

National Earthquake Hazards Reduction Program

... a research and implementation partnership

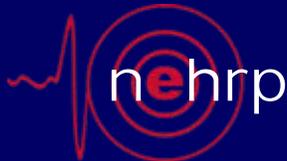
FEMA Program Update

for the NEHRP AECHR Committee Meeting
NIST, Gaithersburg, MD
May 10, 2007

Edward M. Laatsch, P.E., DHS/FEMA



FEMA



national earthquake hazards reduction program

Presentation Outline

- FEMA Role in the NEHRP
- FEMA Resources
- Operational Plan
- Earthquake Program Activity
- Other Multi-Hazard Mitigation Activity
- Future Program Directions



FEMA



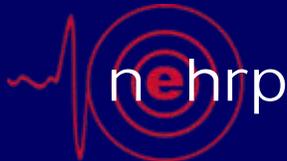
national **earthquake** hazards reduction program

NEHRP Statutory Program Activities

- Develop effective measures for earthquake hazards reduction
- Promote adoption of earthquake hazards reduction measures by Federal, State, & local governments; national standards & model code organizations; architects and engineers; building owners, and others
- Improve understanding of earthquakes and their effects on communities, buildings, structures, and lifelines, through interdisciplinary research involving engineering, natural sciences, and social, economic, and decision sciences



FEMA



national **earthquake** hazards reduction program

FEMA Role in the NEHRP – Current Activities

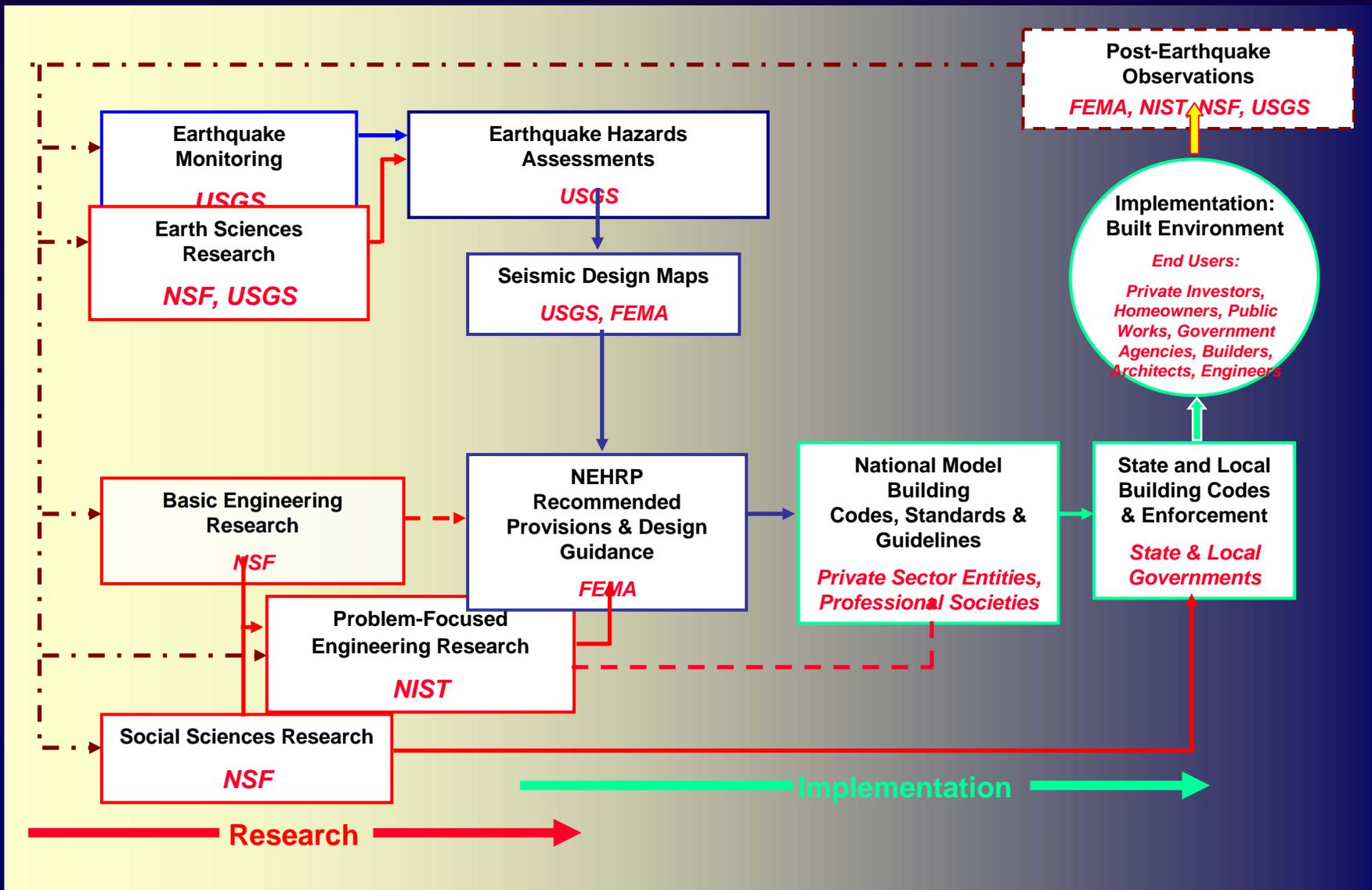
- The program objectives and activities listed in the Re-authorization translate into activities in the following areas: (listed from technical to implementation)
 - Guidance Development (new and existing)
 - Building Codes and Standards (new and existing)
 - Training (current, planned and future strategy)
 - Outreach (strategic communication)
 - State and Local Coordination (NETAP, NMSZ, EMPG)
 - Partnerships
- State Regional Earthquake Program Staff play critical role in meeting NEHRP mission and goals



