Extreme Homebuilding: The Emerging Need for Resiliency

Tim Smail, Federal Alliance for Safe Homes (FLASH)
Fred Malik, Insurance Institute for Business & Home Safety (IBHS)
Randy Shackelford, Simpson Strong-Tie
What is resiliency?

- Definitions proposed based on context
  - Physical
  - Financial
  - Health

A working definition for residential housing:

“Minimize destruction of personal property and loss of use post-catastrophe”

Source: Kristen MacAskill and Peter Guthrie, Cambridge University, Proceedings of the 4th International Conference on Building Resilience.
What is resiliency? What we do know

Source: Fluor Corporation. 2014 All Rights Reserved
Extreme Weather

• # of disasters reported is increasing
  • Better reporting
  • More people live in disaster-prone areas
  • More development in disaster prone areas

This does not take into account climate change

Source: www.disaster-survivial-resources.com/us-disaster-statistics.html
High winds are **NOT** just a coastal issue
The Progression Claims Due to Natural Disasters

Source: The Property Claim Services (PCS) unit of ISO, a Verisk Analytics company.
Everyone is Affected

Source: www.disaster-survival-resources.com/us-disaster-statistics.html
Property Claims

Inflation Adjusted
U.S. Catastrophe Losses by Cause of Loss, 1991-2010
(2010 $B)

Source: The Property Claim Services (PCS) unit of ISO, a Verisk Analytics company.
Extreme Weather – Impacts

Zombie Apocalypse

Source: http://blog.estately.com/2014/03/u-s-states-ranked-from-most-to-least-prepared-for-the-zombie-apocalypse/
Shift Toward Resilience

The real disaster is not being prepared.

What’s your family’s emergency plan?

ready.nj.gov or CALL 2-1-1
Challenge: Can’t Currently Quantify It

- National Institute of Standards and Technology (NIST)
  - 3rd Disaster Resilience Workshop (10/14)
- U.S. Department of Housing and Urban Development (HUD)
  - $1 Billion National Disaster Resilience Competition (9/14)
- National Institute of Building Sciences
  - Integrated Resilient Design Program
  - High Performance-Based Design for Buildings
- Resilience Centers of Excellence (2014)
  - Department of Homeland Security
  - NIST
  - National Science Foundation

Source: http://disaster safety.org and www.usrc.org
Benefits Measurement Will Bring

- Incentivize it
- Determine ROI
- Product ratings
- Incremental change (Fred to discuss)
- Base after disaster support on it
Questions?
Resilient Building 101

Fred Malik
Director of FORTIFIED Programs
IBHS – High Wind

DisasterSafety.org
A Systems Approach to Resilient Construction

Resilient Construction Goals
- Minimize the destruction of personal property
- Minimize loss of use post catastrophe

Systems Approach to Resilience
- Seeks to mitigate all of the components that make up vulnerable assemblies
- À la carte approaches encourage the selection of individual components to achieve a score/credit. Score, first; Performance second
- Without adequate resilience, risk of loss can be significant even in low intensity events
Where Resilience and Sustainability Overlap
Zero Energy Ready Home Systems

Building Science
- Thermal Enclosure
- HVAC QI
- Water Management
- Ducts in Condit. Sp.
- 2012 IECC Insulation
- Super Air-Tight
- Super Windows
- Low-Load Eff. HVAC

Best Practices
- HVAC System
- Lighting/Appliances
- Source Control
- Dilution
- Filtration

Efficient Components
- Water Htg. System
- Outdoor IRRIGATION

Indoor Air Quality
- Solar Electric
- Solar Thermal

Solar Ready
- Hot Water Distribution
- Indoor Fixtures

Water Efficiency
- Encouraged in Challenge Home

Disaster Resistance
- Weather
- Natural Events
- Pests

Quality Management
- Int. Design Process
- Construction Documents
- QM Program
There is nothing sustainable about a home that ends up here
FORTIFIED Home™

The National Standard for Resilient Construction
Cost effective, consistent, definable, verified severe storm protection system upgrades that protect property and deliver meaningful value.
# Severe Storm Protection Systems

<table>
<thead>
<tr>
<th>Hurricane</th>
<th>High Wind and Hail</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORTIFY Roof and Attic Ventilation System</td>
<td>FORTIFY Roof</td>
</tr>
<tr>
<td>FORTIFY Openings, Gables and Porches</td>
<td>FORTIFY Gables, Porches, Carports and Chimneys</td>
</tr>
<tr>
<td>FORTIFY Structure (CLP) and Chimney</td>
<td>FORTIFY Garage Doors and Structure (CLP)</td>
</tr>
</tbody>
</table>
...Because Little Things Matter
FORTIFIED Home™ Project Cost

The difference $500 can make.

