Northeast States Emergency Consortium

Identification of Unreinforced Masonry Buildings (URM’s) in the United States

By Edward S. Fratto, Executive Director
Northeast States Emergency Consortium (NESEC)

www.nesec.org
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A Story of Beauty And Danger

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URM Prohibitive Building Codes in the US?

Approximate mapping of the areas of the United States where current building code regulations do not allow new construction with unreinforced masonry


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URM Buildings in the US

STATUS: We know where building codes limit construction of URM buildings, but we don’t know how many of these buildings exist and where they are located across the country.

FACTORS: Collection of this data has been expensive and labor intensive.

CHALLENGE: Given current technology, we can do better!
What is NESEC Doing?

- Developed a process to rapidly and efficiently estimate the number of URM Buildings locally, regionally, and nationally.

- Mapped URM buildings using Hazus, ArcGIS, Satellite Imagery, Aerial Photography, Google Earth, etc.

Unreinforced Masonry Buildings and Earthquakes
Developing Successful Risk Reduction Programs

FEMA P-774 / October 2009

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Why is NESEC Doing This?

- Raising awareness and establishing a baseline **ESTIMATE** of the number and location of URM buildings and the types of mitigation strategies available to strengthen these buildings or prevent new URM’s from being constructed.
What is Hazus?

Hazus is a tool developed by FEMA that estimates damage and losses resulting from selected natural hazards.
What Does an Unreinforced Masonry (URM) Building Look Like?
What Does an Unreinforced Masonry (URM) Building Look Like?
Historical and Cultural
Old State House

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Historical and Cultural

“New” State House

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Historical and Cultural

Old North Church

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Historical and Cultural
Bunker Hill Monument

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Historical and Cultural

Faneuil Hall

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Fire Stations (URM)
Police Stations (URM)
Schools (URM)
Health Care Centers (URM)
Why URM Buildings?

“Among structures currently in use in U.S. communities, URM buildings are typically the most vulnerable to earthquake damage…” SOURCE: FEMA P-774

“URM buildings, especially older ones, fared poorly (including designated critical and essential facilities).” (Hurricanes) SOURCE: FEMA 490

“You can expect buildings of this type [URM’s] to present a specific hazard when exposed to fire - collapse.” SOURCE: FIRE ENGINEERING, MITTENDORF, 2005
URM Damage Earthquake
Christchurch NZ (6.3) February 23, 2011

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URM Damage Hurricane
Lake Charles, LA Hurricane Rita 2005
URM Damage Earthquake
Lorca Spain. (5.3) May 12, 2011

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URM Damage Fire

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URM Damage Gas Explosion

Before

After

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Where are URM Buildings Located in the Northeast?

URM Density by Tract (Buildings per sq. mile)
What is the Estimated Number of URM Buildings in the Northeast According to Hazus?

1,637,517
Where are URM Buildings Located in Boston?

URM Density by Tract (Buildings per sq. mile)

URM per Sq. Mile
- 0 - 5
- 5.01 - 25
- 25.01 - 100
- 100.01 - 500
- 500.01 and up
What is the Estimated Number of URM Buildings in Boston According to Hazus?

16,240
What is the Number of Actual and Suspected URM Buildings in the City of Boston According to Parcel Map Data?

18,919
What Percentage of the Number of URM Buildings in Boston Does Hazus Estimate?

86%
What is the Accuracy of the HAZUS Estimated Location of URM Buildings in the City of Boston?
Where are URM Buildings Located in the United States?
What is the Estimated Number of URM Buildings in the United States According to Hazus?

17,117,254
Further Validation Necessary

- Further validation of the Hazus-based URM model in a broader range of communities across the United States