FEMA



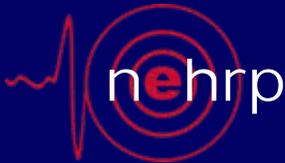
national earthquake hazards reduction program



NEHRP Impact on the Built Environment



FEMA



national earthquake hazards reduction program

HQ Earthquake Program Staff*

- **Cathleen Carlisle – Existing Buildings/Code Adoption & Performance Tracking**
- **Larry Hultengren – Consortia/Building Science**
- **Mike Mahoney – New Buildings/PBSD**
- **Anita Vollmer – Consortia/NEHRP liaison**
- **Vacancy – New Buildings/Building Science**

- ***Mila Kennett – Incremental Rehabilitation Series**



FEMA



national **earthquake** hazards reduction program

Earthquake Program Regional Staff

Chris Jonientz-Trisler

Doug Bausch

Mary Beth Caruso

Bob Archila

Marshall Mabry
Marie Gonzales

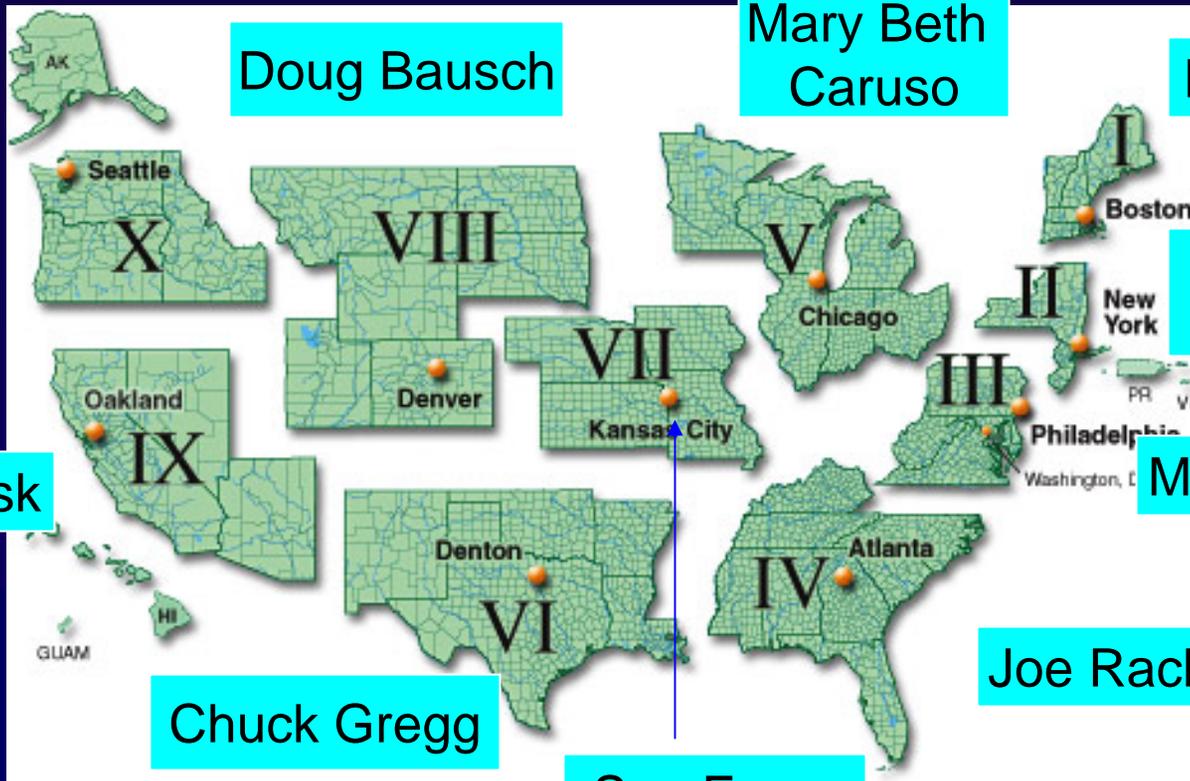
Jeff Lusk

Marty Frengs

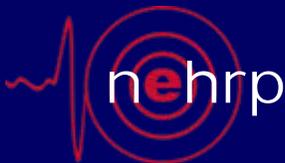
Chuck Gregg

Joe Rachel

Sue Evers



FEMA



national earthquake hazards reduction program

FEMA Authorized NEHRP Budget

Agency / Initiative	\$M				
	FY05	FY06	FY07	FY08	FY09
FEMA	21.0	21.6	22.3	23.0	23.6

Funding levels **authorized** but **not appropriated** by Congress.

	\$M				
	FY05	FY06	FY07	FY08	FY09
FEMA	14.7 ¹	9.5 ²	9.1 ²	TBD	TBD

Notes:

1. Covers program & S&E, but excludes state grants that are administered by DHS Preparedness Directorate.
2. Covers program, but excludes S&E and state grants that are administered by DHS Preparedness Directorate.



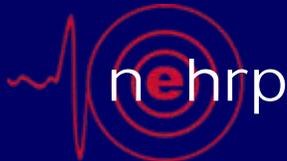
NEHRP Operational Plan

Purpose

- Describes FEMA's strategies to meet its requirements under the Earthquake Hazards Reduction Act (EHRA) of 1977, as amended
- The strategies are focused on FEMA's primary goal for its NEHRP activities: to advance earthquake mitigation through community and industry implementation



FEMA



national earthquake hazards reduction program

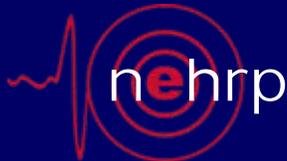
NEHRP Operational Plan

The Operational Plan is aligned with:

- The strategies are organized by the nine activities established for FEMA in the 2004 reauthorization of the EHRA.
- EHRA of 1977, as amended
- NEHRP Strategic Plan
- FEMA Agency-Wide Strategic Plan for FY 2003-2008
- FEMA Performance Measures
- NEHRP Performance Measures