©Insurance Institute for Business & Home Safety
Water Intrusion Highlights
Sealed Roof Deck Demonstration

Sealed roof deck damage estimate
$5,408.59

Unsealed roof deck damage estimate
$16,935.23
Nearly 1 in 3 consumers say they don’t trust homebuilding and real estate companies.

Source: The Business of Trust – The Most Trusted Builders in America, Lifestory Research, January 2013
FORTIFIED Home: Benefits to Builder

Build trust.

3rd party verification that:

• Homes are upgraded to handle the severe weather hazards of where they’re built
• Critical construction details are addressed during construction
• Transferable FORTIFIED Home™ designation
Differentiation and Recognition

- Sell value not price
- Be an expert
- Stronger value proposition than competition (including foreclosures and short sales)
Point of Sale Collateral

• Captivating imagery
• Use demonstration videos to create sales opportunities

FORTIFIED Home: Benefits to Builder
Who is using FORTIFIED?

Wind Retrofit Guide for Residential Buildings
FEMA P-804 / December 2008

HURRICANE SANDY REBUILDING STRATEGY
Stronger Communities, A Resilient Region

August 2013

Resilience STAR
Standards for a stronger, safer tomorrow.

DisasterSafety.org/FORTIFIED/Resilience-STAR/
Long-term Insurance Impacts

Challenges with Status Quo

– State insurance regulatory constraints
– Rates should reflect risk

Potential Insurer Incentives for Resilient Homes
(Individual Insurance Company Basis)

– Greater voluntary market availability
– Credits/discounts
– Lower deductibles
– Insurance endorsements to rebuild post-loss to a higher standard

Builder’s Risk and Warranties

– Potential for lower premiums
– Additional Warranties for Resilient Construction
Success Stories

- Habitat for Humanity Affiliates across the Gulf Coast, New England and in Ohio are building FORTIFIED Homes
- National and Regional builders building 1,000+ FORTIFIED Homes in AL & MS per year
- $20M in Federal Grants awarded to MS to retrofit hundreds of homes to meet FORTIFIED Home requirements
- Local incentive programs:
  - Orange Beach, AL – 50% rebate on building permits for FH
  - State Income Tax Deduction (AL) - $3,000
Questions?
A Driver for the Future of Homebuilding
Key Considerations in Design/Build

- Building code
- Local hazards
- Local insurance market
- Buyer preference
Trends in Building Codes

**IBC (Design based)**
- Industry groups writing standards for their material and removing material from the building code
  - ACI (concrete), ACI/TMS (masonry), AWC (wood), AISI (steel)
  - ASCE (loads)
- Groups typically write a new standard every 3 years
- Changes occur more often

**IRC (Prescriptive based)**
- All changes must be made by a balanced committee of builders, building officials, and other interested parties
- Requirements prescriptive so generally not covered by industry standards
- Major changes occur less often
Current State of Codes and Mandates

Wind design requirements

- Wind loading (pressure) requirements developed by consensus committee & published in ASCE 7
- Structural engineers work w/ interested parties to propose changes to IRC
- IRC balanced committee must approve
Seismic requirements:
• NEHRP - BSSC
• Recommended Seismic Provisions for New Buildings and Other Structures
• Committee takes design provisions and creates prescriptive provisions
• Proposed to IRC-Building Code Change Committee
• Generally approved
Current State of Codes and Mandates

- New wind design standards and maps lowering wind loads for most coastal areas and reducing areas where wind design is required
- IRC 2009, 2012, 2015 all have different wind maps
Where are Codes Going?

Current design basis
• Wind: Damage Prevention
• Earthquake: Collapse Prevention (life safety)

Future
• Performance Based Design
• Owner chooses how they want their building to perform:
  - Collapse, Collapse Prevention, Life Safety, Immediate Occupancy, and Operational Performance
How old are houses in the U.S.? % of Total

86% before 2000
SC Safe Home

- Administered by the South Carolina Department of Insurance
- Provides grant money to individual homeowners for the sole purpose of retrofitting owner-occupied, single-family homes
  - Bracing gable ends
  - Exterior doors, including garage doors
  - Opening protection
  - Problems associated with weakened trusses, studs, and other structural components
  - Reinforcement of roof-to-wall connections
  - Repair or replacement of manufactured home piers, anchors, and tie-down straps
  - Roof covering
  - Roof deck attachment
  - Secondary water barrier
South Carolina Mandatory Premium Discounts

- Code compliance
- Roof attachment
- Roof covering
- Roof to wall connection
- Secondary water protection
- Opening protection
- Some flood protection

### IMPORTANT NOTICE OF PREMIUM DISCOUNTS

**Site-Built Residential Property Insurance Coverage**

Section 39-7-710 requires insurance companies to notify you of the availability and range of each premium discount, credit, other rate differential or reduction in deductibles for properties on which factors or construction techniques demonstrated to reduce the amount of loss in a windstorm have been installed or implemented. Securing your roof is one of the most cost-effective measures you can take to safeguard your home and reduce your premium.

