhibits at the Center's 2004 Annual Meeting, January 15-16, in Los Angeles.

As members of MCEER's Strategic Partnerships Network, representatives from each company – Scott Campbell (Kinetics) and Mark Sereci (Digitexx) – join the Center's Industry Advisory Board (IAB). As IAB members, both will aid MCEER leadership in shaping Center research, education and outreach programs.

Kinetics Noise Control serves building owners in earthquake prone regions by supplying seismic restraint devices for mechanical and electrical equipment that prevent equipment from breaking loose during seismic events. Digitexx provides system solutions for real-time data acquisition and processing for structural health monitoring, tall buildings, special structures (dams, bridges, and power generating facilities), and lifelines. More information is available on these new MCEER members at their respective web sites: <http://kineticsnoise.com> and <http://digitexx.com>.

For more information on MCEER's Strategic Partnerships Network, contact Don Goralski at (716) 645-3391, ext. 108 or via e-mail at goralski@mceermail.buffalo.edu.



US-Japan Bridge Engineering Workshop participants pose for a group picture.

Tri-Center Meeting on Geographically Distributed Systems

Building on the success of the June 24-25, 2003 Tri-Center Workshop in San Pedro, California, a second workshop was held December 11-12, 2003 in Las Vegas, Nevada to strengthen communication and research coordination between investigators and key stakeholders from the three Earthquake Engineering Research Centers (MCEER, PEER and MAE).

About 50 to 60 participants, including academic researchers and research managers from the three earthquake centers, and representatives from industry who are actively engaged in conducting, planning, or managing research on geographically distributed systems, attended the two-day event. A combination of general plenary sessions, short presentations and breakout sessions offered participants the opportunity to identify and develop plans for collaboration on current and future projects.

Of particular interest is the collaboration planned around the matured REDARS Seismic Risk Analysis software platform developed by

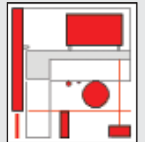
MCEER over the past decade as part of the FHWA project, and how the three Centers can integrate fragility information into the platform. The framework of this collaboration will also serve as a model for similar research work on power distribution systems.

Other discussion areas included: (1) developing improved fragility relationships for bridges with emphasis on quantifying relationships between engineering demand parameters, damage, and bridge functionality; (2) prioritizing research needs on transportation system performance, and identifying collaborative activities that will improve the overall assessment of transportation systems and integrate end-user needs into the development of methodologies and software tools; (3) defining the current status and user/researcher needs to conduct seismic risk analyses of electric utility components and systems; and (4) examining opportunities to dramatically improve seismic risk assessment of geographi-

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MCEER's Research on Nonstructural Components Featured at ATC-29-2 Seminar

The third in a series of seminars on seismic design, performance and retrofit of non-structural components in buildings and industrial structures was held October 23-24, 2003 in Newport Beach, California. Held by MCEER and the Applied Technology Council (ATC), the focus of this seminar was on nonstructural components and systems in facilities with critical functions, such as computer centers, hospitals, manufacturing plants with especially hazardous materials, and museums with fragile/valuable collection items. Components and systems covered include: supports and bracing for elevator systems, ceilings, partitions, cladding, glazing, contents, water piping systems, and mechanical and electrical equipment.



The steering committee was chaired by MCEER affiliates Tsu T. Soong, University at Buffalo, and Chris Rojahn, ATC, and included MCEER investigators Mircea Grigoriu, Cornell University, George Lee, MCEER, Manos Maragakis, University of Nevada at Reno and Andrew Whittaker, University at Buffalo. Many other MCEER researchers presented papers on their research work, on topics ranging from individual components (ceiling systems, hospital piping systems, base-isolated power transformers, elevators) to the use of advanced technologies (semi-active control devices) to measuring the seismic resilience of communities.

The seminar clearly showed that the field of nonstructural components research and development is expanding rapidly, and that new initiatives and experimental facilities are needed to further expand knowledge in this important area. The proceedings, *ATC-29-2: Proceedings of Seminar on Seismic Design, Performance and Retrofit of Nonstructural Components in Critical Facilities* are available from ATC, phone (650) 595-1542, fax: (650) 593-2320; e-mail: ATC@ATCouncil.org, or via the web site at <http://www.ATCouncil.org>. Proceedings from the first two seminars, held October 3-4, 1990 in Irvine and January 22-23 in San Francisco, are also available through ATC.

MCEER Co-sponsors Workshop on the Application of Remote Sensing Technologies for Disaster Response

On September 12, 2003, 15 leading experts in the field of remote sensing technologies met to discuss its use in and application for improved disaster response. Specific topics included the following:

- Using airborne or satellite technologies for disaster mitigation and response
- Detecting damage to bridges and/or transportation systems
- Detecting damage to buildings or large urban areas



Participants pose for a group picture.

- Creating building and infrastructure inventories
- Use in recent earthquakes, including the 2003 Algerian earthquake
- Potential use for earthquake reconnaissance investigations

The format was a mix of presentations by the participants and discussion sessions focused on a particular aspect of remote sensing technologies, such as post-earthquake reconnaissance, and identifying important research needs.