FEMA



national **earthquake** hazards reduction program

NEHRP Operational Plan

Activity #1 - Work closely with national standards and model building code organizations, in conjunction with NIST, to promote the implementation of research results

Strategies

- Achieve, maintain, and improve the seismic design and performance of new and existing buildings through continued collaboration with building code and standards organizations
- Effectively communicate with all partners, customers, and stakeholders on FEMA's NEHRP successes
- Translate research results of all NEHRP partners into a format than can be adopted by national standards organizations



FEMA



national earthquake hazards reduction program

NEHRP Operational Plan

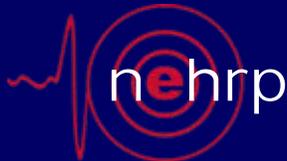
Activity #3 - Operate a program of grants and assistance to enable states to develop mitigation, preparedness, and response plans; prepare inventories and conduct seismic safety inspections of critical structures and lifelines; update building and zoning codes and ordinances to enhance seismic safety; increase earthquake awareness and education; and encourage the development of multi-state groups

Strategies

- Consider expanding the role of the regional consortia. For example, encourage the consortia to assume a greater role in promoting building code adoption



FEMA



national **earthquake** hazards reduction program

NEHRP Operational Plan

Activity #4 - Support the implementation of a comprehensive earthquake education and public awareness program, including the development of materials and their wide dissemination to all appropriate audiences...

Strategies

- Develop and implement a FEMA/NEHRP training strategy
- Support and promote the use of HAZUS-MH
- Continuously improve the FEMA/NEHRP web site
- Provide education and training support to FEMA regional offices, state and local partners, and other stakeholders
- Include earthquake awareness and preparedness messages in earthquake mitigation materials for the public



FEMA



national earthquake hazards reduction program

NEHRP Operational Plan

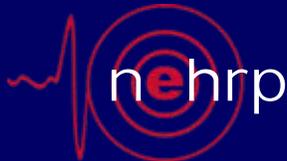
Activity #6 - Develop, coordinate and execute the National Response Plan when required following an earthquake ...

Strategies

- Prepare an issue paper on FEMA's responsibilities for executing the National Response Plan
- Support the establishment of a clearinghouse for post—earthquake resources, data, and information.
- Coordinate post-earthquake investigations in accordance with USGS Circular 1242, *The Plan to Coordinate NEHRP Post-Earthquake Investigations*



FEMA



national **earthquake** hazards reduction program

NEHRP Operational Plan

Activity #7 - Develop approaches to combine measures for earthquake hazards reduction with measures for reduction of other natural and technological hazards, including performance-based design approaches

Strategies

- Develop strategies for addressing the multi-hazard perspective. Where applicable, require the consideration of the multi-hazard perspective in conducting projects and developing products



FEMA



national **earthquake** hazards reduction program

NEHRP Operational Plan

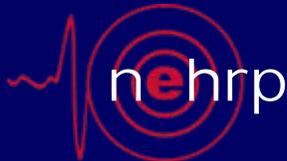
Activity #9 - Enter into cooperative agreements or contracts with state and local jurisdictions and other federal agencies to establish demonstration projects on earthquake hazard mitigation. *This is a discretionary activity*

Strategies

- Undertake nationally applicable demonstration projects and promote the results and successes



FEMA



national **earthquake** hazards reduction program

Earthquake Program Activity

- Guidance Development
 - New Buildings
 - Existing Buildings
- Infrastructure/Lifelines
- Building Codes
- Training
- Outreach
- State and Local Coordination
- Partnerships



FEMA



national earthquake hazards reduction program

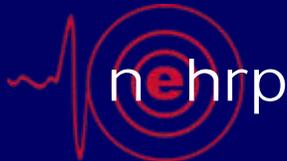
FEMA Guidance Development

FEMA responsibilities under NEHRP include translating NEHRP research results from the other agencies into practice:

- Develop and disseminate technical and non-technical guidance documents, used on a voluntary basis
- Provide input to recognized consensus standards (ASCE 7, ASCE 31, ASCE 41), adopted on a voluntary basis
- Continue to update and maintain the NEHRP Recommended Provisions for 2009 (looking at map updates)
- Support the inclusion of FEMA guidance and loss reduction concepts in the nation's model building codes



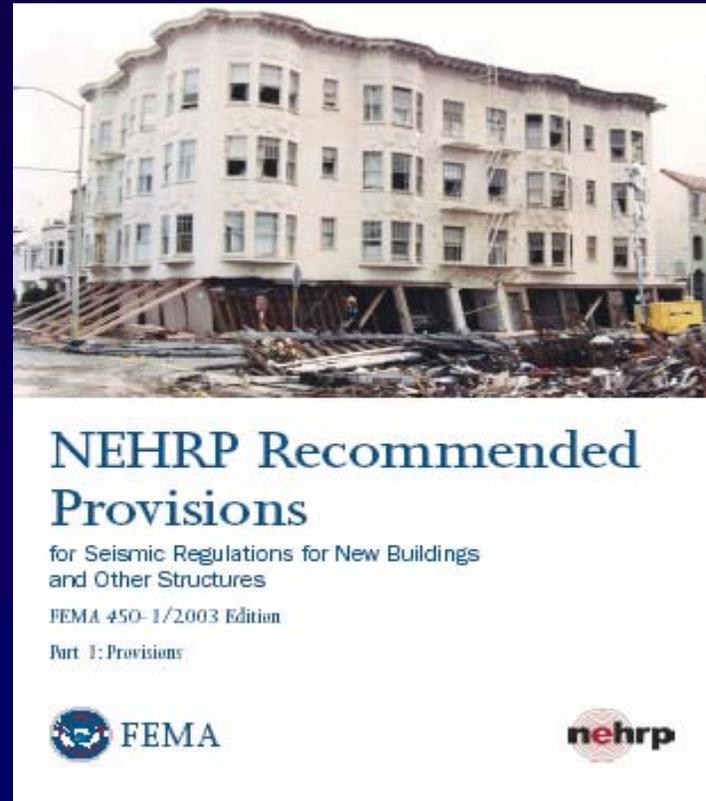
FEMA



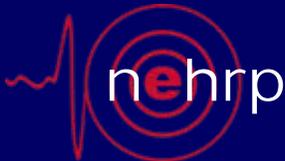
national **earthquake** hazards reduction program