<table>
<thead>
<tr>
<th>Description of Mitigation Measure</th>
<th>Estimated Premium Discount Percent or Range</th>
<th>Other Credit or Rate Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Carolina Building Code/Compliance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Roofs and walls in compliance with the current edition of the International Residential Code as adopted by the South Carolina Building Codes Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof covering (shingles, tiles, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Covering attachment in compliance with the current edition of the International Residential Code as adopted by the South Carolina Building Codes Council or the manufacturer's installation requirements for the wind speed for the site on which the home is located</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Roof Attachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sheathing attached in compliance with the current edition of the International Residential Code as adopted by the South Carolina Building Codes Council or an engineered design for the wind speed for the site on which the home is located</td>
<td></td>
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<td></td>
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<tr>
<td>Roof-to-Wall Connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tile, tile, clay, single stripped double stripped installed in compliance with the current edition of the International Residential Code as adopted by the South Carolina Building Codes Council or an engineered design for the wind speed for the site on which the home is located</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof Shape and Pitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High Pitch (greater than 4:12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/8</td>
<td>1/8</td>
</tr>
<tr>
<td>• Low Pitch (less than 4:12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/8</td>
<td>1/8</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Other</td>
</tr>
<tr>
<td>Secondary Water Resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Roofing felt or other approved layer of protection between the shingles and the roof sheathing below</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening Protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Storm shutters on all windows meeting the minimum requirements of the International Residential Code</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For Companies Offering Flood Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Home located in Flood Zone</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>• Flood Zone Designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• First Floor</td>
<td>Above</td>
<td>Below</td>
</tr>
<tr>
<td>• Flood Insurance</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Florida Retrofits

Mandatory (FL Existing Bldgs Code) When re-roofing
  • Roof decking attachment
  • Secondary water barrier
  • In WBD area if house >$300,000
    – Upgrade roof to wall connections

Any building permit in WBD area
  • If house >$750,000 and >$50,000 work
    – Opening protection must be installed
Exempt if built to modern FL Bldg Code

Voluntary retrofit for rate credit
  • Garage doors
  • Windborne debris opening protection
  • Roof to wall connections
  • Gable end retrofit
Welcome to the Florida Wind Insurance Savings Calculator!

This online tool provides homeowners and builders with a general indication of the types of wind insurance savings available from Florida insurance companies for building features that reduce damage during high wind events like hurricanes. Building features that reduce wind damage and can lower wind insurance premiums include:

![Diagram of building features]

Most existing houses have one or more wind resistive construction features and may qualify for some insurance discounts. In addition, houses built after 1994 in Miami-Dade or Broward Counties and houses built after 2002 in the rest of the state have many wind resistive construction features and will likely qualify for credits.

By answering a series of questions about your home as it currently exists or based on renovations you are planning, the Wind Insurance Savings Calculator (WISC), will help determine what level of savings you may be eligible for.

The discounts found on this website are based on insurance fillings approved through January 2011.

### Insurance Companies and Estimated Savings

<table>
<thead>
<tr>
<th>Insurance Company</th>
<th>How To Contact</th>
<th>Estimated Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Other Companies</td>
<td><a href="http://www.allstate.com">www.allstate.com</a> 800-255-78283</td>
<td>80% - 81%</td>
</tr>
<tr>
<td>Allstate Insurance Company/Castle Key</td>
<td><a href="http://www.citizensinsurance.com">www.citizensinsurance.com</a> 517-540-4100</td>
<td>80% - 81%</td>
</tr>
<tr>
<td>Citizens Property Insurance Corporation</td>
<td><a href="http://www.stjohnsinsurance.com">www.stjohnsinsurance.com</a> 866-304-7779</td>
<td>80% - 81%</td>
</tr>
<tr>
<td>St. Johns Insurance Company</td>
<td><a href="http://www.statefarm.com">www.statefarm.com</a> 877-734-2265</td>
<td>62% - 76%</td>
</tr>
<tr>
<td>State Farm Florida Insurance Company</td>
<td><a href="http://www.universalproperty.com">www.universalproperty.com</a> 800-425-9113</td>
<td>80% - 81%</td>
</tr>
<tr>
<td>Universal Property and Casualty Insurance Company</td>
<td><a href="http://www.usaa.com">www.usaa.com</a> 800-533-4704</td>
<td>80% - 81%</td>
</tr>
</tbody>
</table>
San Francisco Mandatory Soft Story Refit

- **Tier I.** Buildings that contain a Group A, E, R-2.1, R-3.1 or R-4 occupancy on any story
- **Tier II.** Buildings containing 15 or more dwelling units, except for bldgs assigned to Tier I or Tier IV
- **Tier III.** Building not falling within the definition of another tier.
- **Tier IV.** Buildings that contain a Group B or M occupancy on the first story or in a basement or underfloor area that has any portion extending above grade, and buildings that are in mapped liquefaction zones, except for buildings assigned to Tier 1.

