National Research Council's Resilient America Roundtable April 22, 2015

Michael L. Bobby

Acting Superintendent

"Condemn"

The Post and Courier

Quake fears to shutter schools?

More than 1,300 peninsula students could be relocated to other buildings as soon as this summer

By Diette Courrégé
The Post and Courier
Friday, February 26, 2010

Charleston County school leaders effectively condemned six downtown school buildings Thursday after hearing engineering reports that most of the structures couldn't withstand a 5.0 or greater earthquake.

File/STAFF

The Charleston County School District's administrative headquarters at 75 Calhoun St.

Given that information, School Superintendent Nancy McGinley said the district has a moral imperative to investigate the possibility of relocating more than 1,300 students and their teachers into open buildings elsewhere in the county as soon as this summer.

"I know this is a serious issue," she said, "but the safety of our students is our No. 1 priority."

Schools that would be affected are Buist Academy, James Simons Elementary, Memminger Elementary and Charleston Progressive Academy. The Archer building, which has been used as a temporary site for Sanders-Clyde School, and Fraser Elementary, which the board closed last year, also were cited as having significant seismic deficiencies, but neither is housing students.

McGinley plans to present a relocation plan for the four occupied downtown schools by March 22, and district leaders will hold meetings with parents during the next two weeks to explain the seismic reports. The nine-member school board ultimately will decide whether to move downtown students or allow them to stay put.

Seismic Evaluations of Six Charleston County Schools

I. General Project Overview
II. Local Seismic Background
III. Evaluation Procedures
IV. Specific School Evaluations
V. Cost Analysis
VI. Closing Remarks

I. General Project Overview

A. Purpose of Study

B. School Facilities Under Examination

C. Introduction of Engineering Consultants

1 Memminger Elementary School

2. Charleston Progressive Academy

3. Buist Academy

4. James Simons Elementary School

5. Fraser Elementary School

6. Archer Elementary School

II. Local Seismic Background

A. Charleston 1886 Earthquake

B. Evolution of Building Code

C. Charleston's Pre-history Earthquakes

D. Seismic Terminology

The August 31, 1886, magnitude 7.3 earthquake in Charleston was…

"The most damaging earthquake to occur in the Southeast United States and one of the largest historic shocks in Eastern North America"

According to U.S. Geological Survey

USGS science for a changing world

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- *Damaged or destroyed many buildings and killed somewhere between 60 and 124 people (depending on sources)*
- *Property damage was estimated at $5-$6 million (1886 dollars) and damage impacted thousands of buildings*

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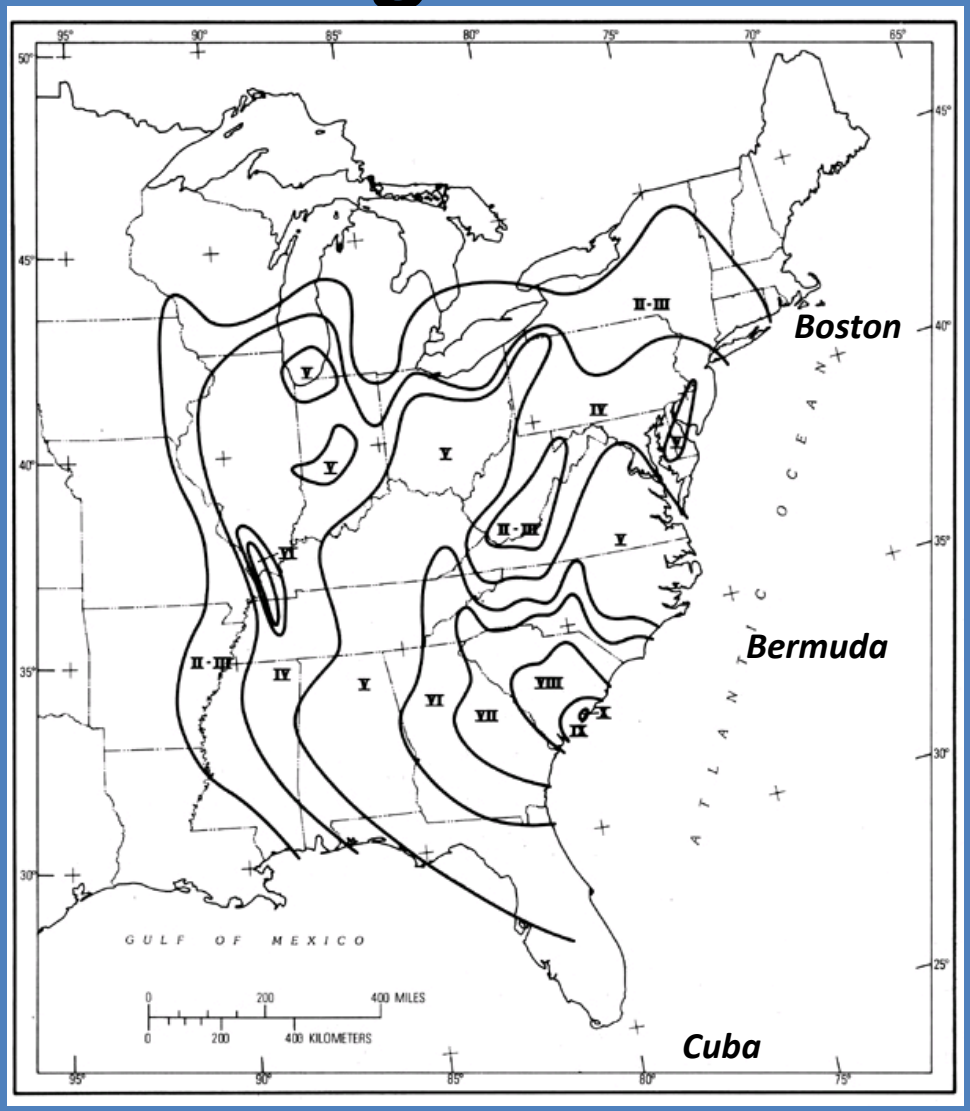
Structural damage was noted as far away as:

