



Inside This Issue

Multi-Hazard Engineering Symposium 2
Symposium on Remote Sensing Applications to Natural Hazards 2
Seismic Testing of a Self-Centering Post-Tensioned Steel Frame..... 3
Quakeline® Online Tutorial 3
Seminar on Seismic Protection of Piping . 4
Opportunities for Strategic Partners 4
Globalnex Joins Partners Network..... 4
ASHRAE Consortium Investigates Performance of Air Handling Unit 5
Nonstructural Components Simulator 5
MCEER-NCREE Research on Accelerated Bridge Construction..... 6
6th National Seismic Conference 6
4th International Remote Sensing Workshop 7
AISC Design Guide..... 7
Tri-Center Field Mission to Japan 8
2007 ASCE Structures Congress..... 8
2007 ANCER Meeting 9
Student Spotlight: Marlon Hill..... 9
2007 Blind Analysis Contest 10
1st Annual Tri-Center Undergraduate Seismic Design Competition 10
Education and Outreach Activities 11
Movers & Shakers 12
14WCEE to be Held..... 12
New Bridge Synthesis Reports 13
US-Taiwan Bridge Proceedings 13
New Technical Reports 14

Highway Project Focuses on Accelerated Bridge Construction and Innovative Seismic Protection Technologies



Use of prefabricated segmental construction is one way to accelerate bridge construction. Here, hinge pipe beams at mid-span expansion joints are being incorporated in the San Francisco - Oakland Bay Bridge

In May 2007, MCEER began work on a new Federal Highway Administration (FHWA) funded research contract entitled “Innovative Technologies and Their Applications to Enhance the Seismic Performance of Highway Bridges.” George C. Lee is the principal investigator and project director and Jerry O’Connor is the project manager. The project has a four year period with funding not to exceed \$3.9 million.

Over the past few years, accelerated bridge construction (ABC) has demonstrated significant time savings and other benefits and has become a key component of FHWA’s vision of the nation’s transportation system. However, there are no design procedures or guidelines for ABC in seismically active states. MCEER’s research work will principally focus on the development of seismic design guidelines for prefabricated reinforced concrete and segmentally constructed highway bridges of short to medium span length. Analytical and experimental work will be carried out with the objective of formulating design guidelines for practical applications so that all states can benefit from the use of ABC.

In addition, this project will continue FHWA’s past efforts to enhance the seismic performance of highway structures by providing for the evaluation of existing types of seismic isolation bearings over time and under various service conditions, preparing for the deployment of a new generation of bridge bearing that was developed under a previous FHWA research contract, and exploring the concept of using a structural fuse to protect bridges from extensive damage in the event of an earthquake. Specific design guidance for using roller isolation bridge bearings will be developed and support given for implementation on actual bridge projects.

In addition to the research, several national and international seismic conferences and workshops on bridges and highways are planned. A Highway Seismic Advisory Panel (HSAP) will be established in the near future to provide technical input and advice to FHWA and to help ensure that the research products are useful, practical and implementable.

Visit <http://mceer.buffalo.edu/research/HighwayPrj/default.asp> for more information on MCEER’s highway research.

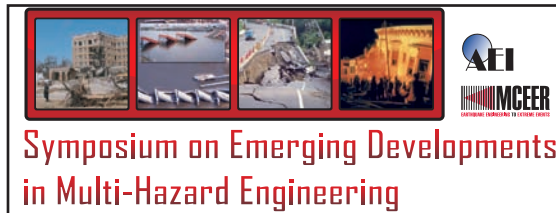
Symposium on Multi-Hazard Engineering to Focus on Infrastructure Issues

A *Symposium on Emerging Developments in Multi-Hazard Engineering*, organized jointly by the Architectural Engineering Institute (AEI) of ASCE and MCEER, will be held on September 18, 2007 at the McGraw-Hill Conference Center in New York City.

The Symposium will address different facets of multi-hazard considerations in infrastructure applications and aims to establish the quantitative methods and guidelines that are needed to promote their use.

Nationally recognized researchers and practitioners will discuss a variety of solutions and applications, including adapting technologies developed for a specific hazard to solve multi-hazard problems, and developing new technologies to mitigate a variety of threats.

Different fields of engineering such as risk, reliability, design,



analysis, cost-benefit, life-cycle costs and structural health monitoring will be addressed from a multi-hazard point of view. The specific hazards that impact the performance of the civil infrastructure, such as blast, earthquake, wind, flood, and wave surge will be integrated in the discussions.

This Symposium is intended to highlight recent engineering advances in the new field of multi-hazards engineering. The organizers believe that the utilization/furthering of these technologies for use in multi-hazards engineering will help to reduce overall costs while maintaining or increasing safety levels.

Visit <http://mceer.buffalo.edu/meetings/AEI/default.asp> for more information. Early bird registration is available through September 4, 2007.

Symposium on Remote Sensing Applications to Natural Hazards

A one-day *Symposium on Remote Sensing Applications to Natural Hazards* will be held September 12, 2007 at The George Washington University (GWU) in Washington, DC. The day long event will follow the invitation-only *Fifth International Workshop on Remote Sensing*, also held at GWU (see page 7).

Sponsored by the MCEER Remote Sensing Institute, Space Policy Institute of The George Washington University, Earthquake Engineering Research Institute, University of California at Irvine, ImageCat, Inc. and *Imaging Notes*, the Symposium will focus on the broad range of natural hazards, their economic and social impacts, and explorations of the benefits of using satellite and other remotely sensed data to reduce the socioeconomic impacts of natural hazards.

For more information, contact Ray Williamson at rayw@gwu.edu, Ron Eguchi, rte@imagecatinc.com or Beverley Adams, bja@imagecatinc.com or visit <http://mceer.buffalo.edu/meetings/default.asp>.

Speakers and Topics

Session 1: Welcome and Opening Remarks

AEI Strategy For Multi-Hazard Engineering
Amar Chaker, AEI, and

The 4 R's of Resilience and Multi-Hazard Engineering

Michel Bruneau, MCEER

Session 2: On Application of Theory of Multi-Hazards to Bridge Design, Analysis, and Monitoring

Sreenivas Alampalli, New York State Department of Transportation and Mohammed Ettouney, Weidlinger Associates, Inc.

Session 3: Assessment and Mitigation of Risk from Competing Low-Probability, High-Consequence Hazards

Bruce R. Ellingwood, Georgia Institute of Technology

Session 4: System Performance under Multi-Hazards

Mircea Grigoriu, Cornell University

Session 5: A Framework for Risk Assessment of Infrastructure in a Multi-Hazard Environment

Stephanie King, Weidlinger Associates, Inc.

Session 6: Lessons from 9/11 and Katrina

Paul F. Mlakar, U.S. Army Research and Development Center

Session 7: The Need for Integrated Multi-Hazard Engineering Design Solutions to Enhance Disaster Resilience

Michel Bruneau, MCEER

Session 8: A Need for Risk-Consistent Approach to Multi-Hazard Engineering

Vilas Mujumdar, National Science Foundation

Session 9: Lessons Learned for Multi-Hazards in New York City and Los Angeles

Thomas O'Rourke, Cornell University

Session 10: Risk Management Series and FEMA Multi-Hazards Risk Management Assessments

Milagros Kennett, FEMA/ Department of Homeland Security

Session 11: Critical Issues in Achieving a Resilient Transportation Infrastructure

Joseph Englot and Ted Zoli, HNBT Corporation

Session 12: Theory of Multi-Hazards: A Quantification Procedure to the Process

Mohammed Ettouney, Weidlinger Associates, Inc.

