



CENTER FOR INFRASTRUCTURE ENGINEERING STUDIES

GEOTECHNICAL AND BRIDGE SEISMIC DESIGN WORKSHOP

New Madrid Seismic Zone Experience

by

Genda Chen, Ph.D., P.E.
and Neil Anderson, Ph.D.

A vertical strip of five images is located on the left side of the cover. From top to bottom: a red-tinted image of a building's facade; a green-tinted image of a brick wall with a circular window; a blue-tinted image of a classical architectural archway; an orange-tinted image of a decorative lantern or finial; and a yellow-tinted image of a person's silhouette. The text "UTC ETT131" is overlaid on the bottom yellow panel.

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16. Abstract A technology transfer workshop will be held in Cape Girardeau on October 28-29, 2004 to disseminate the research results from the UMR earthquake hazards mitigation research program. The workshop will cover the bridge design related topics in geophysics, seismology, geotechnical to structural engineering. Attempt will be made to work step-by-step through a complete design cycle for bridge systems, highlighting the contributions from the UMR efforts in each step.			
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GEOTECHNICAL AND BRIDGE SEISMIC DESIGN WORKSHOP

New Madrid Seismic Zone Experience

**Drury Inn Lodge
Cape Girardeau, Missouri**

October 28-29, 2004

Organizer: University of Missouri-Rolla (UMR)

**Sponsors: Federal Highway Administration
Missouri Department of Transportation
University Transportation Center at UMR**

PREFACE

The University of Missouri-Rolla (UMR) was awarded the project entitled “Earthquake Hazard Mitigation Research Program for Highway Systems” in 2002 by the U.S. Department of Transportation through the Federal Highway Administration. The period of performance was originally from January 30, 2002 through January 29, 2004, but was recently extended to February 28, 2005. Co-funded by the Missouri and Alaska Departments of Transportation, Missouri Department of Natural Resources, UMR, and the University Transportation Center at UMR, the project involves a multidisciplinary team of seismologists, geologists, geotechnical and structural engineers. Focused on the earthquake threat from the New Madrid Seismic Zone, the research project addresses several issues of national importance, including earthquake loss estimation, effect of near-field ground motions on bridge designs, post-earthquake assessment, and seismic retrofit techniques for Mid-American highway bridge systems.

At present, the research team is summarizing the findings and methodology developed from the research project. The final report is expected to become available in Spring 2005. As an integral part of the overall project, this Geotechnical and Bridge Seismic Design Workshop provides a forum for information dissemination. The main objective of the workshop is to present a methodology for the geotechnical and structural seismic design of bridge systems in the New Madrid Seismic Zone based on the recent research findings. The new methodology addresses the uniqueness of earthquake motions (near field and directivity), as well as the effects of deep soil stratigraphy on the seismic response in the New Madrid Seismic Zone. Participants in the workshop will apply this methodology to re-design an existing highway bridge in the vicinity of the New Madrid Seismic Zone.

This workshop is sponsored by the Federal Highway Administration (FHWA), the Missouri Department of Transportation (MoDOT), and the University Transportation Center at UMR; their support is greatly appreciated. The findings and opinions expressed in a series of presentations during the workshop reflect only those of the authors and do not necessarily represent those of the sponsors.

The investigators of the research project all contributed to the organization of this workshop by providing their inputs related to technical contents. The logistics of the workshop were coordinated by Ms. Victoria Bañales from the Continuing Education at UMR. The workshop was administrated by the Workshop Steering Committee, which consisted of Dr. Neil Anderson (Co-Chair), Dr. Genda Chen (Co-Chair), Peter Clogston (FHWA), Thomas Fennessey (MoDOT), and Timothy Chojnacki (MoDOT).

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WORKSHOP PROGRAM

Thursday, October 28, 2004, State/Delta Room

7:45 – 8:30 am	Registration
8:30 – 8:45 am	Introduction (Drs. Neil Anderson/Genda Chen)
8:45 – 9:30 am	Earthquake loss estimation of St. Louis transportation highway system (Dr. Ronaldo Luna)
9:30 – 10:00 am	Post-earthquake condition assessment of RC structures: Part 1 cable sensor and Part 2 microwave technology (Dr. Genda Chen)
10:00 – 10:15 am	Coffee break
10:15 – 10:45 am	Recommended LRFD guidelines for the seismic design of highway bridges (Dr. Phillip Yen)
10:45 – 11:30 am	Seismic design procedure of highway bridges – an overview (Mr. Thomas Fennessey/Anousone Arounpradith)
11:30 – 12:00 pm	General geologic setting and seismicity of the FHWA project site in the New Madrid Seismic Zone (Mr. David Hoffman)
12:00 – 1:00 pm	Lunch
1:00 – 2:00 pm	Synthetic near-field rock motions in the New Madrid Seismic Zone (Dr. Genda Chen)
2:00 – 3:00 pm	Geotechnical site characterization (Drs. Neil Anderson/Richard Stephenson)
3:00 – 3:15 pm	Coffee break
3:15 – 4:00 pm	Site response analysis including liquefaction (Dr. Ronaldo Luna)
4:00 – 4:30 pm	Seismic performance of embankments (Dr. Richard Stephenson)
5:00 – 6:00 pm	Happy hour (Hayward Baker)
6:00 – 7:30 pm	Dinner Dinner Speech: brief overview of seismic threat posted by the New Madrid Seismic Zone (Dr. David Rogers)

Friday, October 29, 2004, State/Delta Room

8:00 – 8:45 am	Soil-pile-structure interaction – geotechnical aspects (Dr. Ronaldo Luna)
8:45 – 9:30 am	Bridge response to near-field ground motions (Dr. Genda Chen)
9:30 – 10:30 am	Seismic evaluation and retrofit of beam-column joints of Mid-America bridges: Part 1 carbon fiber reinforced polymer retrofit and Part 2 steel sheet and plate retrofit (Drs. Genda Chen/Pedro Silva)
10:30 – 10:45 am	Coffee break
10:45 – 11:15 am	Seismic design issues of long-span bridges (Mr. Steve Hague)
11:15 – 11:30 am	Closure (Dr. Genda Chen)
11:45 am –	Site visit – Bill Emerson Memorial Bridge (Mr. Steve Hague)

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