Before (left) and After (right) pan-sharpened Quickbird images of the Bourmedes, Algeria earthquake of May 2003 showing building damage.

As a result of the workshop, the participants agreed to form an Ad Hoc Committee to outline how remote sensing technologies can help in post-earthquake reconnaissance field activities, damage detection for large regions, and quantifying or characterizing exposure or vulnerability of large mega cities or areas (international focus). This committee could be under the auspices of EERI and its information technology committee.

A second workshop is planned for a year from now, to continue the efforts and activities begun this year to develop, improve, adapt and implement

remote sensing technologies for post-disaster response.

Hosted by the University of California, Irvine (UCI), and held at the Beckman Center of the National Academies, the workshop was sponsored by EERI, MCEER, UCI and the U.S. DOT, Research and Special Programs Administration (RSPA). Ron Eguchi, ImageCat, Inc. and M. Shinozuka, UCI, organized the workshop.

Contact Ron Eguchi, rte@imagecatinc.com, for additional information about the workshop.

Tri-Center Meeting on Geographically Distributed Systems

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ally distributed systems to better characterize seismic hazards (strong ground motions and ground deformations).

The strong and positive set of action items formulated by the workshop participants will help to guide future collaboration between researchers of the EERCs, and help the Centers' management team facilitate these interactions in ways that help fulfill their strategic plans.

The steering committee was chaired by Amr Elnashi, Mid-America Earthquake Center (MAE), and included Michel Bruneau, Ronald Eguchi and Ian Buckle from MCEER and Greg Deierlein and Cliff Roblee from PEER.

MCEER SLC Holds Fourth Annual Student Retreat at Cornell

The MCEER Student Leadership Counsel (SLC) held its fourth annual retreat on September 5-7, 2003. The retreat was hosted by Cornell University. Twelve members of the MCEER SLC attended the retreat representing the University at Buffalo, Cornell University, Rice University, University of Nevada Reno, New Jersey Institute of Technology and Florida A&M University.

The retreat began on Friday with a short walk through the campus and an icebreaker dinner at a restaurant nearby. Cornell proved to be a perfect environment to casually acquaint oneself with the new members as well as familiar faces.

SLC members pose in front of Cornell's Bell Tower.



The business side of the retreat began Saturday morning with opening remarks made by the SLC president Jeff Berman. Jeff's introduction was followed by ten-minute presentations by SLC members. Questions and discussion were encouraged and resulted in constructive communication between students. Presentations were followed by lunch and a discussion of the SLC agenda for the following year. Issues such as the involvement of incoming graduate students and the SLC web site were discussed, as well as the call for papers for the Student Research Accomplishments (SRA), which proved to be a great success in 2002. Saturday's meeting concluded with a guest presentation from Dr. Thomas O'Rourke of Cornell University entitled "Seismic Evaluation and Retrofit of Water Supply Lifelines."

After the meeting, the group took a short hike through Taughannock Falls State Park followed by a picnic and a friendly game of soccer. This retreat was a huge success. Many thanks go out to Cagdas Kafali and Jeff Berman for organizing a weekend that was both fun and constructive.

--Mike Astrella, University at Buffalo



SLC members Terri Norton and Jale Tezcan enjoy the scenery at Taughannock Falls State Park.

Winner of First "Best Student Article" Competition Presents Research at Annual Meeting

Michael Pollino, a civil engineering graduate student at the University at Buffalo, is the winner of the MCEER Best Student Article Competition for 2003. Pollino's paper, titled "Seismic Retrofit of Bridge Steel Truss Pier Anchorage Connections,"

was selected as the winner by a panel of judges, comprising distinguished members of MCEER's Industry Advisory Board (IAB). As the winner of the inaugural competition, Pollino made a presentation on his research at the 2004 MCEER Annual Meeting. Honorable mentions were also awarded to Yong Gao, University of Illinois at Urbana-Champaign,

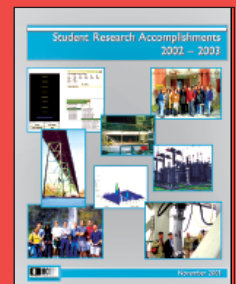
Hiram Badillo-Alvarez, University at Buffalo and Zehra Cagnan, Cornell University.

A total of 16 papers were submitted by members of the Student Leadership Council, which includes students studying under researchers



Michael Pollino receives his award from Andrea Dargush before presenting his paper at the MCEER Annual Meeting.

throughout the MCEER consortium. All of these papers are included in the 2003 Student Research Accomplishments volume, available at http://mceer.buffalo.edu/publications/sp_pubs/03-SP06/default.asp.