Session 13: Expert Panel: Identifying the Path(s) Forward for Multi-Hazard Engineering

Panel members: Bruce R. Ellingwood, Joseph Englot, Milagros Kennett, Vilas Mujumdar and Thomas O'Rourke

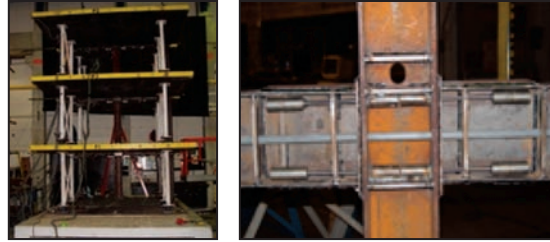
Seismic Testing of a Self-Centering Post-Tensioned Steel Frame

A 1/3-scale three-story steel frame model incorporating innovative Post-Tensioned Energy Dissipating (PTED) connections was seismically tested on a shake table for the first time in the Structural Engineering and Earthquake Simulation Laboratory (SEESL) at the University at Buffalo (UB) from March 19-23, 2007.

The PTED steel system, unlike traditional welded steel frames, incorporates high strength post-tensioned bars along with sacrificial yielding elements in each beam-to-column connection and is particularly appealing for hospital buildings from an initial investment standpoint. The tests, part of MCEER's Hospital Project (Thrust Area 2), were conducted by Ph.D. student Dong Wang under the supervision of UB faculty member and SEESL Director Andre Filiatrault. The PTED concept is fully described in Christopoulos et al. (2002).

The photos show the PTED steel frame concept, where beams are post-tensioned to the columns instead of having the beams and columns welded together. PTED connections are designed to undergo large inelastic deformations without any damage in the beam or column and with minimal residual drift. The post-tensioning (PT) force is provided at each floor by high strength bars or tendons located at mid-depth of the beam.

Four symmetrically placed energy-dissipating (ED) bars are also included at each connection to provide energy dissipation under cyclic loading. These ED bars are threaded into couplers which are welded to the inside face of the beam



PTED steel frame concept: 1/3-scale model on shake table (left); interior beam-to-column joint detail (right)

flanges and of the continuity plates in the column for exterior connections, and to the inside face of adjacent beam flanges for interior connections. Holes are introduced in the column flanges to accommodate the PT and ED bars.

To prevent the ED bars from buckling in compression under cyclic inelastic loading, they are inserted into confining steel sleeves that are welded to the beam flanges for exterior connections, and to the column continuity plates for interior connections. The ED bars are initially stress-free since they are introduced into the connection after the application of the PT force.

The PTED connection relies on the PT force to maintain contact between the beams and columns. Horizontally slotted shear tabs may be welded to the column flanges and bolted to the beam

web to provide stability during construction and to ensure an alternative vertical shear transfer mechanism from the beam to the column. The slots in the tabs need to allow the free opening and closing of the gap at the beam-to-column interface. Non-linear elastic action is introduced by gap openings at each beam-to-column interface. Inelastic action takes place through yielding of the ED bars once the gap is opened.

The results of the test indicated that the PTED frame was able to exhibit similar seismic response as a fully welded frame but without any yielding and permanent deformations in the main structural elements.

Christopoulos, C., Filiatrault, A., Folz, B. and Uang, C-M., 2002. "Post-Tensioned Energy Dissipating Connections for Moment-Resisting Steel Frames," ASCE Journal of Structural Engineering, 128 (9), 1111-1120.

QUAKELINE[®] Online Tutorial

MCEER Information Service is proud to announce the first QUAKELINE[®] online tutorial. The tutorial addresses basic and advanced search strategies, help page topics, printing, tagging and downloading records and contact details for additional questions. The tutorial was created by Jill Tarabula, Information Specialist, and is available at http://mceer.buffalo.edu/infoservice/QKLN_tutorial/tutorial.asp. We welcome feedback and comments, so please complete the four question survey after viewing it.

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

MCEER Explores Expanded Opportunities for Strategic Partners

Nonstructural components developments continue; Globalnex, Inc. joins membership

MCEER is joining forces with faculty in the University at Buffalo (UB) Department of Civil, Structural and Environmental Engineering (CSEE), and the Structural Engineering and Earthquake Simulation Laboratory (SEESL) to explore expansion of opportunities for members of the center's Strategic Partnerships Network and Industry Advisory Board. The overall goal of the effort is to examine development of an industry partnerships program that is served jointly by the three entities.

"There is a great deal more to earthquake engineering research at UB than simply that which is conducted by

MCEER," said Michel Bruneau, MCEER director. "The NEESWood project is a prime example of this (see **Vol. 21, No.1, Spring 2007**). Our goal is to enable partners in business, industry and government to better access the full measure of opportunities and program benefits offered jointly through MCEER, CSEE and SEESL."

A task force including Michael Constantinou, CSEE; Andre Filiatrault, SEESL; and Don Goralski, MCEER, will lead the effort. It will also include participation from members of MCEER's Strategic Partnerships Network.

"We want to ensure industry input and feedback throughout the developmental process," said Bruneau. "Our desire is to better serve industry needs while creating new educational opportunities for students, and we look forward to the increased and new synergies that this expanded program will inspire."

A driving force behind the initiative is the continued development of MCEER-CSEE-SEESL capabilities and expertise in the study of nonstructural com-

ponents. Gilberto Mosqueda, CSEE, is continuing his MCEER-funded work in this area, which includes a memorandum of understanding with the University of Chile and the support of the Pan American Health Organization, for the testing of hospital equipment. A large number of hospital equipment donations have already been secured for this project which will include fragility studies of the various nonstructural components (performed by G. Mosqueda, A. Filiatrault and A. Reinhorn, UB).

Additional studies are also planned with MCEER's ASHRAE Consortium, comprising a group of mechanical equipment and restraint manufacturers from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (A. Filiatrault, UB, see page 5). MCEER experimental studies on nonstructural components also include those on isolated floors systems (M. Bruneau, UB), and piping systems subjected to independent floor motions (E. Maragakis, University of Nevada, Reno), as well as others.



MCEER Researchers & Partners Team up for Seminar on Seismic Protection of Piping

A number of MCEER researchers, industry partners and industry colleagues are teaming up to take part in a seminar on seismic piping protection for New York plumbing contractors, architects, engineers and code officials. The program, organized by the Plumbing Contractors Association of Long Island, is planned for late summer/early fall of this year.

The MCEER segment of the program is titled "Seismic Resilience of Nonstructural Components and Piping Systems." It will include presentations from MCEER industry partner ISAT Seismic Bracing, a provider of nonstructural component and piping restraint systems; consulting engineer Robert E. Bachman; and MCEER investigators Manos Maragakis of the University of Nevada, Reno, and Gilberto Mosqueda of the University at Buffalo.

The seminar will also include presentations from the New York State Department of State on plumbing code and medical gas piping requirements. For more information, contact Don Goralski (716-645-3391 x108 or goralski@buffalo.edu).

Globalnex Joins MCEER Strategic Partnerships Network

MCEER has a new addition to the Strategic Partnerships Network - Globalnex, Inc. has joined the Network at the Partner Level. Globalnex distributes Catena Building Industry (CBI Europe) products and has joined the Partnership Network on the Italian manufacturer's behalf. CBI is a large, privately held Italian corporation focused on the manufacturing of interior finish products such as ceiling grid, access floors, metal ceilings, demountable partitions, etc. The company distributes their products in over 70 countries worldwide. For more on Globalnex, visit www.cbi-europe.com or www.globalnex.com.

