

[Return...](#)

## New MCEER Technical Reports

MCEER technical reports are published to communicate specific research data and project results. Reports are written by MCEER-funded researchers, and provide information on a variety of fields of interest in earthquake engineering. The proceedings from conferences and workshops sponsored by MCEER are also published in this series. To order a report reviewed in this issue, fill out the order form and return it to MCEER. To request a complete list of titles and prices, contact MCEER Publications.

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

### **Fatigue Analysis of Unconfined Concrete Columns**

**J.B. Mander, A. Dutta and J.H. Kim,  
9/12/98, MCEER-98-0009, 184 pages, \$30.00**

This report describes the development of a seismic evaluation methodology for bridges that can be used to determine structural deficiencies prior to retrofit or rehabilitation. The authors describe an energy-based method to explore possible failure mechanisms in bridges not designed to withstand seismic loads. Among the failure mechanisms examined are unconfined concrete fatigue, bond failure in anchorages and lap splices, compression buckling of the longitudinal reinforcement steel, fracture and fatigue of the longitudinal reinforcement, and shear failure in the columns. The seismic evaluation methodology was applied to a bridge pier with multiple failure modes including that of fatigue damage and, when compared to experimental results, yielded good agreement.

**Technical Reports (*continued*)****Centrifuge Modeling of Cyclic Lateral Response of Pile-Cap Systems and Seat-Type Abutments in Dry Sands**

A.D. Gadre and R. Dobry, 10/2/98, MCEER-98-0010, 246 pages, \$35.00

The objective of this work was to develop guidelines for the seismic design of abutments and pile footings based on an analytical and experimental program using centrifuge testing. This report presents the results from a series of centrifuge tests, which were performed on pile-cap foundation systems (cap, single-pile and pile-cap systems) and seat-type bridge abutments, all in dense dry sand. The pile-cap foundation test results were compared to analytical models and nonlinear finite element analyses, with good agreement. The seat-type bridge abutments were compared to established design procedures (Caltrans, ATC and AASHTO) and other evidence such as measurements obtained during past earthquakes. The test results indicate that current design procedures overestimate the measured lateral capacity and stiffness. Additional research to investigate these differences is therefore recommended.

**IDARC-BRIDGE: A Computational Platform for Seismic Damage Assessment of Bridge Structures**

A.M. Reinhorn, V. Simeonov, G. Mylonakis and Y. Reichman, 10/2/98, MCEER-98-0011, 314 pages, \$35.00

This report describes the newest edition to the IDARC series of computer programs, IDARC-BRIDGE, which was developed to determine the seismic response of bridges ([see related article on page 2](#)). IDARC-BRIDGE offers methods to investigate the demand on bridges imposed by various types of excitation, and includes static and

dynamic pushover options for assessing available capacity and possible collapse modes. Some of the component and damage models in the original IDARC program, for the two-dimensional analysis of buildings, have been adapted and extended in this version. A user's guide is provided as an appendix to the report.

The IDARC-BRIDGE software can be obtained by downloading it from <http://civil.eng.buffalo.edu/idarc-bridge>. A link has also been provided from MCEER's web site at <http://mceer.buffalo.edu> under "Publications/Software." If problems are encountered when downloading the software, send an email message to [reinhorn@buffalo.edu](mailto:reinhorn@buffalo.edu).

**Experimental Investigation of the Dynamic Response of Two Bridges Before and After Retrofitting with Elastomeric Bearings**

D.A. Wendichansky, S.S. Chen and J.B. Mander, 10/2/98, MCEER-98-0012, 302 pages, \$35.00

This research involved measuring and assessing the in-situ dynamic behavior and performance of a typical slab-on-girder bridge. Two bridges were subjected to transverse quick-release testing, which simulated transverse seismic loading. This report presents the results of a study of these two bridges before and after replacement of the original steel bearings; one with ordinary neoprene elastomeric bearings, and the other with laminated rubber seismic isolation bearings. Test results indicate that steel bearings have considerable intrinsic strength and are able to withstand strong ground motions, primarily due to the frictional resistance of the bearings. The use of seismic isolation bearings, for these specific bridges, resulted in marginal performance improvement.

**Design Procedures for Hinge Restrainers and Hinge Seat Width for Multiple-Frame Bridges**

R. DesRoches and G.L. Fenves, 11/3/98, MCEER-98-0013, 244 pages, \$35.00

The objective of this research was to examine, evaluate and improve design methodologies for hinge restrainers currently in use by Caltrans and AASHTO. This report addresses hinge restrainers and seat width design for multiple-frame bridges. The authors developed a numerical model to investigate the response of these bridges when subjected to earthquake ground motion, focusing on the longitudinal response of the frames and the hinges. They examined the effects of various dynamic characteristics on the inelastic earthquake response for these types of bridges. On the basis of this analysis, a new, greatly simplified design procedure for hinge restrainers and hinge seat widths was developed and verified by a series of parameter studies and case studies.