REU Students Share Experiences at Symposium

The *Tri-Center Symposium for Young Researchers*, organized by the PEER Center, was held August 8-10, 2003 at the Sun River resort area near Bend, Oregon. Presentations were made by each of the participants in the NSF-funded Research Experiences for Undergraduates program, describing the projects with which they were involved. MCEER student interns Kenneth Loh from the Johns Hopkins University (mentored by Professor M. Shinozuka at the University of California at Irvine) and Chet Vignes from the University of Iowa (mentored by Professor Mircea Grigoriu at Cornell University), attended the event.

Dr. Charles Harris led a special activity focused on ethical considerations associated with engineering projects. A field excursion to areas of volcanic eruptions in the region was a highlight of the program.

Final papers are being prepared and will be compiled in a Tri-Center proceedings of the Symposium. Proceedings copies will be made available through the MCEER web site.



REU students from the three earthquake centers pose for a group photo at the Sun River resort.

Student Spotlight

Darren Vian is a Ph.D. candidate in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo. The working title of Darren's project is "Steel Plate Shear Walls for Seismic Design and Retrofit of Building Structures," and his work is part of MCEER's Thrust Area 2: Seismic Retrofit of Acute Care Facilities. His advisor is professor and MCEER director, Michel Bruneau.

Asked how he became interested in earthquake hazard mitigation, Darren explains "kind of by accident, actually. I grew up near New York City where earthquakes weren't typically a concern of the general population. Then, I attended UB as an undergraduate to study civil/structural engineering, and by virtue of the NCEER/MCEER-related research conducted by many of the faculty members, I received exposure through coursework to various methods of earthquake engineering that were being utilized in practice, some of which, as a direct result of research conducted at UB." Darren also said that "taking Dr. Bruneau's course on *Plastic Analysis and Design of Structures*" in his first semester of graduate studies led to "working with him as a research assistant and my current work."

Following his anticipated graduation in the fall of 2005, Darren would like to work in structural engineering practice for a few years, become a licensed engineer, and then possibly return to academia as a university professor. His interests outside of his studies, in no particular order, include hiking and camping, reading, running and volleyball—he played for the UB team during his freshman year. Darren also enjoys attending concerts, collecting music, and playing guitar.



Darren Vian poses in front of the soon-to-be completed Taipei 101 Building in Taipei, Taiwan.

Tri-Center Student Field Mission

In October 2003, 13 Ph.D. level students from the three earthquake centers and advisors Andrea Dargush from MCEER, longtime NCEER/MCEER researcher Professor T.T. Soong of the University at Buffalo, and Professor Phillip L. Gould of the MAE Center visited various locations throughout Italy on the 2003 *Tri-Center Student Field Mission*. Held October 12-18 and organized by MCEER, the purpose of the trip was to learn more about international centers of excellence in earthquake studies; study emerging areas of research and application; view areas impacted by recent earthquakes; discern useful lessons learned in recovery and rebuilding; experience the international culture of earthquake research; foster cooperation between the three Earthquake Engineering Research centers and encourage networking among the students.

During the group's stay in Italy, they visited several universities and laboratories and were hosted by Dr. Georges Magonette at the European Joint Research Council (Ispra); Professor Fabiano Casciati of the University of Pavia; University of Rome (La Sapienza); and Professor Vincenzo Gattul-



Students visited the village of San Giuliano di Puglia, which suffered severe damage from the 2002 Molise earthquake.

li and his colleagues at the University of L'Aquila. Under the guidance of Dr. Alberto Dusi, members of the group were allowed special access to the town of San Giuliano di Puglia in the Molise region, an area heavily impacted by the earthquake of October 31, 2002. Wrapping up the tour in Naples, the group was given a special private tour of the volcanic observatory on the slopes of Mount Vesuvius, currently under close monitoring because of its imminent eruptive status.

Students will prepare papers focusing on different aspects of earthquake engineering, and post-event design and recovery. Follow-up seminars and a photo-journal of the trip are also planned. The photographic record is separated into five sections which correspond to the principle engineering stops of the field mission. Each section contains a brief description of what the group did at the location and then a series of photographs documenting the group's activities there. Many photos will also be available for download at <http://mceer.buffalo.edu/SLC> for a limited time and more detailed reports will be made available in the future.

Applicants are now being sought for the 2004 Field Mission, scheduled for July 16-24, 2004. This year's event is being planned by PEER and will take place in Japan. For more information, contact Andrea Dargush at dargush@buffalo.edu.



Field mission participants and their hosts pose for a picture during their visit to the Vesuvius Observatory at Naples.