MCEER's ASHRAE Consortium Investigates Performance of Roof-Top Air Handling Unit

MCEER's ASHRAE Consortium has completed Phase II studies involving shake table tests of a rigidly anchored and vibration isolated roof-top air handling unit. Tests were conducted at the University at Buffalo.

Phase I studies involved shake table tests to evaluate the seismic performance of an isolation/restraint system for heavy equipment, in this case, a large centrifugal chiller. The isolation/restraint system tested was typical of those designed by ASHRAE members. It consists of coil springs and rubber snub-

bers to constrain displacement in both horizontal and vertical directions.

This work was conducted by Andre Filiatrault and graduate student Saeed Fathali, both of the University at Buffalo. Findings from the Phase I study are presented in an upcoming MCEER technical report (MCEER-07-0007).

Results of both studies help advance MCEER's program to improve understanding and performance of nonstructural components.

The ASHRAE Consortium comprises members of the American Society of Heating, Refrigerating and Air-Conditioning Engineers' Technical Committee 2.7, which focuses on fundamental scientific and engineering design principles for seismic and wind restraint design of building mechanical and electrical service systems. MCEER's ASHRAE Consortium was established in 2004. For more information, visit <http://mceer.buffalo.edu/research/ASHRAE/default.asp>.



June 2007

MCEER
University at Buffalo
The State University of New York
Red Jacket Quadrangle
Buffalo, New York 14261-0052
Phone: 716-645-3391
Fax: 716-645-3399
Email: mceer@buffalo.edu
Web: <http://mceer.buffalo.edu>

Dear friends and colleagues:

As many of you already know, I have taken on the roles of Principal Investigator of the University at Buffalo NEES Site and Director of the university's Structural Engineering and Earthquake Simulation Laboratory (SEESL), effective June 1, 2007. This double administrative duty has required me to step down as Deputy Director of MCEER.

There are so many people I wish to thank for the many successes enjoyed over the past four years. First, to the MCEER Staff, thank you for your wonderful support. From my very first day at MCEER, you immediately made me feel welcome, and beyond your professional assistance, my family and I will always remember the various personal attentions that you displayed to make us feel at home within the Buffalo community.

To members of the center's Student Leadership Council (SLC), thank you for your enthusiasm in embracing the multidisciplinary aspects of the center's program. You are the future champions that will influence the continuing developments in our field. It is my pleasure to have met and worked with so many of you over these years. I look forward to continuing these associations as I assume my new responsibilities at UB.

To MCEER's partners in business, industry and government, thank you for your continuous dedication and professionalism. With your help, the experience that I have gained has been invaluable and has been particularly insightful in making me appreciate the important role that all of you play in the success of a research center and structural engineering laboratory. On this account, I would like to congratulate you for a job well done.

While I will miss the day-to-day involvement in MCEER's technical program and the center's efforts to serve your interests, my new position in SEESL strengthens opportunities for continued growth in our collaborations. In particular, as Director of SEESL, I look forward to interacting even more closely with some of you through collaborative projects using UB's testing facilities. I am also optimistic that my experience at MCEER and my intimate knowledge of the center's program, will allow me to be of greater service working with and through these two established entities.

Finally, to my faculty/investigator colleagues, thank you for your collegiality and cooperation. You made my job very easy and most inspiring. Above all, our interactions have helped me to fully appreciate the importance of multidisciplinary collaborations and in particular, the role that social sciences play in mitigating seismic hazards.

To all of you – staff, students, partners and academic colleagues – although I now take on new challenges in UB's SEESL, I will continue to support to the best of my abilities the development and activities of MCEER. I am hopeful that my experience at MCEER will allow me to contribute positively to this new endeavor.

Thanks again and please do not hesitate to contact me if I can be of assistance.

Warm Regards,

Andre Filiatrault

Andre Filiatrault, Ph.D., Eng.
Deputy Director

 Headquartered at the University at Buffalo, The State University of New York

Nonstructural Components Simulator to Launch in Fall 2007

UB's Nonstructural Components Simulator (NCS) – the only one of its type in the world – will be commissioned with a symposium and demonstration sometime this fall. The NCS is a modular and versatile two-level platform for experimental performance evaluation of nonstructural components and equipment under realistic full scale floor motions. The simulator can provide the dynamic stroke necessary to replicate full-scale displacements, velocities and accelerations at the upper levels of multi-story buildings during earthquake shaking.

Gilberto Mosqueda, UB, is overseeing the simulator's installation and inaugural test, which will include a fully-equipped hospital emergency suite. The commissioning of the simulator will also include a symposium on nonstructural components issues and research. Additional information will soon be available at <http://mceer.buffalo.edu> and <http://seesl.buffalo.edu/>.

MCEER-NCREE Collaborative Research on Accelerated Bridge Construction

On October 17, 2006, as part of collaborative research between MCEER and Taiwan's National Center for Research on Earthquake Engineering (NCREE), a large-scale precast segmental post-tensioned concrete bridge column was tested at NCREE to examine its seismic performance. The specimen consisted of a foundation, four precast column segments with hollow cross sections and a precast cap beam with a total height of 5.7 m (18.7 ft). In the following four months, six more specimens were assembled and tested.

This collaborative research is part of the Accelerated Bridge Construction (ABC) project funded by the Federal Highway Administration (FHWA) to MCEER on the U.S. side and Taiwan's National Science Foundation (NSF) to NCREE on the Taiwan side. It aims at developing precast segmental post-tensioned concrete bridge columns for use in seismic regions to accelerate bridge construction and minimize traffic disruption. The initial phase of the research involved testing of the critical segment joint of

the columns. The second phase of the research included testing of seven large-scale precast segmental columns with cyclic and pseudo-dynamic loading.

The research was led by George C. Lee (University at Buffalo) on the U.S. side and Kuo-Chun Chang (National Taiwan University) on the Taiwan side. Other key participants included post-doctoral research associate Yu-Chen Ou (University at Buffalo), assistant researcher Ping-Hsiung Wang and graduate student Mu-Sen Tsai (National Taiwan University).

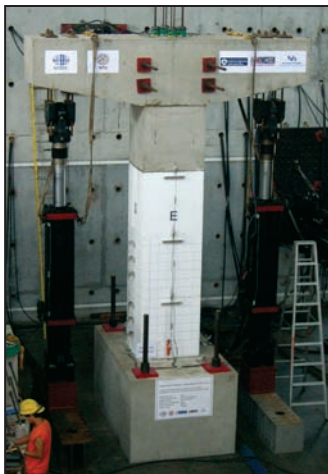
Kuo-Chun Chang is Professor and Chairman of the Department of Civil Engineering of



Kuo-Chun Chang (left) and George C. Lee (right) in front of the specimen

the National Taiwan University. He is also in charge of Bridge Research at the NCREE. He received his M.S. and Ph.D. degrees from the University at Buffalo.

Precast segmental post-tensioned concrete bridge column prior to testing



Sixth National Seismic Conference to be held in Charleston, South Carolina



The *Sixth National Seismic Conference on Bridges & Highways* will be held July 27-30, 2008 in Charleston, South Carolina. Organized by the

Federal Highway Administration (FHWA), the Transportation Research Board (TRB), the South Carolina Department of Transportation (SCDOT) and MCEER, University at Buffalo, under the theme "Seismic Technologies for Extreme Loads," this conference will focus on earthquake risk and include discussions on hurricanes, flooding, and other hazards.