**Response Modification Factors for Seismically Isolated Bridges**

M.C. Constantinou and J.K. Quarshie, 11/3/98, MCEER-98-0014, 268 pages, \$35.00

This report investigates the rationale for the lower response modification factors (R-factors) that have been specified for seismically isolated bridges in the 1997 AASHTO *Guide Specifications for Seismic Isolation Design*. Dynamic analyses were conducted on a number of simple models of both seismically isolated and non-isolated bridges for a range of isolation system types, properties and substructure behaviors. Based on the results from these studies, the authors concluded that R-factors for the substructures of seismically isolated bridges should be in the range of 1.5 to 2.5. These recommended values are similar to those presented in the 1997 AASHTO Guide Specifications.

## Appropriate Seismic Reliability for Critical Equipment Systems: Recommendations Based on Regional Analysis of Financial and Life Loss

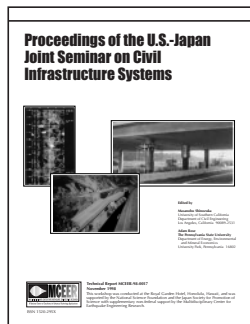
K. Porter, C. Scawthorn, C. Taylor and N. Blais, 11/10/98, MCEER-98-0016, 116 pages, \$25.00

This study recommends a minimum seismic reliability level for critical equipment systems located in seismically vulnerable facilities. It describes a methodology to achieve cost-effective risk mitigation and applies that methodology to a test case involving an automatic sprinkler system in a high-rise building. By making it possible to calculate quantitative risk scores, the methodology provides a basis both for evaluating the seismic adequacy of equipment systems and for making cost-effective equipment retrofit decisions. The methodology is primarily for use in areas of high seismicity.

In addition to this report, an inventory of taxable high-rise buildings in San Francisco (as of January 1997) in spreadsheet format (Excel 97 and Lotus 1-2-3 version 3, leaf "Inventory" or "B", respectively) is located in the Publications section of MCEER's web site (<http://mceer.buffalo.edu/pubs.html>)

## Proceedings of the U.S.-Japan Joint Seminar on Civil Infrastructure Systems Research

Edited by M. Shinozuka and A. Rose, November 1998, MCEER-98-0017, 312 pages, \$35.00



A two and one-half day *Bilateral Seminar on Civil Infrastructure Systems (CIS) Research* was held on August 28-30, 1997, under the joint sponsorship of the National Science Foundation (NSF) and the Japan Society for Promotion of Science (JSPS), with supplementary support by MCEER from non-federal sources. The objective of this seminar was to provide a forum for identifying and comparing common CIS issues in the U.S. and Japan, exchanging ideas on solutions, promoting cooperative research between the two nations, and formulating action plans, all in the frontier areas of CIS research involving the

following main themes of study:

- Science of aging and deterioration
- Health monitoring and condition assessment
- Renewal engineering
- Socioeconomic issues, including institutional effectiveness and productivity
- Research coordination

The seminar consisted of five plenary technical sessions addressing the above themes, two break-out workshop sessions and three plenary sessions for the development and adoption of a working group report, resolutions and recommendations, in addition to the opening and closing sessions. Executive sessions dealt with administrative needs and facilitated communication among conference and session chairs in developing the resolutions and recommendations.

The proceedings of the seminar consists of two parts. Part I contains seminar recommendations for potential future cooperative U.S.-Japan research projects on CIS research, and Part II contains papers presented in the seminar. The seminar agenda, list of participants, and resolutions from the five working groups are included in the appendices.

## Upcoming Events

**August 12-14, 1999**

**5th U.S. Conference on Lifeline Earthquake Engineering: *Optimizing Post-Earthquake Lifeline System Reliability* ■ Seattle, WA**

**Sponsor:**

ASCE Technical Council on Lifeline Earthquake Engineering  
■ Conference Organizer: MCEER

**Technical Program:**

Donald Ballantyne, EQE International ■ Phone: (206) 442-0695 ■ Fax: (206) 624-8268 ■ Email: [dbballan@eqe.com](mailto:dbballan@eqe.com)  
Thomas O'Rourke, Cornell University ■ Phone: (607) 255-6470 ■ Fax: (607) 255-9004 ■ Email: [tdo1@cornell.edu](mailto:tdo1@cornell.edu)

**Web Site:**

<http://mceer.buffalo.edu/conferences/5usclee.html>

**August 15-17, 1999**

**7th U.S.-Japan Workshop on Earthquake Resistant Design of Lifeline Facilities and Countermeasures Against Soil Liquefaction ■ Seattle, WA ■ (By Invitation Only)**

**Sponsors:**

National Science Foundation, California Department of Transportation, and MCEER

**Co-organizers:**

J.P. Bardet, University of Southern California ■ Phone: (213) 740-0608 ■ Fax: (213) 744-1426 ■ Email: [bardet@rccg01.usc.edu](mailto:bardet@rccg01.usc.edu)  
M. Hamada, Waseda University ■ Email: [hamada@mn.waseda.ac.jp](mailto:hamada@mn.waseda.ac.jp)  
T.D. O'Rourke, Cornell University ■ Phone: (607) 255-6470 ■ Fax: (607) 255-9004 ■ Email: [tdo1@cornell.edu](mailto:tdo1@cornell.edu)

**Web Site:**

<http://rccg03.usc.edu/seattle99>