Field Mission Participants

MCEER

Jeffrey Berman, University at Buffalo
Cagdas Kafali, Cornell University
Terri Norton, Florida A & M State University
Nikolaos Politis, Rice University
Ani Natali Sigaher, University at Buffalo
Jale Tezcan, Rice University
Gordon Warn, University at Buffalo
Professor Tsu-Teh Soong, University at Buffalo (faculty)
Mrs. Andrea Dargush, MCEER (staff)

Mid-America Earthquake Research Center (MAE)

Leonardo Duenas-Osorio, Georgia Institute of Technology
Ho Jung Lee, University of Illinois Urbana-Champaign
Bryant Nielson, Georgia Institute of Technology
Carrie Wagener, University of Illinois Urbana-Champaign
Professor Phillip Gould, Washington University - St. Louis (faculty)

Pacific Earthquake Engineering Research Center (PEER)

Jack Baker, Stanford University
Samit Ray Chauduri, University of California - Irvine
Howard Matt, University of California at San Diego

New VIEWS System Detects Earthquake Damage in Bam, Iran

Through MCEER funding, considerable effort has been invested in developing automated building damage detection methods, together with techniques for visualizing damage. The Bam, Iran earthquake of December 26, 2003 marks their first deployment as a post-earthquake reconnaissance tool, within the VIEWS (Visualizing Impacts of Earthquakes with Satellites) system.

Running on a notebook computer for portability in the field (see photo), VIEWS enables reconnaissance teams to compare satellite images acquired before and after an earthquake. The system directs responders to the hardest hit areas, using a preliminary regional damage map (Adams et al., 2003). For more detailed damage information, collapsed buildings are easily identified on the high-resolution satellite coverage.

The imagery also serves as a basemap and orientation device for teams deployed to unfamiliar cities. To help users gain and maintain their bearings, VIEWS tracks their current position using a real-time GPS feed. The system provides easy recall for observations made in the field. As users enter comments such as building damage descriptions and the ID number of their photographs, all information is automatically linked to the current GPS location. Back in the office, VIEWS datasets are readily transferred to a GIS environment, for further analysis.

A preliminary reconnaissance report presents VIEWS satellite coverage of Bam, together with the quick-look regional dam-

age assessment used by the EERI reconnaissance team. The



The VIEWS system enables reconnaissance teams to compare satellite images acquired before and after an earthquake.

report also includes VIEWS excerpts used to visualize building damage in the Bam citadel and surrounding residential districts. The report, written by Beverley J. Adams, Charles K. Huyck, Michael Mio, Sungbin Cho, Shubharoop Ghosh, Hung Chi Chung and Ronald T. Eguchi of ImageCat, Inc., and M. Shinozuka and Babak Mansouri of University of California, Irvine, can be viewed on the MCEER web site at <http://mceer.buffalo.edu/research/bam/page1.asp>.

Adams, B.J., Huyck, C.K., Eguchi, R.T., Yamazaki, F. and Estrada, M. (2003), "Post-earthquake reconnaissance using satellite imagery: Boumerdes case study," in EERI (ed.) *The Boumerdes, Algeria, Earthquake of May 21, 2003*, EERI: Oakland, Insert p. 1-8.

Public Educational Activities

MCEER Participates in "Expanding Your Horizons"

On March 27, 60 middle school girls visited the University at Buffalo campus to take part in "Expanding Your Horizons," a program which encourages interest in science, technology, engineering and mathematics through hands-on, inquiry-based activities. MCEER's Andrea Dargush participated in the day-long program by giving a presentation and engaging participants in a critical thinking activity on earthquake resistant design.

The event is part of a program held in cities across the U.S. and designed to boost the low representation of women in science and technology by focusing on girls in middle school. The program includes hands-on activities, interaction with female scientists and engineers, and programs for parents on how to encourage their daughters in these fields. Materials developed for the program will be made available for download from the MCEER web site. Funding for the program is derived primarily from the Office of the Vice President for Research at UB, the Great Lakes program and New York Sea Grant. Additional sponsors include Verizon and the Society of American Women in Science.

Engineering Seminar and Exhibition for High School Students

On March 13, Andre Filiatrault and Andrea Dargush, MCEER, and Jeff Berman, MCEER SLC President, participated in the Technical Societies Council Engineering Seminar for High School students. The annual event, focused on attracting high school students to undergraduate studies and careers in engineering, was held on the University at Buffalo campus to an audience of more than 450 people. The program featured prominent speakers in engineering and was complemented by several exhibits, demonstrations and tours by engineering societies, government organizations, companies and institutions. Professor Filiatrault gave the closing presentation on "Earthquake Engineering: Hazards and Mitigation."

National Engineers Week



As part of *National Engineers Week*, MCEER staff and students joined representatives from several other western New York engineering societies, engineering firms and colleges and universities to host the MCEER booth at an annual outreach event at a local mall. MCEER representatives were on hand to discuss earthquake engineering education and career opportunities, as well as to provide hands-on earthquake activities for both students and teachers. The Mall Day event was one of a host of activities conducted throughout the country in recognition of National Engineers Week, an awareness raising campaign intended to celebrate the contributions of engineering to society and to stimulate interest in engineering as a potential career.

