Background

At the Advisory Committee on Earthquake Hazards Reduction (ACEHR) meeting in November of 2010 Dr. Jim Cobb, State Geologist and Director of the Kentucky Geological Survey, University of Kentucky made a presentation on the detrimental impact the International Building Code is having on Western Kentucky. On one of his slides he showed an $S_{DS}$ value in Northwest Tennessee of 4.08g taken from Figure 22-1 of the 2009 NEHRP Provisions. The location of this value is at the bottom (south-west) of Union County, Tennessee. The northern boundary of Union County rests on the border between Tennessee and Kentucky.

This seems to put North-West Tennessee and Western Kentucky in a high seismic zone and according to the IBC would require a registered structural engineer to be involved in any new home constructed in Western Kentucky, a position Dr. Cobb finds and extremely harmful to the residents of Western Kentucky and unnecessarily expensive causing harm to development.

When one looks at the West Coast values in Figure 22-1, one finds that the highest value on the West Coast in comparison to the 4.08g on Figure 22-1 is 1.88g, which is on a contour line. Comparison of these two values further substantiates the general statement made by many engineers and officials in both Tennessee and Kentucky that the Central US is required to design buildings in both West Tennessee and Western Kentucky for earthquakes to a much higher standard than in California.

As a result of Dr. Kobb’s presentation discussed above and comments from other engineers and officials in the Central United States, the American Society of Civil Engineers’ (ASCE) Council for Disaster Risk Management (CDRM), the Council, decided that a workshop on these issues was in order to show and explain that the use of the International Building Code and the ASCE Standard, ASCE 7, is really designing for more appropriate values through a “risk-based approach.” The “risk based approach” put the design of buildings in the Central United States at about the same design levels that were being used in previous codes that had been adopted. In fact one of the speakers in the workshop will be talking about cost comparisons.

After the workshop, the Council will send each attendee one copy of the monograph that will fully document each authors presentation, i.e., the paper that each author used for preparing their presentation for the workshop. If extra copies are needed they will be available.

In addition to being organized and conducted by ASCE’s CDRM, the workshop is also be supported by the National Earthquake Conference (NEC) and the Earthquake Engineering Research Institute (EERI) and is being held as part of the EERI Annual Meeting and NEC at the Peabody Hotel in Memphis, Tennessee, April 10 -13, 2012. http://2012am.eeri.org/
8:10 a.m.  The Seismic Design Values, S_{DS} History and Issues, James E. Beavers, James E Beavers Consultants, Knoxville, Tennessee, (Confirmed)

8:30 a.m.  What is Today’s Seismic Risk in the Central US, Dr. Arch Johnston, Center for Earthquake Information and Research, University of Memphis, Tennessee (Confirmed)

8:55 a.m.  Seismic Design for Schools in the Midwest, Lessons from the State of Oregon, Ms. Yumei Wang, State of Oregon, (Confirmed)

9:20 a.m.  The 2008 Sichuan earthquake in China and Implications for the Central US, Dr. Craig Taylor, Managing Partner, Baseline Management Co Inc., Torrance California, (Confirmed)

9:45 a.m.  Break

10:10 a.m.  A Multi-Hazard Perspective for the Central US, Mr. Phil Schneider, National Institute of Building Sciences, Washington D.C. (Confirmed)

10:35 a.m.  Seismic Design of Lifelines in the Central US, Dr. Tomas O’Rourke, Past President of EERI, Professor of Civil Engineering, Cornell University, Ithaca, New York, (Confirmed)

10:55 p.m.  Major Changes in Spectra shapes for Critical Facilities, Mr. Joe Hunt, BWXT, Oak Ridge, Tennessee, (Confirmed)

11:20 p.m.  The International Building Code and the Tennessee Adoption Process, Mr. Ron Mauer, Chief Plan Examiner, Knox County, Knoxville, Tennessee, (Confirmed)

11:45 p.m.  Lunch

1:25 p.m.  Seismic Design in Western Kentucky, Dr. Zhenming Wang, University of Kentucky, Lexington, Kentucky, (Confirmed)

1:50 p.m.  Seismic Design and ASCE 7, Dr. Jim Harris, JR Harris & Company, Denver, Colorado, (Confirmed)