Alabama, Ohio, Kentucky, Virginia, and West Virginia



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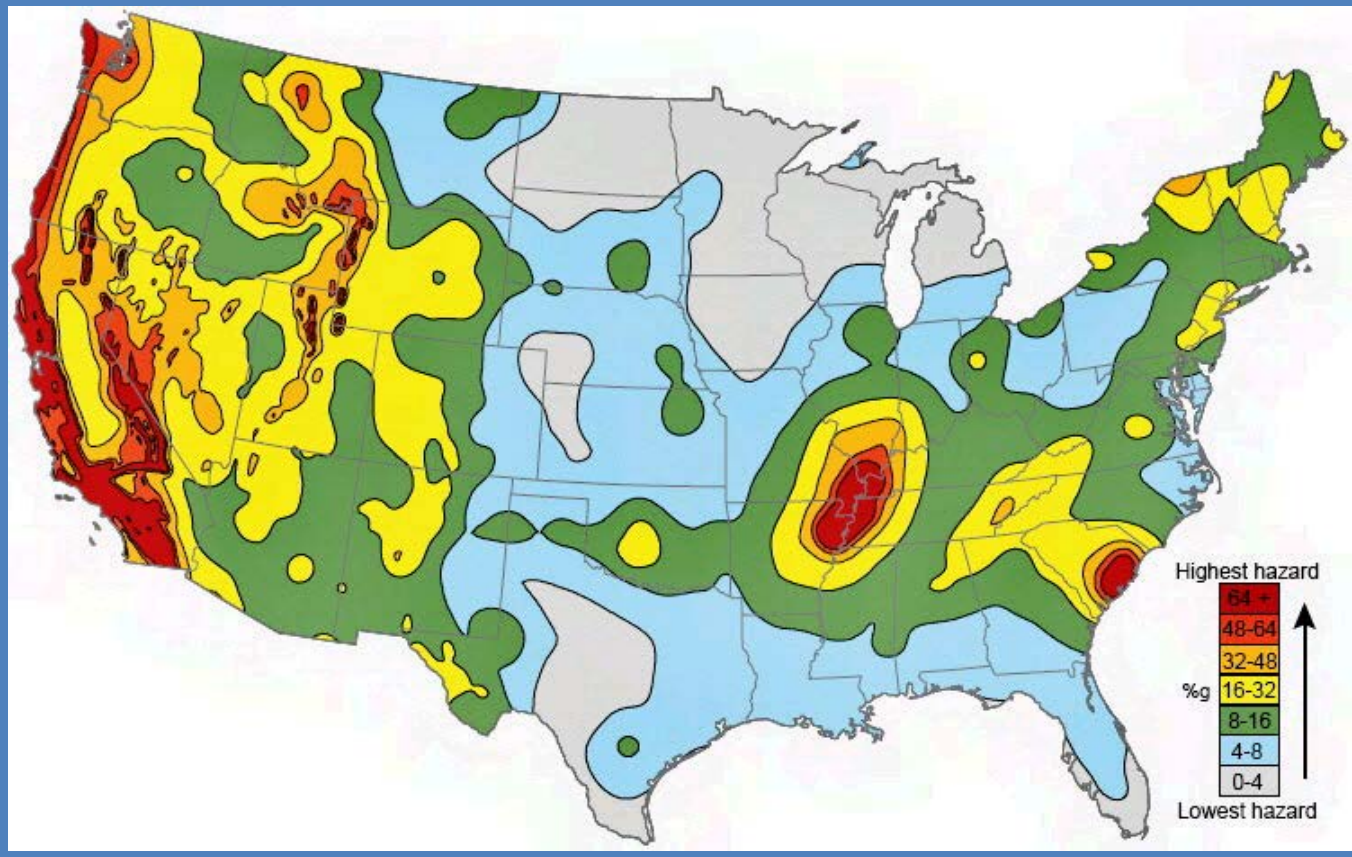

Charleston is East Coast's Highest Hazard

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What does Life Safety (LS) Performance Level mean?