Recent Events

July 1, 2003 – March 31, 2004

Highway Seismic Research Council Meeting

February 27-28, 2004
San Francisco, CA

MCEER Annual Meeting

January 15-16, 2004
Los Angeles, CA

Dinner Reception in Honor of George C. Lee

December 17, 2003
Buffalo, NY

Tri-Center Coordinating Committee on Network Systems

December 11-12, 2003
Las Vegas, NV

Second PRC-US Workshop for Earthquake Engineering for Highway Bridges

December 3-5, 2003
Buffalo, NY

ATC-29-2: Seminar on Seismic Design, Performance, and Retrofit of Nonstructural Components in Critical Facilities

October 23-24, 2003
Newport Beach, CA

Workshop on the Application of Remote Sensing Technologies for Disaster Response

September 12, 2003
University of California, Irvine

Student Leadership Council Retreat

September 5-7, 2003
Cornell University

Tri-Center Symposium for Young Researchers

August 8-10, 2003
Bend, Oregon

MCEER ♦ UB-EERI ♦ MCEER SLC ♦ UB-CSEE

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. All seminars are held at the University at Buffalo, and most are broadcast over the Internet in real-time. They can be viewed on the MCEER SLC web site, which also includes a biography, abstract and full-length review, at <http://mceer.buffalo.edu/SLC>.

Seismic Response of Voltage Transformer

Howard Matt, Ph.D. Student, Department of Structural Engineering, University of California, San Diego, October 9, 2003

Howard Matt discussed the critical parameters of supporting transformer structures affecting the seismic response of bushings, known to be highly susceptible to damage under strong ground shaking. He quantified and compared the dynamic response of voltage transformers with the predictions of the IEEE-693 1997 standard, and introduced various retrofit schemes that would enhance the performance of the transformer structure such that the current quantification standards remain valid. He also modeled four different voltage transformers using the finite element program SAP2000, and conducted shake table tests on a transformer equipped with a mock bushing to validate the numerical modeling.

Continuous Hybrid Simulation with Geographically Distributed Substructures

Gilberto Mosqueda, Ph.D. Student, Department of Civil and Environmental Engineering, University of California at Berkeley, October 16, 2003

After an overview of the George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES), expected to increase the size and complexity of models that can be tested using hybrid simulation, Gilberto Mosqueda demonstrated a control system based on an event-driven scheme that supports the implementation of computationally demanding hybrid simulation algorithms, both continuous and real-time. He also discussed methods for hybrid testing with geographically distributed substructures and explained dynamic models of a test setup for hybrid testing. He concluded that the event-based hybrid test controller and dynamic models of the test setup are new tools in the portfolio of experimentalists that will help deliver one promise of NEES: enable hybrid simulation at geographically distributed sites.

Probabilistic Seismic Hazard Estimates in Nevada: Questionable Results and How We Might Fix Them

Dr. John G Anderson, Director, Nevada Seismological Laboratory, December 8, 2003

Using geologic structures that would be different if strong shaking had occurred at any point in time, such as a 10,000 year old precariously balanced rock formation, Dr. Anderson asserted that probabilistic seismic hazard analyses, such as the high-profile analysis of the proposed Yucca Mountain nuclear waste repository in Nevada, may not be particularly credible. Using more observations of precarious rock formations, he showed how to correct the hazard analyses, and used a laboratory example and a proposed thought experiment to illustrate how hazard analysis can be redefined.

Structural Control Technologies

Thomas Zemanek and Shubin Ruan, Ph.D., P.E., Enidine Structures, January 23, 2004

This presentation focused on structural control products manufactured by Enidine. Mr. Zemanek described the development of the viscous damper, which was first used in military applications, and how it works. He then discussed other available structural control products, including wire rope isolators and floor isolators. He concluded with an overview of structures containing Enidine devices, such as the 3-Com Data Center in San Francisco, the King County Court House in Seattle, and the Coronado Bridge in San Diego.

Today's Structural Engineer as the Classic Master Builder

David A. Friedman, President, Forell/Elsesser Engineers, Inc., February 23, 2004

David Friedman began his seminar with the premise that today's structural engineer is a "Master Builder," who must have a great breadth of knowledge and experience in technical engineering, architecture, and construction, and who must stay up to date on the research, development and design of high performance systems in order to articulate his or her way through a labyrinth of form finding, criteria setting, risk evaluation, design, documentation, and construction. He then used recent Forell/Elsesser Engineers Inc. projects, including San Francisco City Hall, the Haas Pavilion, San Francisco's State Office Building, an Asian Art Museum, a private residence, and a large sculpture, to explore these issues.

MCEER Movers & Shakers

Tsu-Teh (Larry) Soong, Samuel P. Capen Professor of Engineering Science in the Department of Civil, Structural and Environmental Engineering, University at Buffalo, has been named Distinguished Professor by the State University of New York (SUNY) Board of Trustees. The designation as distinguished professor—a rank above full professor and the highest in the SUNY system—denotes exceptional contribution in an academic field through publications, national and international research presentations, research findings and the training of students. Larry was a co-founder of the National Center for Earthquake Engineering Research (NCEER) in 1986, which is now MCEER. He is an internationally recognized authority in the field of engineering structural dynamics. Within this area, his primary research interests are in structural reliability and control, and random vibration.