The program will feature over 60 papers, internationally recognized keynote speakers and poster sessions, with papers and posters to be published on a Proceedings CD. Also planned are a special "hands-on" session on natural phenomena and a technical tour of the state-of-the-art Cooper River Bridge.

For details, visit <http://mceer.buffalo.edu/meetings/6nsc>. Abstracts are due October 1, 2007.

Fourth International Workshop on Remote Sensing Held at Cambridge University

Over 25 remote sensing and GIS researchers and industry practitioners from around the world gathered at historic Cambridge University in England on September 25-26, 2006 for the *Fourth International Workshop on Remote Sensing for Disaster Response*. Hosted by Professor Robin Spence, a fellow of Magdalene College, Cambridge, the workshop was fourth in a series that began in 2003.

During the two-day event opened by keynote speaker Ray Williamson, Professor of Space Policy at The George Washington University, workshop attendees presented cutting-edge research on the use of satellite and aerial technologies for post-disaster damage response and recovery, and building inventory development. Sessions included SAR-based techniques for disaster monitoring, multi-peril applications using advanced technologies, optically-based techniques for disaster management, multi-sensor techniques for disaster monitoring, disaster management: integrating in-field deployment, implementation of advanced technology for disaster management and research to operational implementation: next steps for remote sensing technologies. Presentations spanned multiple-disaster types, including response to storm surge, gas explosion, earthquake, flood and tsunami, with case study events ranging from Hurricane Katrina to the Bam earthquake and the Indian Ocean tsunami.

Participants were also treated to some highlights of Cambridge living, including dining at an old-fashioned English pub, punting on the River Cam,



Participants at the Cambridge workshop pose for a group photo

and a famous British curry. The event was sponsored by the MCEER Remote Sensing Institute, EERI, the University of California at Irvine, the University of Memphis, The Martin Center at Cambridge University, and ImageCat, Inc.

The *Fifth International Workshop on Remote Sensing* will be held in Washington DC, September 10-11, 2007, followed by a one-day Symposium on September 12 (see page 2). The MCEER Remote Sensing Institute will sponsor the event, which will be hosted by Ray Williamson of The George Washington University. For further details,

contact Ray Williamson (rayw@gwu.edu), Beverley Adams (bj@imagecatinc.com) or Ron Eguchi (rte@imagecatinc.com).

Past workshops have been held in Irvine (2003) and Newport Beach (2004), California and Chiba, Japan (2005). Visit <http://mceer.buffalo.edu/publications/workshop/05-sp03/default.asp> for more on the series and proceedings. Information about MCEER's Remote Sensing Institute is available from: http://mceer.buffalo.edu/research/remote_sensing/default.asp.

-Submitted by Beverley J. Adams
ImageCat, Inc.

MCEER Research on SPSWs Incorporated into AISC Design Guide

Recent NSF-sponsored MCEER research is featured in the American Institute of Steel Construction's (AISC) **Design Guide 20/ Steel Plate Shear Walls**, by Rafael Sabelli and Michel Bruneau. The Guide features a history of steel plate shear walls, a literature survey, system behavior and design methods, design examples for low and high seismic design, design of openings, and special considerations.

Rafael Sabelli is the Director of Technical Development of DASSE Design in San Francisco. Michel Bruneau is Director of MCEER and a professor in the Department of Civil, Structural and Environmental Engineering (CSEE) at the University at Buffalo (UB). Members of MCEER's SLC from UB's Department of CSEE made significant contributions to the book, including Darren Vian, Jeff Berman, Diego Lopez-Garcia, Ramiro Vargas and Shuichi Fujikura.

The Design Guide, published in May 2007, is available from the AISC website at <http://www.aisc.org> for \$40 (members) and \$80 (non-members).

Five MCEER-sponsored SLC Members Present Research at the 2007 ASCE Structures Congress

From May 16-19, 2007, over 1,000 structural engineering professionals from around the world gathered in Long Beach, California for the 2007 ASCE Structures Congress. Topics included: Bridge & Transportation Structures; Business & Professional Practice; Buildings; Non-Building Structures; Existing Structures; Research Frontiers, including Fundamental, Analytical, or Experimental Research Results, Performance-based Seismic Design, NEES Projects, New Materials & Systems, Health Monitoring & Sensor Networks; and Forensic Engineering, which included remote sensing research.

Several MCEER investigators and students presented research at the conference. The students were all from the University at Buffalo, and their presentation topics were as follows:



MCEER SLC students (from left): Mohammad Reza Bayat, Mehdi Ahmadzadeh, Xiaoyun Shao, Macarena Schachter, Hyong Uk Kim, Gian Paolo Cimellaro

Mehdi Ahmadzadeh, *Combined Implicit or Explicit Integration Steps for Real-Time Hybrid Simulation*

Gian Paolo Cimellaro, *Seismic Response of Adjacent Buildings Connected by Nonlinear Viscous Dampers*

Michael Pollino, *Experimental Study of the Controlled Rocking Response of Steel Braced Frames*

Macarena Schachter, *Analytical Modeling of Zipper Frames Subjected to Shaking Table Testing*

Xiaoyun Shao, *Real-time Hybrid Dynamic Simulation with Sub-structure Techniques*

The conference provided the students with first-hand exposure to information on the state-of-the-art in both practice and research in structural engineering while providing all of the presenters experience with public speaking. It also fostered discussion and networking among students, researchers, and practitioners from around the world. The students also enjoyed the attractions of Long Beach, including the ocean. Altogether, the conference was a very rewarding and enjoyable experience for all who attended.

-Submitted by Gian Paolo Cimellaro
University at Buffalo

Tri-Center Field Mission to Japan Planned

Four MCEER Student Leadership Council members, Bing Qu, Seda Dogruel, Georgios Apostolakis, and Nurhan Ecemis will participate in the 2007 Tri-Center Field Mission to Japan. All four are pursuing Ph.D. degrees at the University at Buffalo. They will join their counterparts at the Mid-America Earthquake Center (MAE) and the Pacific Earthquake Center (PEER) on the trip. The trip will be led by Prof. Scott Ashford, PEER's education director, with the help of Prof. S. Thevanayagam, MCEER's education director, and Prof. P. Gould, MAE's education director.

The field mission will take place from July 21- 28, 2007, when the students and their faculty advisors will visit various earthquake engineering testing facilities and universities and also engage in a hands-on field assessment exercise.

The trip will begin in Tokyo. Highlights include a visit to the Center for Urban Earthquake Engineering (CUEE), at the Tokyo Institute of Technology, a boat tour of Tokyo Bay, a visit to Port and Airport Research Institute, Yokosuka. Planned tours include Tsukuba Research City, National Research Institute for Earth Science and Disaster Prevention (NIED), Public Works Research Institute (PWRI) and the Building Research Institute (BRI). In Kyoto, the group will visit the Disaster Prevention Research Institute (DPRI), along with Kyoto University. In Kobe, the students will visit the world's largest shake table facility, the Miki shake table in Miki City near Kobe, and the Hanshin Expressway Museum.

Participants will collaborate on a final group report and submit a presentation after they return. Past field missions have been held in New Zealand (2006), Greece (2005), Japan (2004), Italy (2003), and Taiwan (2002). More information on the program is available at: <http://mceer.buffalo.edu/education/tricenter/default.asp>.

MCEER SLC Student Receives Award at the 2007 ANCER Meeting

With "Earthquake Engineering Research: From Strong Seismic Regions to Regions of Moderate Seismicity" as a theme, the 2007 ANCER Meeting was held at Hong Kong Polytechnic University, in Hong Kong, China from May 29-30, 2007 under the leadership of ANCER president Professor Jan-Ming Ko.