FEMA 310:
significant damage, but margin against either partial or total collapse remains

Injuries may occur, but the level of risk for life-threatening injury and entrapment is low

April 18, 2008 5.2 magnitude in Louisville, KY

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You get building on left vs. building on the right.

III. Evaluation Procedures

- **A. Drawing Review & Field Visits**
- B. Geotechnical & Material Testing
- C. Seismologist
- D. ASCE 31
- E. ACSE 41
- F. Existing Seismic Capacity
- G. Required Retrofit
- H. Report

IV. CHARLESTON PROGRESSIVE

A. Main Building

B. Annex

C. Addition

D. Gymnasium

TIER 1 & 2 Deficiencies – Non-Structural

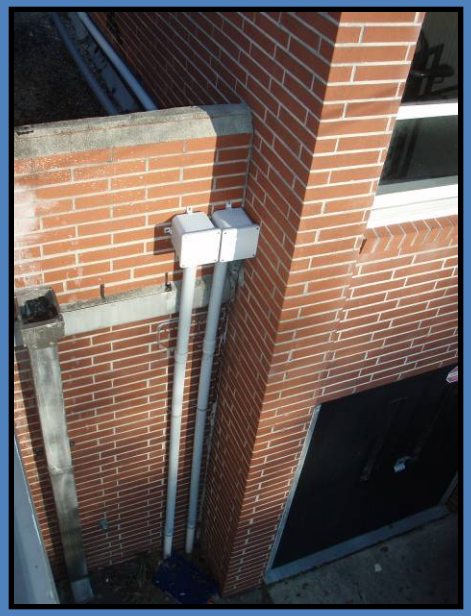
A. Adjacent Elements