2:20 p.m.  Seismic Design in Memphis is not Designing to California, The Risk Targeted Approach, Dr. Nico Luco, U.S. Geological Survey, (Confirmed)
2:45 p.m.  Break

3:10 p.m.  New Directions, i.e., Design Costs of the National Earthquake Hazards Reduction Program, Dr. Jack Hayes, National Institute of Standards and Technology (Confirmed)

3:35 p.m.  Developing Resiliency Measures to Reduce Seismic Hazard Impact in the Central United States, Dr. Vilas Mujumdar, Consultant, Vienna, VA, (Confirmed)

3:55 p.m.  Summary, Dr. James E. Beavers, James E Beavers Consultants, Knoxville, Tennessee (Confirmed)

4:15 p.m.  Close of Workshop
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<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(s)</th>
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<tr>
<td>8:00 - 8:15 am</td>
<td>Welcome and Opening Remarks</td>
<td>Tennessee Emergency Management – Cecil Whaley</td>
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<td>FEMA - David Miller, Sandra Knight</td>
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<td>8:15 - 8:30</td>
<td>Participant Introductions</td>
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<td>8:30 - 9:00</td>
<td>State Earthquake Assistance Program Funding Update</td>
<td>FEMA - Ed Laatsch, David Miller</td>
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<td>9:00 - 9:15</td>
<td>FEMA Regional Highlights</td>
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<td>9:15 - 10:00</td>
<td>State Earthquake Program Highlights</td>
<td>States &amp; Territories</td>
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<td>10:00 - 10:15</td>
<td>Break</td>
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<td>10:15 - 10:45</td>
<td>State Earthquake Program Highlights</td>
<td>States &amp; Territories</td>
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<td>10:45 - 11:30</td>
<td>Consortia Highlights</td>
<td>CUSEC, NESEC, WSSPC, CREW</td>
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<td>11:30 - 12:30 pm</td>
<td>LUNCH - no host; map of local restaurants to be provided</td>
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<td>12:30 - 1:00</td>
<td>FEMA Headquarters Briefing</td>
<td>Building Codes</td>
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<td>Other Issues</td>
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<td>1:00 - 1:30</td>
<td>Senior State Earthquake Program Managers Leadership Panel</td>
<td>Bob Carey, UT</td>
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<td>Kate Long, CA</td>
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<td>Tammie Wells, SC</td>
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<td>Cecil Whaley, TN</td>
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<td>1:30 - 2:20</td>
<td>Strategic Planning for the Future of NEHRP &amp; NEPM</td>
<td>FEMA NEHRP Strategic Plan</td>
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<td>Facilitated Group Discussion Lead by Ed Laatsch, FEMA</td>
<td>NEPM Action Items</td>
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<td>NEPM Wrap Up</td>
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<td>2:20 - 2:30</td>
<td>Summary and Closing Remarks</td>
<td>Tennessee Emergency Management – Cecil Whaley</td>
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<td>2013 NEPM Meeting</td>
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<td>FEMA - Ed Laatsch</td>
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Background

The New Madrid Chapter of EERI began consideration of an activity for the New Madrid Earthquake Series Bicentennial about a decade ago. The activity developed into the New Madrid Earthquake Scenarios (NMES). A free workshop (schedule attached) has been developed to present the NMES to interested parties.

The NMES Project was originally going to be an evaluation of a single catastrophic earthquake. A Catastrophic Earthquake Assessment in the Central U.S. was conducted by at least three other intervening studies (Olshansky, Wu, & French, 2003; Elnashai, et al, 2009; & FEMA, 2011). Seismic studies and other allied fields continued to advance and allow better assessment earthquake losses. The Executive Committee of the NMES decided to appraise separate scenario events for six areas after conducting stakeholder meetings. The NMES resolved the likely regional earthquakes for any 50-year period with some involvement from the U.S. Geological Survey. The scenarios’ “probable earthquakes” were evaluated to resolve “likely earthquake impacts” for each of the six areas. The NMES compared loss estimates of “likely earthquake impacts” to the loss estimates of a single, catastrophic event’s (National Level Exercise 2011’s, NLE-11’s, FEMA, 2011) impacts.

The web-based (http://www.eeri.org/projects/earthquake-scenarios/new-madrid-earthquake-scenarios/) reporting is the completion of the NMES’ development phase. An implementation phase is envisioned to continue the benefits of the NMES and to recognize other important works to improve preparedness and reduce potential seismic impacts in the region.