New Buildings Guidance

- NEHRP Recommended Provisions for New Buildings – a resource document to translate NEHRP research results to design guidance
- 2003 edition (FEMA 450) available both paper/CD
- 2000 edition (FEMA 368/369) still valid, in CD only



FEMA



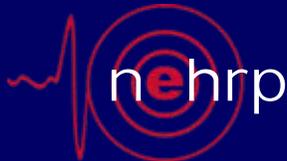
national earthquake hazards reduction program

New Buildings Guidance

- Since 1985, NEHRP Recommended Provisions have served as a national seismic design resource document - Served as a source document for the nation's model building codes
- Relies on the work of the USGS as the basis for the hazard maps
- Serves as a source for seismic in ASCE 7, and therefore feeds into the IBC, IRC and NFPA-5000
- With adoption of ASCE 7 by model codes, *NEHRP Provisions* has gone back to its NEHRP role as a resource to translate research results into practice



FEMA

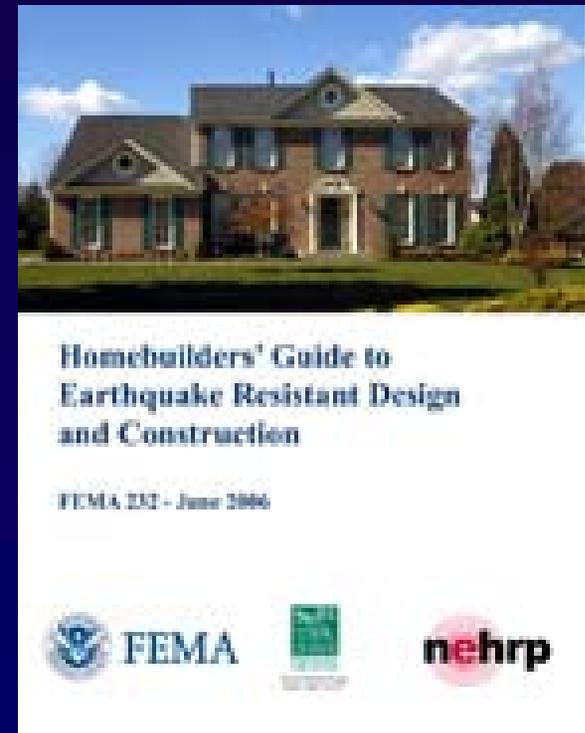


national **earthquake** hazards reduction program

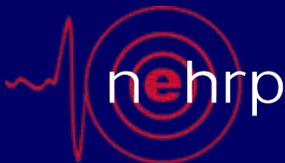
New Buildings Guidance

Homebuilders' Guide to Earthquake Resistant Design and Construction (FEMA 232)

- Presents seismic design and construction guidance for one- and two-family houses for homebuilders and other non-engineers
- Incorporates the prescriptive provisions of the 2003 International Residential Code
- Incorporates the results of the FEMA-funded CUREE Wood frame Project
- Includes “above-code” recommendations
- Available thru the warehouse and online



FEMA



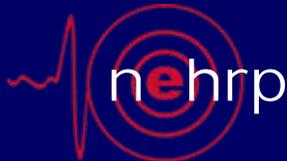
national earthquake hazards reduction program

Performance Based Design

- Goal of the project is to develop design and construction criteria for new and existing buildings that will allow the owner to determine the performance of their building based on criteria the owner can understand:
 - Dollars Casualties Downtime
- Project will also allow for better validation of current code level prescriptive design
- Project is based on EERI Action Plan (FEMA-349)
- The first phase is to develop a Performance Assessment Methodology, which will include a software tool



FEMA



national earthquake hazards reduction program

Performance Based Design

- Project is being developed based on a Project Work Plan, published as FEMA 445
- The project includes development of a joint FEMA and NSF-EERC testing protocol for verifying structural and nonstructural elements, to be published as FEMA 461
- PBSB project will provide periodic inputs to the NEHRP Provisions (and ASCE 7) and ASCE 41 (FEMA 356)
- Second phase will use the Performance Assessment Methodology to develop Performance Based Seismic Design Guidelines for use with new and existing buildings



FEMA



national earthquake hazards reduction program

Existing Buildings Guidance

FEMA recently completed two new products, with NIST assistance, to help reduce earthquake damage to existing buildings thru improved construction practice

- Techniques for Seismic Rehabilitation of Existing Buildings, (FEMA 547) provides a compilation of practical engineering techniques for multiple existing building types vulnerable to earthquake damage. The manual provides details and constructability tips that might not otherwise be available to structural engineers and other design professionals. In addition to a strong demand in the private sector, strong federal interest in this topic enabled FEMA to leverage additional funding from other Feds



FEMA



national earthquake hazards reduction program

Existing Buildings Guidance

- The Seismic Rehabilitation Cost Estimator (SRCE) is a new web-based tool that enables an individual to obtain a range of cost estimates for potential seismic mitigation projects involving upgrades to existing buildings. This interactive tool is an enhanced version of FEMA's Typical Costs for Seismic Rehabilitation of Existing Buildings methodology and will can be used as an additional resource for potential FEMA grant applicants and other individuals interested in mitigation



FEMA



nehrp

national **earthquake** hazards reduction program

Infrastructure Guidance

- The National Dam Safety and Security Program developed a guide book on earthquake-resistant design of dams with support and involvement of several Federal Agencies
- Numerous guidelines have been produced for critical infrastructure lifelines assessments for owners and operators covering:
 - Oil and natural gas
 - Water and wastewater
 - Electric power distribution
 - Underground utilities
 - Others (see www.americanlifelinesalliance.org)



