

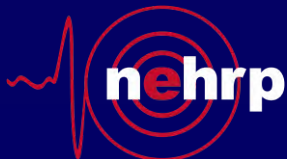
National Earthquake Hazards Reduction Program

... a research and implementation partnership

NIST R&D on Seismic Performance of Buildings in the Central and Eastern U.S.

Advisory Committee on Earthquake Hazards Reduction

10 November 2010



FEMA

NIST
National Institute of
Standards and Technology

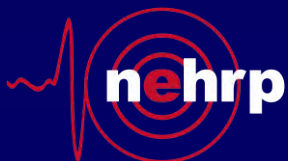


USGS
science for a changing world

national **earthquake** hazards reduction program

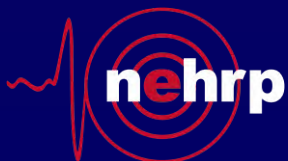
Seismic Performance of Buildings in the Central and Eastern U.S.

- 2011 new start
- Work currently being performed in-house
- Project to examine interrelationships between design requirements to accommodate wind loading and design requirements to accommodate earthquake loading
- Initial focus: Structural steel moment and braced frames in areas where strength requirements may be controlled by wind but where buildings may be in Seismic Design Category D
- Premise: May be possible to reduce seismic detailing requirements (for ductility) where certain (to be determined) ratios of strength provided by wind design to strength provided by seismic demands are exceeded (e.g., robustness may lessen need for ductility)
- 2011-2012 effort to key on 9 archetypical steel systems of varying heights and plan areas



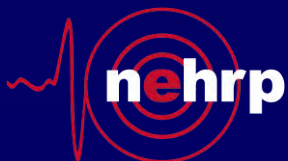
Cost-Benefit Analysis of Codes & Standards for Earthquake-Resistant Construction in Selected U.S. Regions, Phase 1 (1/3)

- 2010 new start
- Work being performed by NEHRP Consultants Joint Venture, NCJV (ATC + CUREE)
- Up to 8 archetypical buildings to be designed to a level of completion (“preliminary engineering design”) that will be adequate to support detailed construction cost estimation
- For each building:
 - Design 1: “Aseismic” design
 - Design 2: Seismic design using current local building code requirements
 - Design 3: Seismic design using 2009 *NEHRP Recommended Provisions for New Buildings and Other Structures* (FEMA P-750) and ASCE 7-10



Cost-Benefit Analysis of Codes & Standards for Earthquake-Resistant Construction in Selected U.S. Regions, Phase 1 (2/3)

- Sites to typify Mid-America (e.g., Memphis, Dyersburg, TN; Blytheville, AR; Paducah, KY; Charleston, Sikeston, MO)
- Moderate to severe site conditions to be represented, in accordance with actual site conditions in areas of interest (work with established hazard maps)
- Buildings to be typical low and mid-rise commercial and residential buildings, with at least one “essential” building (e.g. hospital, fire station) included
- Emphasis to be placed on buildings (structural systems) that are likely to be significantly impacted by seismic design
- Structural irregularities and unique architectural features to be minimized
- To extent that is possible based on local cooperation, will use recently constructed buildings to form basis of archetypes



Cost-Benefit Analysis of Codes & Standards for Earthquake-Resistant Construction in Selected U.S. Regions, Phase 1 (3/3)

- Designs to include all typical structural and non-structural features that are normally impacted by seismic design considerations
- Project Technical Committee (PTC) to include knowledgeable earthquake practitioners with structural, architectural, cost estimation, and building code expertise
- PTC to balance extensive knowledge of seismic design with in-depth knowledge of local practices
- Project Review Panel (PRP) to include expertise similar to PTC, as well as geotechnical engineering and local building code officials
- Project funded @ ~\$510K in FY 2010, with completion anticipated in 2-3 years