References


New Madrid Earthquake Scenarios Workshop
Tuesday, April 10th, 2012
9:00 a.m. – 2:00 p.m. • Venetian Room, Peabody Memphis

0900-0920 Overview of the New Madrid Earthquake Scenarios: Greg Hempen, Geophysicist, URS Corporation, greg.hempen@urs.com

0920-0945 Determination of the Ground Motions for the Scenarios’ Earthquakes: Chris Cramer, Seismologist, University of Memphis, CERI, ccramer@memphis.edu

0945-1005 USGS ShakeMap and PAGER Earthquake Products for the Scenarios: Robert Williams (Central & Eastern US Earthquake Hazards Coordinator, rawilliams@usgs.gov), Vince Quitoriano, David Wald, US Geological Survey, and Chris Cramer, University of Memphis

1005-1030 HAZUS Runs for the NMES: Shanna Michael, GIS Specialist, AECOM Water, shanna.michael@aecom.com

1030-1045 Break

1045-1130 Comparison of the varied scenarios’ HAZUS Output: Robert A. Bauer, Engineering Geologist, Illinois State Geological Survey, rabauer@illinois.edu

1130-1300 Lunch on your own

1300-1320 Value of the NMES to the Public and Emergency Management: Arleen Hill, Associate Professor, University of Memphis, aahill@memphis.edu

1320-1340 Value of the NMES to the Engineering Community: Nathan Gould, Director, ABS Consulting, NGould@absconsulting.com

1340-1400 Value of the NMES to the Private Sector: Rose Grant, Program Director, State Farm Insurance Companies, rose.grant.gsxi@statefarm.com
Summary: A cross disciplinary public panel on historic URM maintenance, repair, and retrofit as it applies to the South Main Historic District and the greater Mid-South. We will focus on the Retrofit Demonstration Project that is being organized here (please see attached flyer). Technical and non-technical speakers will speak for 10 to 15 minutes each to give a multi-faceted snapshot of the project and what it means to the city.

Session Motivation: To focus on smaller, older, often historic, and usually privately owned, storefront style buildings (Occupancy Category II, Performance Category: Life Safety or Collapse Prevention), especially with wood frame floors and roofs. Uses tend to be commercial or residential. These buildings are very common in the central US, as well as elsewhere. As a rule they have no rational lateral force resisting system or detailing. Some are poorly constructed and/or maintained. They were originally built on a tight budget and without design professionals involved, with a design life of about 100 years. However over the last generation they have come back into fashion, are experiencing reinvestment, are valued as historically important, and in Memphis are the sites of vibrant culture, strong communities, small businesses, art galleries, and some of the best food and drink establishments in town.

So while the community is investing in them, the opportunity this presents for seismic and natural hazard mitigation measures is usually missed. There is a lack of direction and clarity on this issue from local governments, while design and construction professionals often defer to the status-quo of doing nothing to improve lateral force resistance and integrity. Some of the common characteristics of this building type in the New Madrid region:

- No jurisdictions have passed ordinances and few have consistently enforced existing codes to address these buildings.
- Many of these buildings are in economically challenged, yet culturally important and rapidly gentrifying areas. However, due to lower property values, large resources cannot be deployed to retrofit them.
- The most likely earthquakes they will face in the near future are somewhat smaller than on the west coast.
- They generally do not get as much attention from the earthquake engineering community as larger, more modern, or more important structures.
- Many structural and policy lessons about how to approach these buildings can be derived from years of experience on the West Coast and Utah.
- The attitude of the public, government, and building industry are substantially different than on the west coast. For instance, the ability for cities to pass mandatory retrofit ordinances is extremely unlikely.

Sample Inventory and Modeling: As part of our effort, we are conducting before and after retrofit modeling using HAZUS for a pilot inventory of 105 buildings in the neighborhood.