The meeting focused on issues of earthquake engineering in regions of moderate seismicity, and experiences that can be learned from regions of strong seismicity. It is particularly timely because the Hong Kong Government is now actively studying its earthquake hazard and risk, and considering whether seismic design should be included in building regulations. The meeting provided an opportunity for local as well as international experts to contribute to its development.



Participants at the 2007 ANCER Meeting

The two-day program included four keynote papers and 55 technical papers presented in two keynote sessions and 10 technical sessions. There were two sessions each on "Hazards," "Structures," and "Health, Control & Smart Structures," and one session on: "Substructure and Ground Motions," "General Topics," "Experiments" and "Bridges." Authors and participants were from Australia, China, Taiwan, Hong Kong, Greece, Italy, Korea, New Zealand and the US.



UB Ph.D. candidate Bing Qu receives an award from ANCER president Jan-Ming Ko

Two MCEER Student Leadership Council (SLC) members attended the meeting along with several MCEER investigators. Bing Qu and Shenlei Cui from the University at Buffalo presented results of their respective ongoing research on earthquake engineering. Bing's paper, "Analytical Study on Steel Plate Shear Walls Using Dual Strip Model and 3D FE Model" (Qu, B. and Bruneau, M.) received a merit award in the best student paper competition, as determined by a panel of directors (or their nominees) of ANCER centers.

The meeting is the fourth in a series whose purpose is to provide researchers from member centers opportunities to share the latest knowledge and techniques across a broad range of earthquake engineering topics and to provide young researchers with a chance to network among their peers. Previous meetings were held in Harbin, China (2002), Hawaii, US (2004), and Jeju, Korea (2005). More on ANCER can be found at http://mceer.buffalo.edu/research/International_Research/ANCER/default.asp.

-Submitted by Bing Qu, University at Buffalo

Student Spotlight

Marlon Hill, a Ph.D. Candidate at Florida A&M University (FAMU) is working on a research project entitled "Investigating the

Effects of Extreme Winds on Civil Structures," under the supervision of Makola Abdullah, MCEER Diversity Director and Associate Professor in the Department of Civil Engineering. Marlon also received his BA from FAMU.

Marlon became interested in his current research program after participating in the Ronald E. McNair Summer REU program, "by virtue of living in the south and wanting to know more about the effects of hurricanes on structures."

He anticipates graduating in the Spring of 2009 and "plans to use my research to determine the most adequate hurricane mitigation methods and possibly new more effective techniques." He expects to pursue a career in industry as a structural engineer. After obtaining a P.E. and some practical experience, he would like to return to academia to teach at an HBCU (Historically Black College and University).

In his spare time, Marlon likes to fish, golf, and play various recreational sports such as flag-football, softball, and soccer.



Marlon Hill

MCEER Team Wins Egor Popov Prize in the First Annual Tri-Center Undergraduate Seismic Design Competition

This spring, in conjunction with EERI, the three earthquake engineering research centers (MCEER, PEER, & MAE) hosted the *Fourth Annual Undergraduate Seismic Design Competition* in Los Angeles, California. The competition has been held for the past three years to promote the study of earthquake engineering among undergraduate students. Some of the competition participants have continued on into the MCEER summer REU programs and also into graduate school, studying civil and earthquake engineering.

A total of 14 teams competed in the event, three representing MCEER. These were Florida A&M University (Glen Wieger, Aaron Williams, Denaye Hinds, Don Cesarone and Daniel Benitez.); New Jersey Institute of Technology (Adam Anea, Steven Flormann, Indira Hernandez, Britain Materek, Anthony Massari, Shefali Patel and Diana Rodriguez); and the University at Buffalo (Donald Taylor, Masamichi Ikeda, Jeremy Gworek, Walter Fairlie and Laura Przybylski).



Members of the FAMU Team (from left): Aaron Williams, Denaye Hinds and Glen Wieger



The NJIT team won the Egor Popov prize (from left): Indira Hernandez, Britain Materek, Diana Rodriguez, Anthony Massari, Shefali Patel, Steven Flormann, and Adam Anea

The teams were charged with designing a scaled high-rise office building out of balsa wood. They were to incorporate some form of structural control into their design to mitigate the effects of earthquakes. Limiting the height of each structure to five feet and the total weight to fifteen pounds were the most important challenges facing the teams year.

As in past competitions, each team's main objective was to maximize their structure's net income, a function of building



Members of the UB Team (from left): Masamichi Ikeda, Laura Przybylski, Jeremy Gworek, Donald Taylor, Walter Fairlie

cost, income, and seismic cost. The building cost was based on the total weight of the structure, income was determined by the building's total usable floor area, and seismic cost by the performance of the building subjected to a few historical earthquakes. Performance was measured in terms of the structure's relative displacement and roof top acceleration. Teams were also given bonus increases for their presentation, poster, and architectural creativity.

With restrictions on certain forms of structural control, teams had to find creative ways to implement energy dissipation devices, making the contest a good learning experience. Some teams used friction dampers, while others used elastic absorbers in chevron brace configurations and torsion to dissipate energy. Some of the more memorable designs included a twisting torso model, a rotating star design, and a model with exterior lattice bracing.

The University at Buffalo team placed sixth overall and the New Jersey Institute of Technology team won the Egor Popov Prize for Structural Innovation with their "torsional structure." Oregon State University (PEER) won the overall top prize.

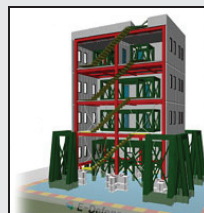
--submitted by Marlon Hill
Florida A&M University

2007 Blind Analysis Contest

The Executive Committee of the E-Defense Steel Building Project has announced the *2007 Blind Analysis Contest*, in which a full-scale four-story steel building will be tested to collapse on the world's largest three-dimensional shake table, located in Miki City, Japan. The building will be shaken and collapsed from September 20-30, 2007, by applying a scaled version of near-fault motion recorded during the 1995 Kobe earthquake.

Participants will predict results before and after the test. The contest is open to researchers, students and practitioners, with winners in two categories: researchers and students, and practicing engineers. Winners will be honored at the *14th World Conference on Earthquake Engineering (14WCEE)* in 2008 in Beijing, China, with travel and accommodations covered by the contest sponsor, Japan's National Research Institute for Earth Science and Disaster Prevention.

The registration deadline is August 10, 2007. Visit the E-Defense website at <http://www.bosai.go.jp/hyogo/ehyogo/index.html> for details and application information.



Education and Outreach Activities at the University at Buffalo

Elementary School Outreach

MCEER Information Service hosted four school groups this spring for a combined lecture and demonstration on the core geophysical elements of earthquakes, the dangers from seismic disasters and the merits of earthquake engineering. Union Pleasant Elementary School participated in March with 40 third graders and two 6th grade science classes from Buffalo Public School #18 (Dr. Antonia Pantoja Community School of Academic Excellence) visited in May. The groups were hosted by Andrew McNeil and included a presentation and a hands-on demonstration of the properties of seismic liquefaction. Highlights of the events included images detailing structural damage from past, historical earthquakes and the archival videos from the "NEESWood Benchmark Shake Table Testing of a Full-Scale Two-Story Townhouse Woodframe Building" performed in SEESL November 2006. More information is available from <http://mceer.buffalo.edu/infoservice/Education/educationOutreach.asp>.