Larry Soong

MCEER researcher **William Petak**, Professor in the School of Policy, Planning and Development at the University of Southern California, received the Annual Distinguished Lecture



William Petak

Award from the Earthquake Engineering Research Institute (EERI). This award recognizes members of the Institute who have made outstanding professional contributions in earthquake hazard mitigation. The Distinguished Lecture by Petak, delivered at the 2003 EERI Annual Meeting and at engineering campuses across the United States, was based largely on the work that he and **Dan Alesch**, Professor Emeritus, University of Wisconsin-Green Bay, have conducted on organizational decision making with respect to extreme events, under the auspices of MCEER.

Kathleen Tierney Heads Natural Hazards Center

Longtime MCEER Executive Committee member and researcher **Kathleen Tierney** has been named director of the Natural Hazards Research and Applications Information Center (NHRAIC) at the University of Colorado at Boulder. The Center is a national and international clearinghouse for information on natural hazards and human adjustments to hazards and disasters. Previously the director of the University of Delaware's Disaster Research Center, Dr. Tierney is considered an expert on the human and social dimensions of hazards and disaster.



Kathleen Tierney

She also holds a joint professorship in the Institute of Behavioral Science and the Department of Sociology at University of Colorado at Boulder. For more information on the Natural Hazards Center, see their web site at <http://www.colorado.edu/hazards/>.

Spencer named PI of the NEES System Integration Project

Bill F. Spencer, Nathan M. Newmark Professor in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign and MCEER researcher, has been named PI of the system integration (SI) component of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). The SI component will design, construct, implement, test, and make operational NEESgrid, a high-performance Internet network that enables a truly synergistic national simulation resource for research and education, supporting collaborative experimentation, modeling, and simulation for the earthquake engineering community. Dr. Spencer is part of MCEER's education program, focusing on the development of a series of interactive, virtual laboratory (VL) experiments available over the Internet.



B.F. Spencer, Jr.

Von Winterfeldt Named Co-Director of First Homeland Security Center of Excellence

MCEER researcher **Detlof von Winterfeldt**, School of Policy, Planning, and Development, and Randolph Hall, School of Engineering, University of Southern California, are co-directors of the first Homeland Security Center of Excellence (HS-Center) created by the U.S. Department of Homeland Security. The Homeland Security Center for Risk and Economic Analysis of Terrorism Events will address both the targets and means of terrorism, with emphasis on protecting the nation's critical infrastructure systems, such as electrical power, transportation and telecommunications. In addition, the HS-Center will develop tools for planning responses to emergencies, to minimize the threat to human lives and reduce the economic impact in the event of an attack. New York University, the University of Wisconsin at Madison and the University of California at Berkeley are partners with the Center.



Randy Hall, Tom Ridge and Detlof von Winterfeldt

Detlof is part of MCEER's hospital project, focusing on the development of integrated decision analysis methods together with Dan Alesch (University of Wisconsin, Green Bay), Bill Petak (University of Southern California), Mircea Grigoriu (Cornell University) and Gary Dargush (University at Buffalo).

MCEER Movers & Shakers

O'Rourke Testifies on Behalf of NEHRP Reauthorization

In October 2003, the U.S. House of Representatives voted to reauthorize the National Earthquake Hazards Reduction Program (NEHRP), providing substantially increased funding for research and applications. As president of the Earthquake Engineering Research Institute (EERI), MCEER executive committee member and long-time researcher **Thomas O'Rourke** testified at a House Science Committee Research Subcommittee hearing on the reauthorization of the National Earthquake Hazards Reduction Program (NEHRP) in May 2003, and has since participated in Senate staff briefings in January 2004. O'Rourke advocated a strong and viable NEHRP before the Research Subcommittee on the grounds that 75 million Americans in 39 states are directly vulnerable to serious earthquakes, and all Americans are vulnerable to the economic and social disruption caused by earthquakes, including the potential loss of thousands of lives, and estimated costs of \$100 to \$200 billion dollars. He reviewed the progress NEHRP has made in the twenty-five years it has been in existence, and explained how NEHRP has contributed to improved performance and reliability of infrastructure in other natural disasters and even the WTC attacks. His testimony also included recommendations for NEHRP improvements and policy changes.



Tom O'Rourke

The full text of his testimony, along with a power point presentation and detailed information regarding the hearings and the issues involved, can be found online at <http://www.eeri.org/news/nehrrp/index.html>. Senate action on the reauthorization is not expected until early 2004.

Tierney Testifies Before Congress on Impact of Social Science Research on Disaster Preparedness

Kathleen Tierney, MCEER Executive Committee member and long time researcher, was one of three leading sociologists to testify before congress at a hearing entitled The Human Dimension of Disasters: How Social Science Research Can Improve Preparedness, Response, and Recovery, on October 27, 2003. Moderated by William Anderson of the National Research Council (The National Academies), the panelists discussed how social science research can help governments and private-sector organizations improve preparedness for, response to, and recovery from human and natural disasters. Tierney's testimony focused on the individual and collective preparation needed in order to prevent disasters or to mitigate the adverse impact of possible disasters.

