Resilience: What Role will Concrete Play in Making our Communities Safer?

ACI Hot Topics April 12, 2015
Lionel Lemay, NRMCA
Disaster Losses (CPI adjusted)
Hurricane Sandy: $50 billion
Climate Change Factors

Strongest Scientific Evidence Shows Human-Caused Climate Change Is Increasing Heat Waves and Coastal Flooding

- **Severe Droughts**
- **Extreme Precipitation Events**
- **Coastal Flooding**
- **Heat Waves**

Limited Evidence  
Strong Evidence  
Strongest Evidence

©2012 Union of Concerned Scientists  www.ucsusa.org/exremeweather  
Source: Intergovernmental Panel on Climate Change SREX Report (2012)
Development Factors

Map showing various factors affecting development with icons representing natural disasters and population density across the United States. Notable regions include New York City and the South Dallas-Fort Worth metro area.
Nature + Development

DISASTER
Great San Francisco Quake & Fire 1906
We are stuck in response mode.
Disaster is the failure of our society to adapt to our new environment.
How do we Adapt?
Pathway to Resilience
A Guide for Developing a Community Action Plan

Resilience - A community’s capacity to provide viable continued use in the built environment through extended service life; adaptive re-use; and the ability to resist, absorb, and recover from hazards.

www.nrmca.org/resilience
Workshops

- South Dakota Ready Mixed Concrete Association
- Northern New England Concrete Promotion Association
- Kentucky Ready Mix Concrete Association
- Conco Companies, Inc.
- Roanoke Cement
- Mississippi Concrete Industries Association
- The Carolinas Ready Mixed Concrete Association, Inc.
- Titan America
- Habitat for Humanity Virginia
- Smart Home America
- Virginia Ready-Mixed Concrete Association
- Florida Concrete & Products Association
- Florida Independent Concrete & Associated Products, Inc.
Breakouts

FLOODS
- Local zoning
- Downtown
- Less density use
- Green infrastructure
- Stormwater
- Drainage design upgrade
- Fortified: tied to incentives
- EM education
- Education Plan
- NFIP

TORNADO
1. Emergency Planning:
   - Shelter: School, Shelters
   - Signage, Fortify
   - $ in existing

2. Action Plan: Coordinate
   - Reassess 2nd tier responders

3. Improve Codes - Fortified
   - Change process
   - Take out, 1st review
   - Enforcement

4. Education:
   - Owners & Developers
   - Community (Response Plan)

NEASTERS/HURRICANES
1. Rain: Snow
   - Power outage
   - Training, private, information

2. List of private contracts

3. Shelters - 1 month

4. Transportation

5. Everybody

6. MUBES, enforcement
   - Resources
   - Financial

7. Insurance incentives

FIRE ACTIONS
1. Insurance Co incentives
   - Educate, discounts
   - 2nd tier

2. Statewide Code + Enforcement
   - FEMA

3. Raise awareness: local level
   - City officials
   - Fire officials
   - Public alerting

HURRICANE+WIND
- Response
- Increasing buffers
- Preventing in flood plains
- Funding
Key Strategies to Drive Resilience:

1. Strengthen the Built Environment
   A. Voluntary, community-based enhancement programs
   B. Mandatory adoption of stricter standards

2. Empower Advocacy
   A. Model code language
   B. Model ordinances
   C. Testify before state and local governments
   D. Coordinate future research activities

3. Launch Integrated Dialogue
   A. Create a network through social media
   B. Demonstrate resilience adoption successes
   C. Developing position papers
Strengthen the Built Environment
Designed by Architect.  
Built to Code.  
Passed All Inspections.  
Safe?
Designed by Architect. Built to Code. Passed All Inspections. Safe?
Mitigate
Mitigate
Voluntary Programs
FORTIFIED® Building Programs

- Hurricanes
- Tornadoes
- Earthquakes
- Floods
- Wildfires
- Severe winter weather
Steps 1: Risk Assessment

Zip Code Risk Search Results
SEARCH RESULTS
ZIP CODE = 95833

EARTHQUAKE
FLOOD
HIGH WINDS
WINTER WEATHER
WILDFIRE

BECOME A FORTIFIED EVALUATOR

BUILDING CODES
- Rating the States Report

SHARE THIS

Enter your ZIP Code below to discover the risks you face.

www.disastersafety.org
Steps 2: Design and Construction
Step 3: Inspection and Compliance

- Foundation
- Roof Deck
- Pre-drywall
- Final
Step 4: Designation Certificate

This designates that the residence located at
XXX Hurricane Alley
Winter Haven, FL 33884
satisfied the Institute for Business & Home Safety’s
Fortified...for safer living®
program requirements as of January 5, 2011.