Host Andrew McNeil demonstrates seismic liquefaction properties

-submitted by Sofia Tangalos, MCEER Information Service

Middle School Students Visit UB

Buffalo Academy of Science Charter School

Connecte²d Teaching colleagues, Gilberto Mosqueda, Deborah Moore-Russo and Sofia Tangalos, hosted two Buf-



Buffalo Academy of Science Charter School seventh graders

falo Academy of Science Charter School seventh grade classes for a full morning of activities including a presentation, tour of UB's SEESL lab and a shake table demonstration. The 40 students were very eager to have Mosqueda test their 3-D models on a mini shake table to assess the model's ability to withstand several intense earthquakes, including Northridge and Kobe. Led by their teacher, Ms. Elaine Nieman, the students had previously studied seismology concepts related to math topics using several lesson plans from the *Connecte²d Teaching* website. They had also used the Shake & Quake simulator prior to creating the model. The group visited UB on May 23, 2007. For more information on *Connecte²d Teaching*, visit http://mceer.buffalo.edu/connected_teaching/index.html.



Gilberto Mosqueda with a 3-D model

-submitted by Sofia Tangalos, MCEER Information Service

Washington Middle School

On March 30, 2007, 55 sixth graders from Washington Middle School in Jamestown, NY visited UB's Department of Civil, Structural, and Environmental Engineering (CSEE) and the Structural Engineering and Earthquake Simulation Laboratory (SEESL).



Sixth graders from Washington Middle School visited UB to learn about earthquake engineering

Students viewed a presentation titled "Engineering, Earthquakes, and Earthquake Engineering" from UB graduate student and SLC Chair, Michael Pollino. The presentation started by introducing the field of civil engineering and then discussed how earthquakes are generated and affect structures. The discussion on earthquakes followed from the earth science curriculum they had learned prior to the visit. The final part of the presentation introduced them to earthquake engineering and many of the studies taking place at UB to help protect people and structures during an earthquake. Following the presentation, the class saw a demonstration of a model high-rise building structure subjected to a series of earthquakes from a mini-shake table. UB graduate and undergraduate students Charles Ekiert, Donald Taylor and Laura Przybylski set-up and discussed the testing with the students.

The students then visited the SEESL lab where some of the experimental testing discussed in the presentation took place. From the third level of the mezzanine, the students could see the equipment used to test structures from the forces of earthquakes. The students were excited to see the laboratory and had a number of good questions during the lunch that followed.

The visit from the middle school students was a reverse site visit from the previous year, when Michael went to the middle school. The teacher, Lisa Peterson, felt that the presentations and laboratory visits had a very positive impact.

-submitted by Michael Pollino, University at Buffalo

MCEER Movers & Shakers



George Lee

Lee Named Distinguished Professor

George C. Lee was named Distinguished Professor by the State University of New York Board of Trustees. The designation, a rank above full professor and the highest in the SUNY system, denotes national or international prominence and an established reputation in the recipient's field of expertise. Dr. Lee, MCEER's former director and current special tasks director, has served at the University at Buffalo for more than 40 years.



Andrei Reinhorn

Reinhorn and Pitman Receive SUNY Chancellor's Awards

Two MCEER affiliates from the Department of Civil, Structural and Environmental Engineering at the University at Buffalo were recognized for their outstanding achievements with 2007 Chancellor's Awards from the State University of New York. Andrei Reinhorn received an Award for Excellence in Scholarship and Creative Activities, which recognizes the work of those who actively engage in scholarly and creative pursuits beyond their teaching responsibilities. Andrei, Clifford C. Furnas Eminent Professor, is an expert on the behavior of structures under dynamic loads near collapse.



Mark Pitman

Mark Pitman, Technical Services Manager of the Structural Engineering and Earthquake Simulation Laboratory (SEESL), received an Award for Excellence in Professional Service. The award honors performance excellence "both within and beyond the position." A specialist in electro-hydraulics, computers, data-acquisition systems and control systems, Pitman supervises technical and administrative functions related to the SEESL laboratory. He supervised the commissioning of this NSF-funded NEES lab, including the acceptance testing of all experimental equipment and networked tele-presence infrastructure.



Ron Eguchi

Eguchi Named UB Professor

Ron Eguchi, President of ImageCat Inc. and MCEER investigator, has been appointed Research Associate Professor in the University at Buffalo's Department of Civil, Structural and Environmental Engineering. Ron will play a strong role in the Department's research efforts in the area of remote sensing for damage detection.



Sissy Nikolaou

Nikolaou Named one of "40 Under 40"

Sissy Nikolaou, Ph.D., was recently named one of the winners in the 2007 "40 Under 40" competition sponsored by *Building Design & Construction* magazine. Winners are leaders who excel in their professional roles as architects, engineers, contractors, designers, and business developers, while giving back to their communities and professional societies, and finding time off the clock to expand their horizons. Dr. Nikolaou is an associate with Mueser Rutledge Consulting Engineers, where she heads the Geo-Seismic Department. She is a former NCEER/MCEER student who received Masters and Ph.D. degrees from the University at Buffalo in 1995 and 1998, respectively, under the direction of Professor George Gazetas.



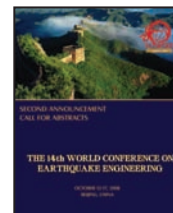
Mehdi Ahmadizadeh

Ahmadizadeh Wins EERI Student Paper Competition

Mehdi Ahmadizadeh, a graduate research assistant in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo, won the top prize in EERI's 2006 graduate student paper competition with his paper, "A Comparison Between Passive and Semi-Active Structural Control Systems Using Viscous Fluid Dampers." Ahmadizadeh received a grant to present his paper at the 59th EERI Annual Meeting in Los Angeles, California, on February 7-10, 2007. His faculty advisor is MCEER investigator Gilberto Mosqueda.

14WCEE to be Held in Beijing, China

"Innovation, Practice, Safety," is the theme of the 14th World Conference on Earthquake Engineering (14WCEE), which will take place October 12-17, 2008, in Beijing, China.



Under the auspices of International Association for Earthquake Engineering (IAEE) and hosted by the Chinese Association of Earthquake Engineering (CAEE), this once-every-four-years event is sponsored by the China Earthquake Administration, Ministry of Construction, China.

The 14WCEE will serve as an international forum where specialists, government officials and NGO representatives in earthquake engineering and relevant fields may exchange the latest research results and technologies. The Conference strives to promote innovation, practice and safety in reducing the impact of earthquakes on our society and natural environment. The deadline for abstracts is October 1, 2007, and early registration is available through May 1, 2008.

Visit <http://www.14wcee.org/> for details, including a downloadable announcement and call for papers.

MCEER ♦ UB-EERI ♦ MCEER SLC ♦ UB-CSEE Seminar Series

Skyscraper Design – Trump Tower Chicago

Jeremy Kirk, Structural Engineer
Skidmore, Owings and Merrill
February 13, 2007

View archived webcasts, abstracts
and more on the series at
<http://civil.eng.buffalo.edu/webcast/>.

**To Order
MCEER
Publications**

Phone:
(716) 645-3391
ext. 105

Fax:
(716) 645-3399

Web:
<http://mceer.buffalo.edu/publications/default.asp>

E-mail:
mceer@mceermail.buffalo.edu

New Bridge Synthesis Reports

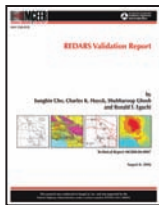
REDARS Validation Report

By S. Cho, C.K. Huyck, S. Ghosh and R.T. Eguchi, MCEER-06-0007, August 8, 2006, 150 pages, \$30.00

This report presents the results of an extensive review and evaluation of the Seismic Risk Assessment (SRA) methodology for highway systems, as documented in "A Risk-Based Methodology for Assessing the Seismic Performance of Highway Systems," by Werner et al., MCEER-00-0014.