<table>
<thead>
<tr>
<th>Compliance Tier</th>
<th>Submission of Screening Form and Optional Evaluation Form</th>
<th>Submittal of Permit Application with Plans for Seismic Retrofit Work</th>
<th>Completion of Work and Issuance of Certificate of Completion and Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1 Year</td>
<td>2 Years</td>
<td>4 Years</td>
</tr>
<tr>
<td>II</td>
<td>1 Year</td>
<td>3 Years</td>
<td>5 Years</td>
</tr>
<tr>
<td>III</td>
<td>1 Year</td>
<td>4 Years</td>
<td>6 Years</td>
</tr>
<tr>
<td>IV</td>
<td>1 Year</td>
<td>5 Years</td>
<td>7 Years</td>
</tr>
</tbody>
</table>
US DHS Resilience Star

- Recognizes homes that are voluntarily built or remodeled to include design features that make the homes more resistant to specific natural hazards
- Third-party evaluators inspect homes to ensure they meet the resilience standards
- Uses IBHS FORTIFIED requirements
USRC is a leading organization in the implementation and dissemination of ratings systems for buildings

- USRC will fulfill its role through the following activities:
  - Using information and market forces to incentivize action
  - Bringing together diverse stakeholders and technical experts into leadership and advisory positions
  - Promoting quality, usability, and fairness to increase public acceptance, adoption and implementation

- Use the Structural Engineers Association of Northern California Earthquake Performance Rating System.
Coming soon: There’s an app for that
- Enter characteristics of house
- Provides the three most cost-effective retrofits
Good example of demand: storm shelters
Local action as a result of several disasters

City of Moore

City Adopts New Building Codes, First in the Nation

The new building codes will go into effect 30 days from today, March 17th, 2014.

MOORE, Okla (March 17, 2014) – Homeowners in Moore will have a better chance against the fury of Mother Nature thanks to the City’s adoption of new residential building codes. The Moore City Council voted unanimously Monday night to adopt the new codes based on research and proven engineering technology proposed by civil engineers Chris Ramseyer and Lisa Holliday. The new building codes mark the City of Moore as the first city in the nation to adopt building codes that focus on the tornadoic impact on homes.

“We have seen from this tornado, progressive construction techniques that can survive strong winds,” said Mayor Glenn Lewis. “We can learn from this devastating event to build stronger homes and neighborhoods across the United States – and it starts in Moore.”

Moore’s new residential building codes include requiring roof sheathing, hurricane clips or framing anchors, continuous plywood bracing and wind-resistant garage doors. The homes would be built to withstand winds up to 135 miles per hour rather than the accepted standard building requirements of 90 miles per hour.

“I applaud the City of Moore for taking proactive, yet thoughtful steps to protect its citizens should another major tornado hit our area. These steps demonstrate how a community can rebuild stronger through advanced construction techniques with minimal cost impact on the homeowners,” said Melissa Hunt, Moore Planning Commissioner and Executive Director of the American Institute of Architects, Central Oklahoma Chapter. “As a citizen of Moore, I am extremely pleased that our city leaders saw this as an important step in the rebuilding process and I hope other cities will follow Moore’s lead.”

The City is basing its new building requirements on research and damage evaluation by Ramseyer and Holliday who were part of the National Science Foundation Rapid Response team that evaluated residential structural damage after the tornado.

“A home is deconstructed by a tornado, starting with the breaching of the garage door,” Ramseyer explained. “The uplift generated by the wind causes the roof to collapse until the pressure pulls the building apart. These new residential building codes could possibly prevent that in the future.”
Barriers

• Even though these measures are proven cost-effective, they still do cost money
• Some incentive programs have been developed, but not enough
• Awareness tends to peak after a disaster
• It won’t happen to me
Resources

- www.approvalzoom.com
- www.disastersafety.org
- https://www.disastersafety.org/resilience-star
- www.usrc.org
- www.scsafehome.sc.gov
- http://www.coastalretrofitms.org/
- www.strongtie.com (search training)
Final Questions or Comments?