FEMA



national **earthquake** hazards reduction program

Building Codes

- Goal is to develop guidance materials that can be input into the code process, either directly or indirectly through consensus standards
 - Code activities coordinated with other hazards
- FEMA continues to support the building code development process to ensure model codes remain substantially equivalent to the NEHRP Provisions
 - Required under EO 12699
- Work with ICSSC on Federal Buildings issues
 - Ongoing guidance on EO 12941 seismic standards for existing Federally owned/leased buildings



FEMA



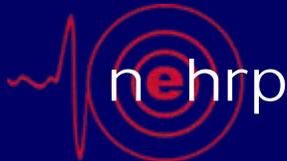
national **earthquake** hazards reduction program

Training

- Training Support
 - FEMA New Buildings/NEHRP Provisions (FEMA 451)
 - FEMA Existing Buildings Guidance
 - HAZUS Earthquake Module Training
- Strategic Training Initiative under development to evaluate where we stand, what's needed and what we need to do to get there



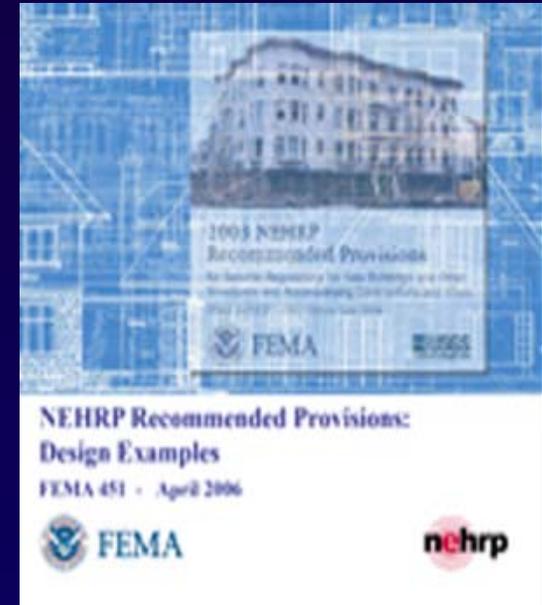
FEMA



national **earthquake** hazards reduction program

New Buildings Training

- Design Examples for NEHRP Provisions
 - (FEMA-451)
 - 2003 Provisions Design examples
 - Available in CD-ROM only
- Training Materials for New Buildings (FEMA 446)
 - PowerPoint slides, instructor's notes, student handouts based on the NEHRP Provisions .
 - CD-ROM for individual training and instructors guide.
 - Will include MBDSI Seismic Design courses (basic and advanced) and NonLin software design program.

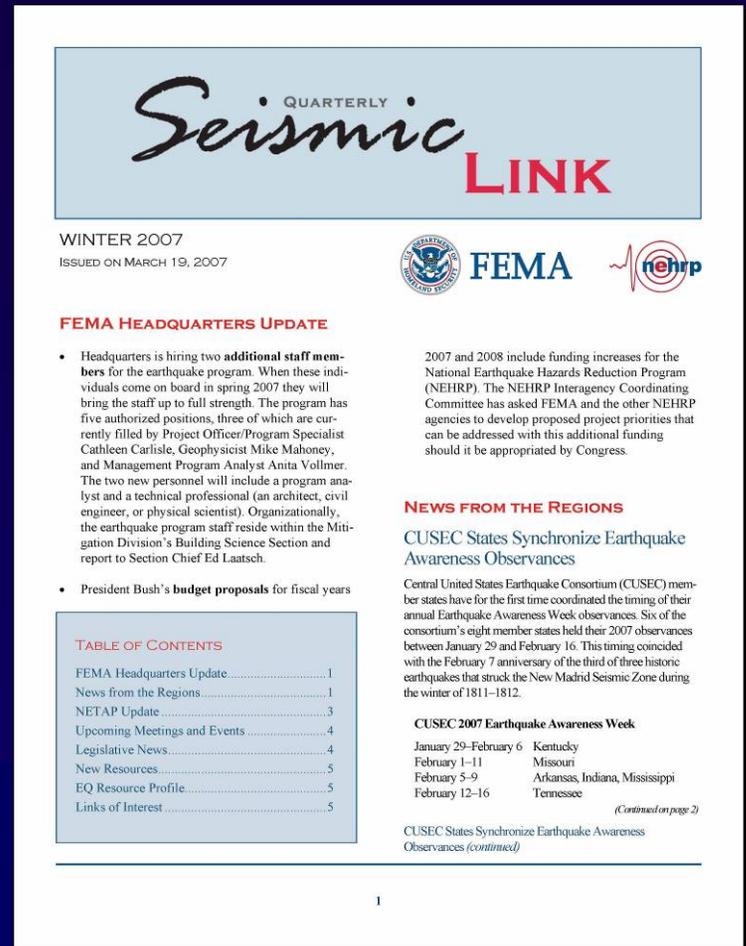


➤ Due out later this year
FEMA nehrp

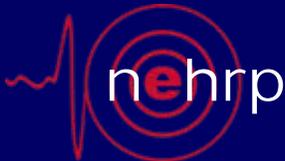
national earthquake hazards reduction program

Outreach

- New internal communication tool under development
- Strategic Communications Initiative to help get the word out to decision-makers
- Presentations and materials (booths and books) at conferences and meetings
- Over 1,500 contacts at International Builders Show in January



FEMA



national earthquake hazards reduction program

State and Local Coordination

- Support for 2008 Earthquake Conference
- Recent Products and Tools
 - “Putting Down Roots in EQ Country” for Northern California
 - Tsunami Vertical Evacuation Shelter Design Guide – co-funded with NOAA to be completed this year
- Support for State Efforts through EMPG
 - Administered by Preparedness Division and returning to FEMA with other homeland security grants
 - Some States identify and capture this funding source for Earthquake projects and some do not