The efficacy of all key modules in the REDARS (Risk of Earthquake Damage for Roadway Systems) software program was evaluated. The modules included: bridge damage or fragility module, post-earthquake traffic state module, transportation module and economic loss module. The results from this review were evaluated by the REDARS development team and subsequently used to update the REDARS software program.

The REDARS methodology and software for seismic risk analysis of highway systems is presented in a companion MCEER special report, "REDARS 2 Methodology and Software for Seismic Risk Analysis of Highway Systems," by Werner et al., MCEER-06-SP08.



Review of Current NDE Technologies for Post-Earthquake Assessment of Retrofitted Bridge Columns

By J. Song, Z. Liang, and G.C. Lee, MCEER-06-0008, August 21, 2006, 108 pages, \$25.00

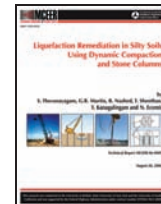
This report presents an evaluation of various nondestructive testing/evaluation (NDE) technologies for use on bridge columns that have been retrofitted with FRP-type jackets. Suitable and/or potentially suitable techniques for practical applications are identified, and promising techniques that could benefit from additional research are assessed. For each technology, the inherent physical principles and application characteristics are analyzed to determine whether they could be used to detect damage and defects in the jacketed bridge columns. The most promising NDE methods (impact echo and electromagnetic method) are identified and corresponding application procedures are presented. This report focuses solely on the application of NDE technologies to bridge columns, and therefore, the recommendations and conclusions may differ from those discovered for other applications. Furthermore, this is a rapidly advancing field, so some applications and conclusions may change in the coming years.



Liquefaction Remediation in Silty Soils Using Dynamic Compaction and Stone Columns

By S. Thevanayagam, G.R. Martin, R. Nashed, T. Shenthan, T. Kanagalingam and N. Ecermis, MCEER-06-0009, August 28, 2006, 114 pages, \$25.00

This report introduces a rational analysis procedure and design guidelines for liquefaction hazards mitigation in saturated sands and non-plastic silty sands using Dynamic Compaction (DC) and Vibro-Stone Columns (SC). A numerical model was developed to simulate the densification processes by quantifying pore pressure generation due to vibrations caused by successive impacts on the ground or repeated insertions of a vibratory probe. Site-specific conditions such as hydraulic conductivity, fines content, etc. were quantified for a range of energy contents delivered to the soil at specific spacing. The effects of field operational parameters such as energy per impact, number of impacts, time cycle between impacts, impact grid spacing, impact grid pattern, and wick drain spacing, in the case of DC, or area replacement ratio and wick drains spacing in the case of SC, on post-improvement resistance to liquefaction were included. Based on the results, design charts, guidelines, procedures and examples are provided.



US-Taiwan Bridge Workshop Proceedings Available on CD

The *Proceedings of the Second US-Taiwan Bridge Engineering Workshop*, MCEER-06-0014, are contained on a CD-ROM that includes papers, presentations, photo gallery, biographies and an electronic author index. Edited by Phil Yen and J. Shen (US) and J.Y. Chen and M. Wang (Taiwan), the proceedings include 23 papers and presentations from the 40 participants -- 21 from Taiwan and 19 from the US.

The event, held Sept 21-22, 2006, was sponsored by the Federal Highway Administration. Phil Yen, FHWA, was the conference chair. It was organized by MCEER and the Taiwan Construction Research Institute. The workshop built upon the first gathering in Taipei in 2005 which had a focus on "Bridge Maintenance." The theme of the 2006 workshop was "Bridge Engineering." There was much discussion on the seismic design of highway bridges and the repair of bridges damaged by earthquakes, flooding and landslides. There were also presentations on bridge maintenance and bridge management systems that extended the discussions initiated at the 2005 workshop.

To order the CD, visit the Publications section of MCEER's website at <http://mceer.buffalo.edu/publications/workshop/06-0014/default.asp>.



New Technical Reports

A Study of the Coupled Horizontal-Vertical Behavior of Elastomeric and Lead-Rubber Seismic Isolation Bearings

By G.P. Warn and A.S. Whittaker, MCEER-06-0011, September 22, 2006, 272 pages, \$35.00

This report presents an analytical and experimental investigation of the coupled horizontal-vertical response of elastomeric and lead-rubber bearings focusing on the influence of lateral displacement on vertical stiffness. Component testing was performed with reduced scale low-damping rubber (LDR) and lead-rubber (LR) bearings to determine vertical stiffness at various lateral offsets. The numerical studies included finite element (FE) analysis of the reduced scale LDR bearing. The results of the experimental and FE investigations were used to evaluate three analytical formulations to predict vertical stiffness at a given lateral displacement. One of the three analytical formulations, based on the Koh-Kelly two-spring model, was shown to predict the measured reduction in vertical stiffness of the LDR and LR bearings at each lateral offset with reasonable accuracy. Earthquake simulation testing was performed to investigate the coupled horizontal-vertical response of a bridge model isolated with LDR or LR bearings. The results of simulations performed with three components of excitation were used to evaluate an equivalent linear static procedure to estimate vertical load due to vertical ground shaking. The procedure was shown to conservatively estimate measured maximum vertical loads due to the vertical component of excitation for most simulations.



Proceedings of the Fourth PRC-US Workshop on Seismic Analysis and Design of Special Bridges: Advancing Bridge Technologies in Research, Design, Construction and Preservation

Edited by L.C. Fan, G.C. Lee and L. Ziang, MCEER-06-0012, October 12, 2006, 404 pages, \$35.00

The fourth workshop in the PRC-US Workshop on Seismic Analysis and Design of Special Bridges, was held June 19-21, 2006 in Chongqing, China.

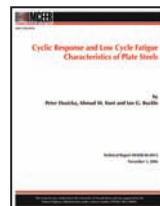
The workshop was designed to exchange state-of-the-art information on highway bridge technologies and to plan and develop future cooperative research projects between the United States and the People's Republic of China. A total of 39 participants, 16 from the U.S. and 23 from China, attended this workshop. These proceedings contain 32 papers covering a wide range of research fields.



Cyclic Response and Low Cycle Fatigue Characteristics of Plate Steels

By P. Dusicka, A.M. Itani and I.G. Buckle, MCEER-06-0013, November 6, 2006, 84 pages, \$25.00

Due to the lack of experimental data on the stress-strain behavior of specialty steels and conventional grade steels, a comprehensive study on the stress-strain and low cycle fatigue properties was conducted. The purpose of the study was to evaluate the stress-strain characteristics of plate steels subjected to repeated cyclic plastic deformations. The steel grades ranged from high performance steel HPS 485MPa to low yield point steel LYP Grade 100 MPa. Of specific interest was

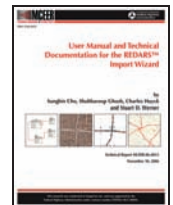


the cyclic stress as measured relative to the yield strength and the variability of the achieved stresses across the different steel grades. In addition, low cycle fatigue characteristics were desired to compare the fatigue life. The experimental results showed that all of the steels would be suitable for earthquake engineering applications, although the effects of welding or multi-axial stresses were not considered.