The South Main Retrofit Demonstration Project lays out a roadmap to address these issues. We are working with the community and our partners to develop strategies that could lead to most of these buildings being retrofit within 25 years. These buildings are about 100 years old, Memphis has begun to reclaim them from decay, and repurpose them for contemporary uses. Our goal is to prepare them to last another 100 years.
Session Presentations:

**Opening Remarks:** Paul Young, Director, Memphis/Shelby County Office of Sustainability

**Moderator:** Joey Hagan, Architecture Inc.

**Film:** "Urban Magnets: South Main Historic District", by Crosstown Arts (8 min) [http://vimeo.com/36668734](http://vimeo.com/36668734)

**Topic 1:** Community Organizing for Social Change: South Main Retrofit Demonstration Project Design and Development Overview, Dmitry Ozeryansky

**Topic 2:** Memphis Context 1: The South Main Neighborhood history and importance of main street style historic buildings to the region – June West, Memphis Heritage

**Topic 3:** Scenario Selection: Basis for using a magnitude 6.5 event as a design basis for the South Main design, Chris Cramer, U of M

**Topic 4:** Lessons from Christchurch, New Zealand, Damage to Main St. URM buildings with and without retrofit – Justin Marshall, Auburn University

**Topic 5:** Community Resiliency: What does it take to get to “resilient”? How does this project figure in? – Elaine Clyburn, Red Cross, West TN Seismic Safety Commission

**Topic 6:** Case Study: Schematic design and pricing for two typical South Main buildings – Andrew Kizzee, SSR Inc.

**Topic 7:** Memphis Context 2: The role of building codes and departments in Memphis URM retrofit scenarios – Terry Hughes, Code Solutions Group LLC

**Topic 8:** A Preservationist Planners Perspective - Laura Saija, U of M, City and Regional Planning

**Panel Discussion**
A unique opportunity presents itself to “shake up” the dialogue on seismic preparedness in Memphis. A seismic retrofit demonstration project is planned for a particularly vulnerable yet culturally important neighborhood. The project is intended to coincide with next year’s National Earthquake Conference held on the occasion of the 200th anniversary of the great 1811-1812 Earthquakes on the New Madrid fault.

Our goal is to educate the public, the building industry, and local governments on the subject of multi-hazard preparedness and proper conservation measures for aging brick buildings.

Our plan is to organize and raise money for an initiative to construct a seismic retrofit demonstration project on South Main. After construction, the storefront space will be open to the public and used as a temporary event and educational space with displays and a product showcase.

Programming will include:
- For the public, events that increase understanding of the hazard and risk posed by earthquakes.
- For building industry folks, workshops of best methods and practices, and new technologies.

We want to:
1. Protect people and property from harm
2. Nurture local and small businesses
3. Preserve our cultural heritage
4. Showcase low cost solutions that bring big benefits

For more information, please contact: dmitry@ozerengineering.com or call 901-305-6540
**The South Main Historic District is an inspiring example of Memphis’ culture and downtown revitalization.**

But most of the great old buildings that line South Main are of brick bearing wall construction. These buildings represent the most seismically vulnerable building types in Memphis because the brick walls are unreinforced and the buildings were built without any lateral force resisting features. However, when properly strengthened and maintained, the hazards can be substantially reduced: from earthquakes, to storms and tornadoes, to long term wear by the elements.

We believe that many of these buildings, which are highly vulnerable to even moderate shaking can be successfully retrofit for a reasonable cost.

For instance, anchorage of the timber roof joists to brick walls and parapets by through-bolting (usually visible as rows of cast-iron washers or ‘stars’ on the outside of the building), has been implemented all over the world for brick buildings and field-tested by many earthquakes.

**The Vision**

A few of the buildings in the neighborhood, such as the National Civil Rights Museum Annex, have been strengthened over the years, but the majority have not. We believe that confronting this problem will be good for Memphis economically, it will protect people’s lives and investments, and the independent, local businesses that are most vulnerable to disruption; it will preserve our cultural heritage for years to come and make Memphis a more resilient and sustainable city.

**The Time is Now**

Memphis is currently in a time of transition, and a new generation is committed to a bright future for the city. With the recent kickoff of the Sustainable Shelby Plan, Memphis envisions itself a regional leader in the green and sustainability movement. As mayor AC Wharton recently said: Let’s “take advantage of the rebirth of spirit that this city is now undergoing.”

This spirit coincides with the earthquake bicentennial, as well as recent earthquakes in our region, and a nationwide consciousness of community resiliency. So let’s seize the opportunity, let’s invest in one of our greatest neighborhoods and build a foundation to preserve its unique heritage for years to come.

**We hope you will join us!**

For more information, to support the project, or to have your building considered, please contact: dmitry@ozerengineering.com or call 901-305-6540