FEMA



national **earthquake** hazards reduction program

State and Local Coordination

- National Earthquake Technical Assistance Program (NETAP)
 - FY 05 focus on support for training for State/local partners
 - FY 06 & 07 focusing on both training and projects
 - FEMA Regional office is the POC for State requests
 - Currently over \$200K per year
 - Important but modest tool for Regional/State interaction – especially with the changes to EMPG



FEMA



national **earthquake** hazards reduction program

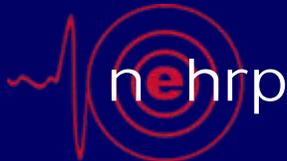
State and Local Coordination

New Madrid Seismic Zone Catastrophic Planning Activity (NMSZ)

- Multi-year planning activity involving 8 States and 4 FEMA regions (develop Catastrophic plans for States and establish regional framework for response)
- Kick-off meeting was March 13 – 15, 2007 in Branson, MO
- Planning Workshops for NMSZ will occur and the local, State and regional level
- Culminating in the 2012 exercise marking the 200th anniversary on the New Madrid earthquakes



FEMA



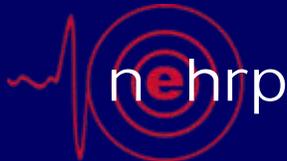
national earthquake hazards reduction program

Partnerships

- Support Multi-State Consortia/Partners
 - WSSPC, CREW, CUSEC, NESEC, and EERI
 - Develop and disseminate training materials
 - Develop policy recommendations for state and local jurisdictions
 - Facilitate information exchange through conferences and other activities
 - Encourage partnership between public and private sector



FEMA



national **earthquake** hazards reduction program

Other Initiatives the Earthquake Program Supports

- **Pre-Disaster Mitigation Grants (PDM)**
- **Mitigation Assessment Team (MAT)**
- **Risk Management Series (RMS)**
- **HAZUS-MH**
- **Blast Benefits from EQ Design Project**
- **New FEMA EQ National Response Planning Report**



FEMA



nehrp

national **earthquake** hazards reduction program

Pre-Disaster Mitigation Grants

- Competitive grants for specific mitigation projects or plans
- Successful proposals demonstrate both cost benefit and technical feasibility
- 1st round (FY 03) funded several earthquake-related projects
- FY 04 and FY05 are funding increased numbers of earthquake projects and plans
- FEMA and other NEHRP agency representatives participate on the panels and act as technical reviewers on specific proposals



FEMA



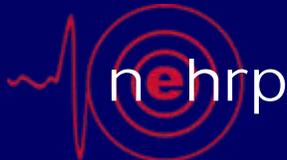
national **earthquake** hazards reduction program

Mitigation Assessment Team

- Conducted since the 1980's under several names including BPAT and MAT
- Forensic engineering analyses to determine causes of structural failure and success following significant disasters
- Provides recommendations that communities, states and organizations/agencies can take to reduce future damages and protect lives and property in hazard areas
- Increase damage resistance through improvements in construction codes and standards, designs, methods, and materials used for both new construction and post-disaster repair and recovery
- Used for Hurricanes, Floods, Tornadoes and Terrorist Attacks



FEMA



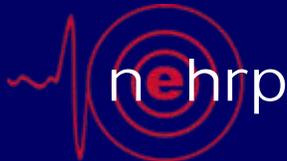
national **earthquake** hazards reduction program

MAT Composition

- Representatives of FEMA Headquarters and FEMA Regional Offices
- State and local officials
- Public- and private-sector experts:
 - Team comprised of national experts in wind engineering, building codes and coastal construction
 - Provides mitigation solutions for coastal and wind events
 - With years of experience, they offer solutions in studying, documenting and developing reconstruction guidance



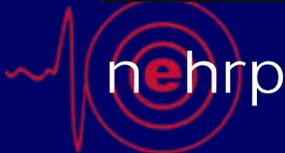
FEMA



national **earthquake** hazards reduction program



FEMA



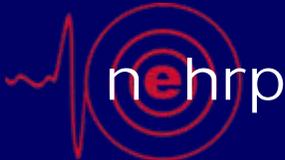
national earthquake hazards reduction program

RMS Existing Publications

- FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings
- FEMA 427, Primer for Design of Commercial Buildings to Mitigate Terrorist Attacks
- FEMA 428, Primer to Design Safe School Projects in Case of Terrorist Attacks
- FEMA 429, Insurance, Finance, and Regulation, Primer for Terrorist Risk Management in Buildings
- FEMA 452, Risk Assessment, A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings
- E155, Building Design for Homeland Security



FEMA



national earthquake hazards reduction program

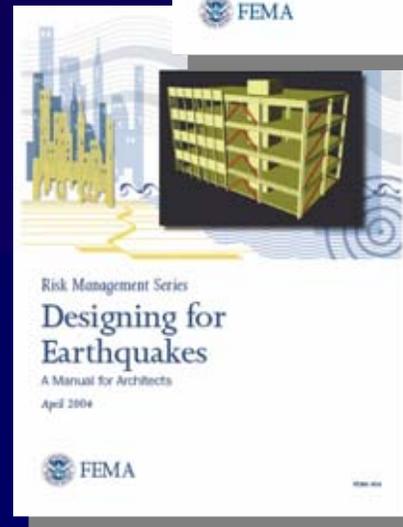
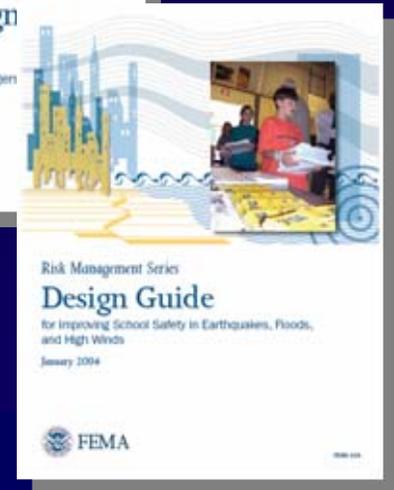
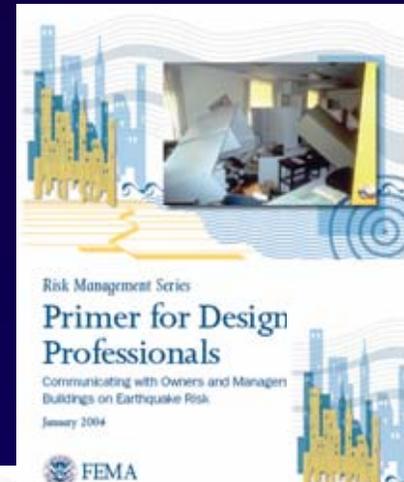
RMS Natural Disaster Publications