User Manual and Technical Documentation for the REDARS™ Import Wizard

By S. Cho, S. Ghosh, C.K. Huyck and S.D. Werner, MCEER-06-0015, November 30, 2006, 136 pages, \$25.00

As REDARS™ moved from a methodology to a fully functional software program for seismic risk analysis of highway systems, a key element in encouraging widespread use was developing an import module that could process standard data formats into a format suitable for REDARS™. This report documents the development of an Import Wizard, including the base data, research, modeling assumptions, and user requirements, necessary for importing source data into the REDARS software. Data from several national and regional databases are able to be accommodated by the Import Wizard, such as the National Highway Planning Network (NHPN), Highway Performance Monitoring System (HPMS), National Bridge Inventory (NBI), National Earthquake Hazard Reduction Program (NEHRP) Soil, and Origin-Destination zones and trip tables (OD data) (available through local Metropolitan Planning Organizations). A complete user manual and technical documentation is included in the report. The REDARS methodology and software is presented in a companion MCEER special report, "REDARS 2 Methodology and Software for Seismic Risk Analysis of Highway Systems," by Werner et al., MCEER-06-SP08.



Hazard Mitigation Strategy and Monitoring Technologies for Urban and Infrastructure Public Buildings: Proceedings of the China-US Workshops

Edited by X.Y. Zhou, A.L. Zhang, G.C. Lee and M. Tong, MCEER-06-0016, December 12, 2006, on CD-ROM, \$25.00

This CD-ROM contains papers, photos and movies from two US-China workshops on multi-hazard mitigation strategies for large public buildings and other infrastructure. Co-sponsored by NSF and the China National Natural Science Foundation and co-organized by G.C. Lee and X.Y. Zhou, both workshops were held at the Beijing University of Technology in Beijing, China. "Protection of Urban Infrastructure and Public Buildings against Earthquakes and Manmade Disasters" was held February 21-22, 2003 and featured sixty papers. Discussion focused on the use of advanced technologies in critical public buildings and transportation networks to protect them from damage due to earthquakes and other hazards. A follow-up workshop was held November 14-15, 2005. Fifteen papers on research related to multiple hazards resilient critical facilities were presented. Topics included structural health monitoring, design structural strength under multiple hazard loadings, indoor air quality and safety monitoring, structural damage detection and response control, multiple hazard risk analysis and evacuation systems.



Static and Kinetic Coefficients of Friction for Rigid Blocks

By C. Kafali, S. Fathali, M. Grigoriu and A.S. Whittaker, MCEER-07-0001, March 20, 2007, 104 pages, \$25.00

The study described in this report is the first phase of research on the seismic performance evaluation of block-type nonstructural components. The analytical work was performed at Cornell University, while the experimental study was conducted at the University at Buffalo. The objective was to characterize the coefficients of friction of three interfaces for rigid blocks with low, medium, and high coefficients of friction. The interfaces selected were PTFE on steel, wood on steel, and carpet on steel, which represented interfaces with low, moderate, and high coefficients of friction, respectively. Two sets of blocks with different geometry were designed and constructed to model block-type nonstructural components. The static coefficients of friction for the three interfaces were characterized by a series of standard pull and tilt tests. Estimates of the kinetic coefficient of friction were calculated using the maximum responses of the blocks obtained through laboratory experiments and analytical relationships between the maximum responses and the kinetic coefficient of friction. The method explicitly accounted for the uncertainty in experimental errors, imperfections in block-floor interfaces, and the relationship between the kinetic friction coefficient and the loading and block size.



Hazard Mitigation Investment Decision Making: Organizational Response to Legislative Mandate

By L.A. Arendt, D.J. Alesch and W.J. Petak, MCEER-07-0002, April 9, 2007, 4/9/07, 94 pages, \$25.00

This is the third in a series of reports on overcoming obstacles to implementing hazard mitigation policies against extreme events. It focuses on developing an organizational decision-making model that may be used to predict the conditions under which organizations will spend money to reduce the likelihood of damage to their buildings from natural hazards. The report describes a theoretical framework of organizational decision making around hazard mitigation investments, primarily developed from theoretical literature and structured interviews with hospital executives and other stakeholders over a three-year period. Public, not-for-profit, and investor-owned acute care hospital facilities in California and their response to State legislation known colloquially as SB 1953 are examined.



Earlier reports are "Seismic Safety in California Hospitals: Assessing an Attempt to Accelerate the Replacement or Seismic Retrofit of Older Hospital Facilities," by Alesch et al., MCEER-05-0006 and "Overcoming Obstacles to Implementing Earthquake Hazard Mitigation Policies: Stage 1 Report," by Alesch et al., MCEER-01-0004.

To Order MCEER Publications

Phone: (716) 645-3391 ext. 105

Fax: (716) 645-3399

Web: <http://mceer.buffalo.edu/publications/default.asp>

E-mail: mceer@mceermail.buffalo.edu

Publications Order Form			
Name _____	Publication # _____	Authors _____	Price _____
Address _____			
City/State/Zip _____			
Country _____			
Telephone _____ Fax _____		Shipping Total _____	
Shipping Options <input type="checkbox"/> Media Mail (Book rate) - U.S. (no additional charge) <input type="checkbox"/> Priority - U.S. (add \$4.60 per title) <input type="checkbox"/> Global Priority to Canada or Mexico (add \$9.00 per title) <input type="checkbox"/> Global Priority - All Other International (add \$11.00 per title)		For Credit Card Orders: Name on credit card _____ Card number _____ Expiration date _____ Card type (circle one) VISA Mastercard American Express Signature _____	
Use this form to order technical reports, monographs and other publications from MCEER.			



Symposium on Emerging Developments in Multi-Hazard Engineering

A *Symposium on Emerging Developments in Multi-Hazard Engineering* will be organized jointly by the Architectural Engineering Institute (AEI) of ASCE and MCEER on September 18, 2007 in New York City. More information and online registration is available at: <http://mceer.buffalo.edu/meetings/aei/default.asp>



Sixth National Seismic Conference on Bridges & Highways

The *Sixth National Seismic Conference on Bridges & Highways* will be held July 27-30, 2008 in Charleston, South Carolina. The conference is being organized by the Federal Highway Administration, the Transportation Research Board, the South Carolina Department of Transportation and MCEER. For details, visit <http://mceer.buffalo.edu/meetings/6nsc>. Abstracts are due October 1, 2007.

Published by

MCEER
University at Buffalo, The State University of New York
Red Jacket Quadrangle
Buffalo, NY 14261

Phone: (716) 645-3391
Fax: (716) 645-3399
E-mail: mceer@mceermail.buffalo.edu

Website: <http://mceer.buffalo.edu>

ISSN 1520-2933

Staff

Editor: Jane Stoye

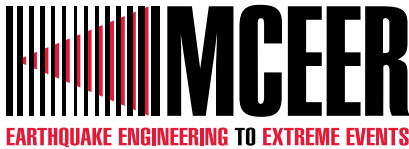
Illustration/Photography: David Pierro

Layout/Composition: Michelle Zuppa

Some of the material reported herein is based upon work supported in whole or in part by the Earthquake Engineering Research Centers Program of the National Science Foundation (under award number EEC-9701471), the State of New York, the Federal Highway Administration of the U.S. Department of Transportation, the Federal Emergency Management Agency and other sponsors. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of MCEER or its sponsors.



University at Buffalo *The State University of New York*



University at Buffalo
State University of New York
Red Jacket Quadrangle
Buffalo, NY 14261

NON-PROFIT
U.S. POSTAGE
PAID
Buffalo, NY
Permit No. 311

Change Service Requested