B. Narrow Contents

C. Attached Equipment

D. Flexible

E. Glazing



Limiting Event

A. Main Building

B. Annex

C. Addition

D. Gymnasium

Proposed Retrofit Measures

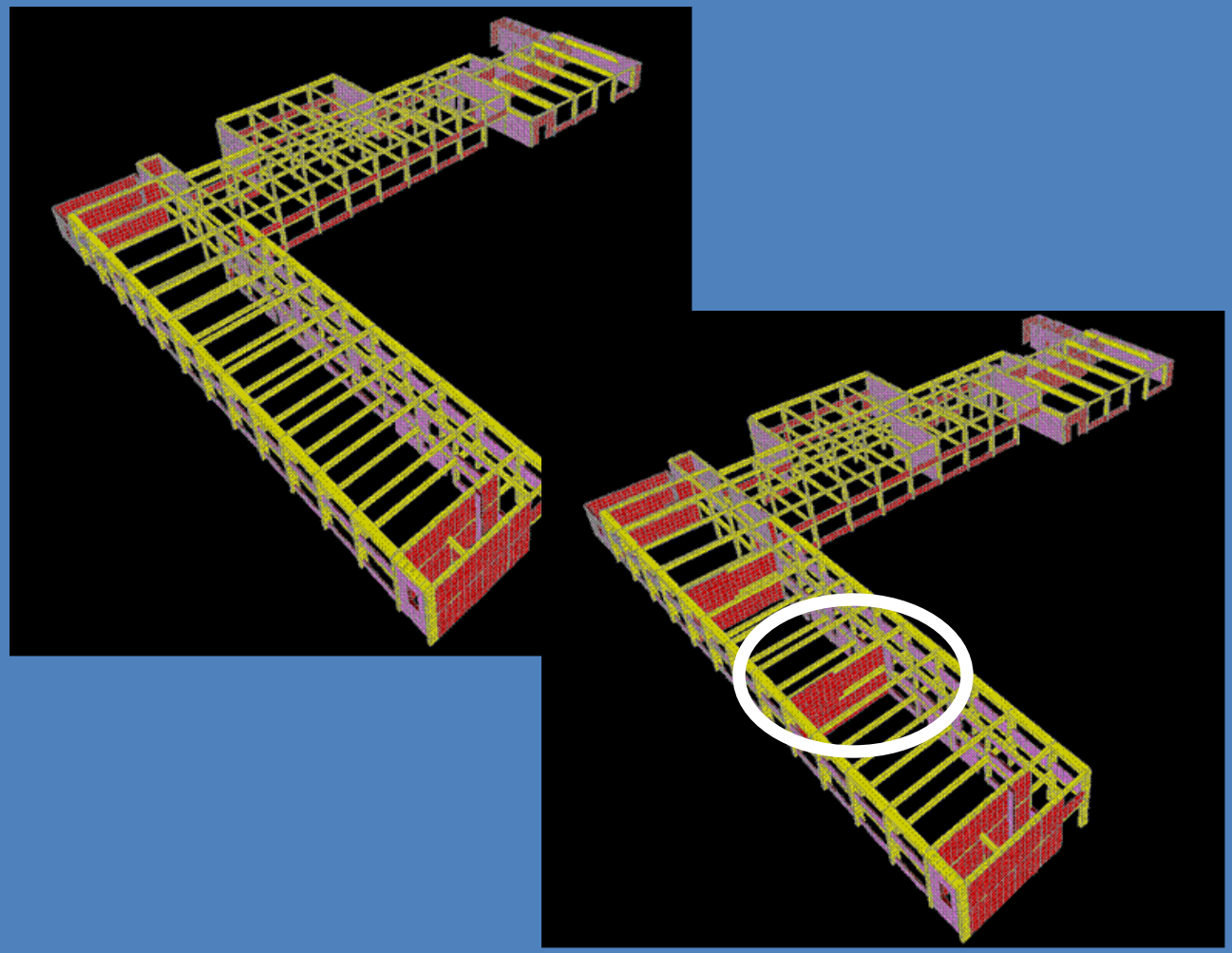
A. New Shear Wall

B. Wall Strengthen Shotcrete

C. Wall Strengthen FRP

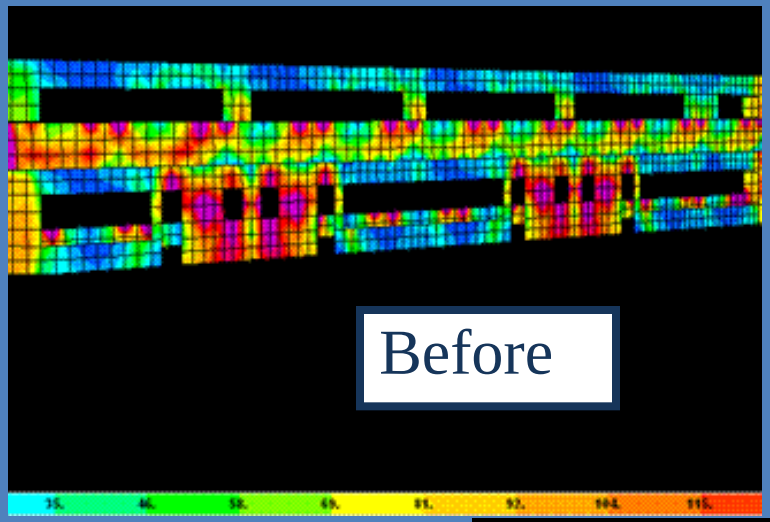
D. Create Loadpath

E. Earthquake Drains

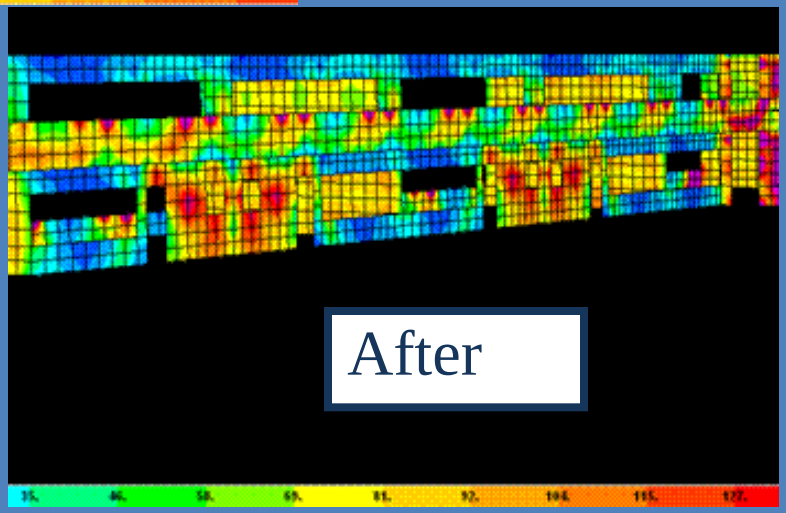


Proposed Retrofit Measures

- **A. New Shear Wall**
- **B. Wall Strengthen Shotcrete**
- **C. Wall Strengthen FRP**
- **D. Create Loadpath**
- **E. Earthquake Drains**



Reduces stress in walls, and reduces load in concrete frame



Old vs. New Schools

Buist Academy

James Simons

Old vs. New Schools

Memminger

Charleston
Progressive