FEMA 389, Communicating with Owners and Manager of New Buildings on Earthquake Risk

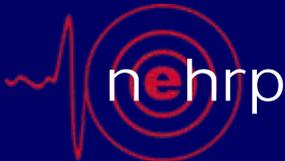
- FEMA 424, Design Guide for Improving School Safety in Earthquakes, Floods, and Winds

- FEMA 454, Designing for Earthquake: A Manual for Architects

<http://www.fema.gov/fima/rmsp.shtm>



FEMA



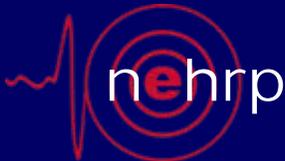
national **earthquake** hazards reduction program

RMS Natural Disaster Publications

- FEMA 395, Incremental Seismic Rehabilitation of School Buildings (K-12)
- FEMA 396, Incremental Seismic Rehabilitation of Hospital Buildings
- FEMA 397, Incremental Seismic Rehabilitation of Office Buildings
- FEMA 398, Incremental Seismic Rehabilitation of Multifamily Apartment Buildings
- FEMA 399, Incremental Seismic Rehabilitation of Retail Buildings



FEMA

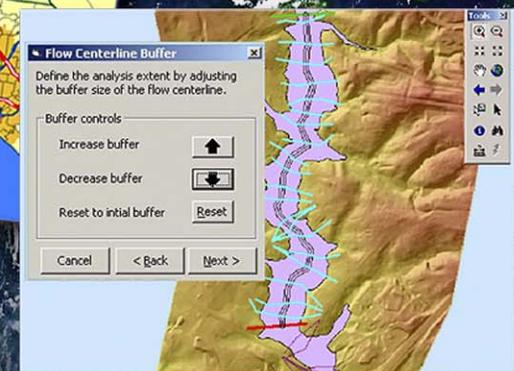
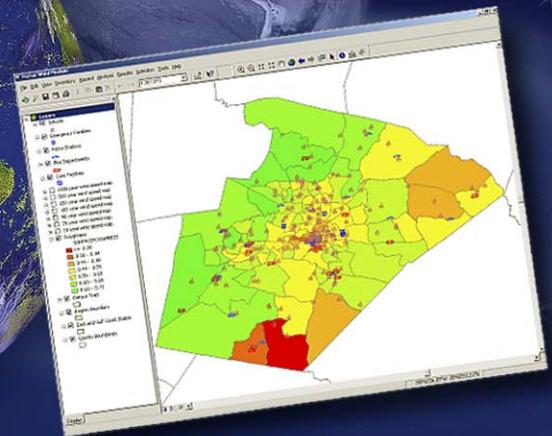


national earthquake hazards reduction program

HAZUS[®] MH

EARTHQUAKE • WIND • FLOOD

FEMA's Software Program for Estimating Potential Losses from Disasters



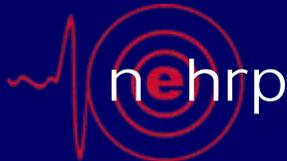
FEMA

HAZUS Summary

- HAZUS-MH allows you to:
 - **IDENTIFY** vulnerable areas that may require planning considerations (e.g., land use or building code requirements)
 - **ASSESS** the level of readiness and preparedness to deal with a disaster before the disaster occurs
 - **ESTIMATE** potential losses from specific hazard events, including pre-event, near real-time, and post-event report capability
 - **DECIDE** on how to allocate resources for the most effective and efficient response and recovery
 - **PRIORITIZE** the mitigation measures that need to be implemented to reduce future losses



FEMA



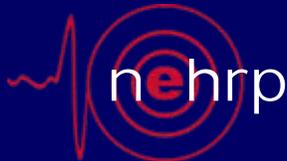
national **earthquake** hazards reduction program

HAZUS Nationwide Databases

- **Demographics** – Population, Employment, Housing
- **Building Stock** – Residential, Commercial, Industrial
- **Essential Facilities** – Hospitals, Schools, Police Stations, Fire Stations
- **Transportation** – Highways, Bridges, Railways, Tunnels, Airports, Ports and Harbors, Ferry Facilities
- **Utilities** – Waste Water, Potable Water, Oil, Gas, Electric Power, Communication Facilities
- **High Potential Loss Facilities** – Dams and Levees, Nuclear Facilities, Hazardous Material Sites, Military Installations