The briefing was sponsored by the American Sociological Association, and co-sponsored by the Institute for Crisis, Disaster and Risk Management at George Washington University and the Senate Natural Hazards Caucus Work Group. More information about the hearings, including Dr. Tierney's Power Point presentation, can be found at <http://www.asanet.org/public/disaster-cb.html>.

Shinozuka Delivers Keynote Address

Masanobu Shinozuka, chair of the civil engineering department at the University of California at Irvine and long-time member of MCEER's Executive Committee, delivered a keynote address at ASCE's 2004 Earth and Space Conference, the 9th Aerospace Division International Conference on Engineering, Construction and Operations in Challenging Environments. Professor Shinozuka discussed "Remote Sensing for Homeland Security." Former NASA astronaut Edwin Eugene "Buzz" Aldrin, Jr. also delivered a special lecture at the conference. Aldrin, together with Neil Armstrong, made history in July 1969 with the first lunar landing and exploration. The conference was held March 7-10, 2004 in Houston, Texas.



Masanobu Shinozuka

George Mylonakis, Associate Professor at the City University of New York and MCEER researcher, received the 2002 *Shamsher Prakash Research Foundation Award* for young researchers in geotechnical earthquake engineering. George earned his Ph.D. from the Department of Civil, Structural and Environmental Engineering at the University at Buffalo in 1995 and specializes in seismic soil-structure interaction, pile foundations, and geotechnical earthquake engineering.



George Mylonakis

The prize honors specialists in geotechnical engineering and/or geotechnical earthquake engineering who have made significant independent contributions and show promise of excellence. The award includes a cash prize of \$1100.

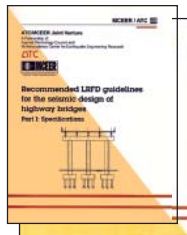
Staff News

We are pleased to announce that **Sofia Tangalos** has been named MCEER Information Specialist. Sofia joined the Information Service as a graduate reference assistant in August 2002, and has since received her Master of Library Science degree from the University of Buffalo. Sofia completed her Bachelor of Arts Degree with a major in French Literature and Language from Bryn Mawr college, where her program included coursework in geology. Recently, Sofia was asked to join Phi Beta Mu, an international honor society for library students.

Sumedh Shirodkar, a graduate assistant at the Information Service, has served as the EQ-NET webmaster since January 2003. EQNET is a one-stop, authoritative source for earthquake information on the Internet. Sumedh is pursuing a Master's degree in computer science from the University at Buffalo and expects to graduate in September, 2004.

New Special Reports

ATC/MCEER Joint Venture Publishes New LRFD Guidelines for Bridges



The *Recommended LRFD Guidelines for the Seismic Design of Highway Bridge*, an ATC/MCEER Joint Venture, is now available. Consist-

ing of specifications, commentary, and appendices developed to be compatible with the existing load-and-resistance-factor design (LRFD) provisions for highway bridges published by the American Association of State Highway and Transportation Officials (AASHTO), the *Guidelines* are based on significant enhance-

ments in knowledge and practice over the last 15 years.

The nationally applicable *Guidelines* contain innovative and updated requirements and procedures, including: state-of-knowledge seismic hazard maps developed by the U.S. Geological Survey (USGS); recommended design earthquakes and performance objectives; guidance on assessment of liquefaction and design solutions; new soil factors and spectral shapes; seismic design requirements for steel bridges; "no analysis" design concept; some seismic resisting systems and elements not permitted in the current AASHTO provisions; capacity spectrum design proce-

dures; displacement capacity verification ("Pushover") analysis; and cost comparisons and implications.

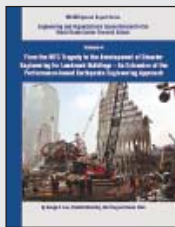
Development of the *Guidelines* was funded by the National Cooperative Highway Research Program (NCHRP) Project 12-49, and by the Federal Highway Administration as part of MCEER's Highway Project. The project included a distinguished advisory committee of experts, and received guidance from the NCHRP Project Panel as well as from the AASHTO Highway Subcommittee on Bridges and Structures seismic design technical committee (T-3). As a result, the *Guidelines* reflect a broad consensus opinion of leaders in the field of seismically designed bridges and highway structures and can be considered the most advanced bridge seismic design tool available today.

Several companion publications that demonstrate the application and use of these new provisions, and contain liquefaction case studies will also be published soon. Their availability will be announced on the ATC and MCEER web sites.

The *Recommended LRFD Guidelines for the Seismic Design of Highway Bridges* is published in two volumes: *Part I: Specifications*, and *Part II: Commentary and Appendices*. The set includes a CD-ROM containing USGS Seismic Hazard Curves and Uniform Hazard Response Spectra for the United States and will be available from both ATC and MCEER for \$75.00 (plus shipping and handling). To order, contact MCEER Publications at (716) 645-3391, ext. 105, e-mail: mceer@mceermail.buffalo.edu, or visit the MCEER web site, <http://mceer.buffalo.edu>. Or, contact ATC Publication Sales at (650) 595-1542, e-mail: ATC@ATCouncil.org, or use ATC's Online store at <http://www.ATCouncil.org>.