Remington Brown
IBHS Sr. Engineering Manager

FFSL #YYY
FORTIFIED for Safer Living® Homes
Pre-Hurricane Ike
Bolivar Peninsula, Texas

FORTIFIED for Safer Living® Homes
Post-Hurricane Ike
Bolivar Peninsula, Texas
FORTIFIED Incentives

- Alabama
- Georgia
- Mississippi
- North Carolina

MODEL LEGISLATION

Resilient Construction Incentive Act

(a) … insurance companies shall provide a premium discount or insurance rate reduction …

(b) … FORTIFIED For Safer Living (FFSL) for residential or FORTIFIED For Safer Business (FFSB) for commercial
Mandatory Standards
(Or Optional for Local Adoption)
Resilient Building Standards

Minimum Life Safety

Property Protection

BUILDING CODE REQUIREMENTS FOR RESILIENT CONSTRUCTION

Amendments to the 2015 International Building Code
2. Empower Advocacy
Participate in code formation
Governments Taking Action
SF- Soft Story Ordinance
Governments Taking Action
Moore, OK – 135 mph Wind
Governments Taking Action
NY City – No Wood Multi-Family
LEED Resilient Pilot Credit

Material Reduction (Weight or Cost) Through Resilient Structural Design

IBHS FORTIFIED for Safer Living & Business Designation

Resilience-based Earthquake Design Initiative (REDi™) Rating System, developed by Arup
“Building Stronger and Safer Communities and Infrastructure”

- Disaster Resilience Workshops (6 locations)
- Disaster Resilience Framework
- Disaster Resilience Standards Panel (DRSP)
- Model Resilience Guidelines
- Community Resilience Center of Excellence
Other National Initiatives

- HR 1878, Safe Building Code Incentive Act
  - Increased disaster relief for latest codes
- HR 2241, The Disaster Savings and Resilient Construction Act
  - Tax credits for resilient construction
- FEMA NFIP Building Code Study
  - Insurance losses reduced with building codes
3. Launch Integrated Dialogue
Marketing

Letter: Stronger building codes save lives

After every great disaster, our leaders evaluate the lessons learned to avoid future catastrophes. The Avalon fire in Edgewater was the second fire to strike this luxury apartment complex in 15 years. Both blazes are considered among the worst in the history of Bergen County. Was a lesson learned?

Buildings of this type are a major safety problem. Now is the time for substantial changes to New Jersey building codes to avoid a future disaster and better ensure preservation of life and property. We urge state officials to amend the building code to limit construction with wood materials and put in place regulations that prohibit reductions in safety measures simply because there are sprinklers.

Code officials ignored it. Developers ignored it.

Wood you? Demand concrete block.

It was built to code. It had working sprinklers. But as local firefighters pointed out, once the lightweight wood assembly caught fire, sprinklers were simply no match for the 5-alarm blaze that tore through this luxury apartment complex recently in Edgewater, New Jersey. It prompted local officials to declare a state of emergency, and displaced more than 1,000 residents.

It also has resulted in several lawsuits against the developer for millions of dollars in damages. Though it begs the question: Who is responsible? The designer? The developer? The owner? Or building officials?

Incredibly, there were no fatalities—this time. More often than not, in a fire this extreme, lives are lost—not to mention the devastating property damage and the people who are left homeless, with life-long treasures gone.

So much loss could have been prevented through more durable, fire-proof construction—starting with concrete block. Edgewater’s fire chief said, “If it was made out of concrete and...block, we wouldn’t have this sort of problem.”

The chief construction officer for the developer, AvalonBay, says it was built to code, adding in a statement that “The purpose of these codes is not to prevent the building from burning down, but rather to ensure that there is sufficient time and opportunity for all occupants to exit safely in the event of a fire.”

Unfortunately, the exit time for a 20-year-old can differ dramatically from that of a senior citizen.

Think about it. When it comes to real-life fires and today’s lightweight wood and drywall assemblies... Well, look at the picture and see for yourself.

Demand concrete block construction. Build it from block and build it for life.

Learn more about the benefits and safety of building with concrete block.

Contact the Canadian Concrete Masonry Producers Association.

www.ccmpa.ca
info@ccmpa.ca
Marketing

LEED-Platinum Habitat Home
Focus on building science research through national entities
High Performance Criteria

Flood  Fire

Seismic  High Wind
Performance Based Design

- Fully Functional
- Immediate Occupancy
- Life Safety
- Collapse Prevention

Code – “Important Buildings”
Code – “Regular Construction”

Higher Performance
Lower Performance

R. Hamburger
Use Existing Hazard Data

- HazUS

- Designed to be run with very little info
  - When do we make decisions regarding design strategy??

- Customize analysis where more is known

- Component breakdown allows us to ID & target “environmentally sensitive” elements
Case Study

- 5 story 75,000sf office building
- Seattle area
- Systems considered:
  - Conc MF
  - Conc SW
  - Base-isolated conc SW
Incorporate hazard resistance into life cycle framework

- Life Cycle Total
  - Construction
    - Raw materials, labor, equipment, & energy
  - Use
    - Electricity, gas, and oil consumption throughout life
  - Maintenance due to typical wear and tear
  - Maintenance due to hazard damage

Calculations for both environmental impact & cost

Raw materials, labor, equipment, & energy

Electricity, gas, and oil consumption throughout life

Painting, windows, siding, …

Combines probability of hazard with damage from hazard
Thank you.