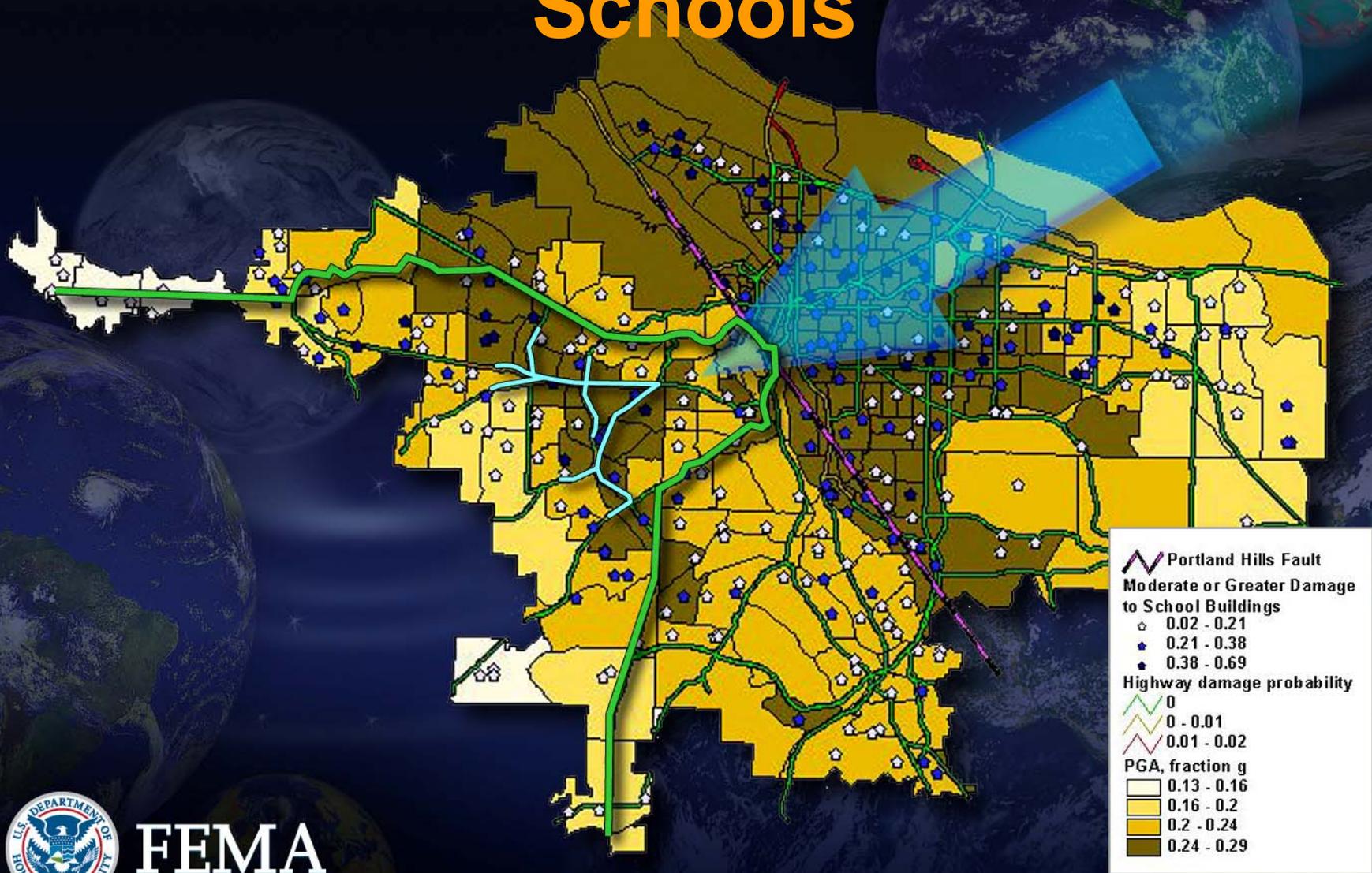


FEMA



national **earthquake** hazards reduction program

Damaged Highways and Schools



FEMA

Blast Benefits of Earthquake Design

- Multi-year project to look at the benefits for blast resistance of earthquake design
- Completed evaluation of Murrah Building as Concrete Moment-Frame
- Completed analysis of Rigid Metal Frame building
- Report expected in the next 12 months detailing benefits of redundant frame design and other features



FEMA



national earthquake hazards reduction program



U.S. Federal Government Earthquake Response Plans

Report to Congress

“... [T]he Director of the Federal Emergency Management Agency in conjunction with the Director of the National Institute of Standards and Technology shall submit a report to the Committees on Appropriations of the Senate and the House of Representatives **outlining Federal earthquake response plans for high-risk earthquake regions in the United States** as determined by the United States Geological Survey.” (emphasis added)

- Final draft under review - due to be completed on May 1, 2007
- Covers all States defined by USGS as having high or very high seismic risk
- Produced by Response with Mitigation as Co-lead and input and review by NIST and USGS



FEMA

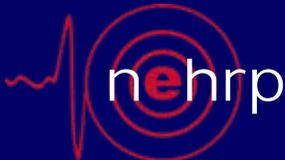


national **earthquake** hazards reduction program

Future NEHRP Program Directions

- Disaster Operations Plan for FEMA NEHRP– under development
- Improve Strategic Communication
- NEHRP Ramp-Up Initiatives
- Performance Measurement
 - Interim Report on NEHRP Performance Measures – December 2005
 - Building Code Adoption Tracking effort – Ongoing
 - Publications distribution efficiency – Ongoing
 - HAZUS Utilization for community assessments
- Do More with Less



FEMA  nehrp

The NEHRP logo consists of a red circle with a white 'e' in the center, and a red line resembling a seismic wave or heartbeat line passing through the circle.

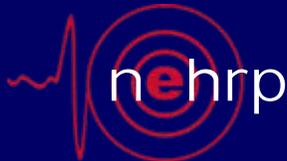
national **earthquake** hazards reduction program

Conclusion

- FEMA continues to carry out NEHRP technology transfer and implementation activities
- As part of DHS, NEHRP implementation activities need to be carried out in an all-hazards environment
- We remain committed to the goal of NEHRP, taking action today to reduce future earthquake losses and the associated loss of life
- FEMA Headquarters works with and supports the ongoing work of the State and Regional Earthquake Program Staff



FEMA



national **earthquake** hazards reduction program