Fourth Report in WTC Series Focuses on Multi-Hazard Engineering

The fourth report resulting from MCEER's research on damage to critical facilities and crisis response following the World Trade Center disaster, funded by the National Science Foundation, is now available. The report is part of a series entitled "Engineering and Organizational Issues Related to The World Trade Center Terrorist Attack."



From the WTC Tragedy to the Development of Disaster Engineering for Landmark Buildings - An Extension of the Performance-based Earthquake Engineering Approach begins with a review of the major hazards (collision, fire and explosion) that were factors in the collapse of the WTC towers. It then advances a performance-based engineering approach, referred to as "multi-hazard engineering," that combines knowledge accumulated in earthquake engineering design, hazard mitigation methods and structural response control approaches with lessons learned from the WTC collapse. The newly defined "multi-hazard engineering" is meant to emphasize an integrated and cost-effective disaster operation against all types of serious hazards. It includes information development, coordinated efforts in mitigation, and emergency response and restoration, with a focus on saving the lives of occupants when structural collapse is imminent. The proposed framework must be complemented by a parallel effort to educate a new generation of engineering professionals who can effectively carry out research and development, implement policies and technical approaches, as well as plan, design, construct, manage and maintain landmark buildings in dense population centers.

To order, contact MCEER Publications at (716) 645-3391, ext. 105, e-mail: mceer@mceermail.buffalo.edu, or via the web site at <http://mceer.buffalo.edu>. The report is \$25.00.

New Technical Reports

Visit the MCEER Publications Catalog
<http://mceer.buffalo.edu/publications/default.asp>



1 **Proceedings of the First PRC-US Workshop on Seismic Analysis and Design of Special Bridges**

Edited by L.C. Fan and G.C. Lee, 7/15/03, MCEER-03-0004, 288 pages, \$35.00

The Proceedings are the result of the first in a series of international workshops on seismic analysis and design of special bridges collaboratively arranged by MCEER and the State Key Laboratory for Disaster Reduction in Civil Engineering, Tongji University, Shanghai, China. The workshop themes include seismic design and retrofit of long span bridges, performance based design, seismic safety evaluation, soil-pile-structure interaction and pseudo-dynamic and hydrodynamic experimental study. This volume contains 22 papers addressing a wide range of these research fields, and includes a discussion of seismicity in China. The workshop agenda and list of participants is also included.

2 **Urban Disaster Recovery: A Framework and Simulation Model**

by S.B. Miles and S.E. Chang, 7/25/03, MCEER-03-0005, 120 pages, \$25.00

This report introduces a conceptual framework of disaster recovery, guided by insights from the empirical literature. The resulting model focuses on simulating recovery processes, rather than on estimating dollar losses. It emphasizes the dynamic or temporal processes of recovery; simulates impacts at the individual agent level of analysis; relates recovery across business, household, and lifeline infrastructure sectors; relates recovery across individual, neighborhood, and community scales of analysis; highlights the key role of lifeline systems in recovery; and is designed to explore the complex consequences of mitigation, planning, and policy decisions. The model was applied to both a hypothetical community and to an area affected by a real earthquake in Kobe, Japan, and it was able to replicate broad trends from the disaster.

3 **Behavior of Underground Piping Joints Due to Static and Dynamic Loading**

by R.D. Meis, M. Maragakis and R. Siddharthan, 11/17/03, MCEER-03-0006, 258 pages, \$35.00

This report describes the procedures and results of an empirical data research program designed to determine the static and dynamic behavior of some typical restrained and unrestrained underground pipe joints. Five different material types with eight different joint types and several different pipe diameters were used in this testing program. The test results are given as load-displacement plots, moment-rotation plots, and tables listing the axial and rotational stiffness, force capacities, and bending moment capacities. A comparison is made between static and dynamic results to determine if static testing is sufficient to characterize the dynamic behavior of pipe joints. This report also suggests methods to use the test results for a finite element pipeline system analysis and for risk assessment evaluation.

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Attention Former Students, Researchers, Industry Partners and Staff Members from MCEER, and its Predecessor, the National Center for Earthquake Engineering Research (NCEER)

For the first time in many years, the 13th World Conference on Earthquake Engineering will be held in North America, in Vancouver, British Columbia, Canada on August 1 - 6, 2004. MCEER Executive Committee member and long-time researcher Thomas D. O'Rourke, Cornell University, is providing one of the keynote addresses at this world-class event. We are hoping to meet and reconnect with those of you who have played a part in the Center's history and success, perhaps by holding a social activity or other type of informal get-together with our friends from the past.

Please let us know if you are interested in this type of activity by contacting Donald Goralski, (716) 645-3391, ext. 108 or via e-mail at goralski@buffalo.edu. We hope to see you in Vancouver!

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