TESTIMONY BEFORE THE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
UNITED STATES SENATE

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Commentary for the Hearing on "Weathering the Storm: The Need for a National Hurricane Research Initiative"

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FLASH inc.
FEDERAL ALLIANCE FOR SAFE HOMES

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I. Introduction

Thank you Senator. Committee Members.

My name is Leslie Chapman-Henderson and I am here today representing the Federal Alliance for Safe Homes – FLASH®, Inc. We are a partnership of more than 100 public, private and nonprofit organizations and leaders who have dedicated the past eleven years to making America a more disaster-resistant nation. Our mission is to "strengthen homes and safeguard families" from disasters of all kinds, including earthquakes, floods, hail, hurricanes, lightning, tornadoes and wildfires.

Our *Legacy Partners* include FEMA, Home Depot, International Code Council, NOAA/National Weather Service, RenaissanceRe, State Farm, WeatherPredict Consulting Inc. and USAA.

The Federal Alliance for Safe Homes helps reduce impacts from catastrophic losses like windstorms by providing the public with accurate and timely information on how to make homes more disaster-resistant — either at the time of construction or with post-construction hardening or retrofitting techniques. We want consumers to understand that they can protect their property, and that "luck" is not their best tool when they confront natural disaster threats.

Our work is part of a movement to establish disaster safety as a public value in this country. We support a built environment strong enough to reasonably resist and survive natural disaster threats. We specifically focus on mitigation and the collective work undertaken beforehand to prevent or lessen impacts of hurricanes and other threats.

Our goal is to create widespread public demand for safer, better-built homes. We modeled this approach after the highway safety movement, which succeeded in creating American demand for safe, well-built vehicles with seat belts and air bags. Just as the highway safety movement has saved lives on our roads, the disaster safety movement can save lives and reduces losses from catastrophic events. We recognize the following elements as essential to the success of the disaster safety movement:

1. Model building codes that are enacted and enforced intact
    - Applied to new construction, rehabilitated construction and restored construction, especially following large scale catastrophes
2. Financial incentives
    - Including banking, insurance, real estate and tax
3. Mitigation public policy
    - Home inspection and matching grant programs for home "hardening" or retrofitting activities (combine disaster mitigation and weatherization retrofit activities addressing attics, walls, windows and doors to leverage economies of scale)
    - Federal mitigation funding levels linked to the quality of the locally adopted building codes

4. Public awareness
   - Create a public value and market demand for mitigation
5. Professional education
   - Architecture, construction, emergency management & engineering
6. Research and innovation
   - Continuously enhanced products and construction techniques
   - Effective and ongoing knowledge and technology transfer to ensure end use
   - Reliable system to support superior product testing and consumer protection

We convene stakeholders that serve in all of the above roles, and our primary activities include public policy forum events, public awareness campaigns featuring free consumer resource and referral services, integrated multi-media campaigns, accredited professional education programs, extensive public outreach and subject matter expertise as requested by policy leaders.

Below are some of our initiatives:

- Blueprint for Safety® — (www.blueprintforsafety.org) A national, award-winning curriculum for contractors, design professionals and home inspectors featuring training on disaster-resistant construction techniques. Blueprint recommendations are referenced as the basis for mitigation policies and programs enacted in many states and municipalities.

- Mitigation Leadership Forums (www.mitigationleadership.com) - The risk mitigation leadership forums bring together academics, scientists and public and private sector representatives to advance hurricane risk mitigation scientific efforts and public awareness.

- The Tale of Two Houses – Wildfire - A motivational video story of seven families impacted by the 2007 San Diego Witch Creek Fires. One home in the center of the cul-de-sac survived while six burned to the ground because one homeowner took affirmative, prescriptive steps to prevent wildfire losses while others did not. The compelling FLASH video story is the consumer outreach basis of the National Wildfire Education Initiative launched in 2007, and is the subject of an upcoming retrospective by a national news program.

- The Tale of Two Houses – Wind - A motivational video story of two neighboring families and homes affected by Hurricane Charley in 2004. The story highlights dramatically different building performance and outcomes based on the different building practices used. The Tale of Two Houses program inspired two seasons of nationally syndicated television shows and joint work with home improvement guru Bob Vila.

- Turn Around --- Don't Drown - A jointly sponsored public awareness life safety campaign with the National Weather Service that helps raise awareness of the risks associated with walking or driving into moving water. The slogan is in widespread use by broadcast meteorologists, forecasters and others.

- StormStruck: A Tale of Two Homes® (www.stormstruck.org) - FLASH and three of its Legacy Partners (RenaissanceRe, Simpson Strong-Tie & State Farm) opened this three year, interactive "edu-tainment" experience in August of 2008 at Epcot at the Walt Disney World Resort in Florida. The 4-D, virtual storm experience combines fun and entertainment with game-based learning to provide more than four million annual guests to Epcot with motivation and information on how to protect their homes and families from severe weather of all kinds. After just one year, the StormStruck experience is so successful that FLASH is developing a parallel approach to earthquake "edu-tainment" at Disneyland in California.

II. Background- Windstorm Risk

We believe that the U.S. built environment is highly vulnerable to windstorm hazards, and the vulnerability is increasing. There are various ways to characterize the level and demonstrate the increase, including:

A. *Coastal Population Growth.* According to the U.S. Census Bureau, as of July 1, 2007, 35.3 million people lived in areas of the United States most threatened by hurricanes[1]. These areas are defined as the coastal portions of Texas through North Carolina and represent approximately 12% of the U.S. population (Coastal counties include those with at least 15 percent of their total land area within the nation's coastal watershed.[2]). This figure represents an increase from the 1950 level of 10.2 million, which represented 7% of the U.S. population. Florida alone represents 6% of the current coastal population.

   Three of the 20 most populous metropolitan areas from 2006 to 2007 were within Atlantic or Gulf coastal areas from North Carolina to Texas[3]. These areas are:
   - Houston-Baytown-Sugar Land, Texas (sixth)
   - Miami-Fort Lauderdale-Miami Beach, Fla. (seventh)
   - Tampa-St. Petersburg-Clearwater, Fla. (19th)

[1] Source: Population Estimates http://www.census.gov/popest/estimates.php
[2] Source: http://www.census.gov/geo/landview/lv6help/coastal_cty.pdf
[3] Source: http://www.census.gov/Press-release/www/releases/archives/population/011671.html

B. *Historic Losses*[4] *(United States)*. Disaster losses tell a compelling picture of our economic and societal vulnerability to windstorms. From 1987 to 2006 the inflation-adjusted, insured losses break down as follows:

- $297.3 billion — total disaster losses
- $137.7 billion, or 46.3% — tropical cyclone losses
- $77.3 billion, or 26% — tornado losses
- $19.1 billion, or 6.4% — earthquake losses

Seven of the 10 most expensive hurricanes in U.S. history occurred between August 2004 and October 2005.

C. *Today's Insured Values (Sample: Florida)*.
- 4.5 million single family homes
- $1.8 trillion in residential property
- $1.0 trillion in commercial property

D. *Coastal Construction (Sample: Galveston, Texas)*[5].
- More than $2.3 billion in residential, commercial and public construction was under way in 2007
- More than 6,500 residential units under construction
- Mostly condos, including towers up to 27 stories high
- One Centex Homes development — 2,300 condos and houses on 1,000 acres
- Galveston is the site of the deadliest natural disaster in U.S. history
- At least 8,000 people were killed in a 1900 hurricane
- 3,600 homes were destroyed

The seawall in Galveston is 15.6 ft. high; Katrina's storm surge was nearly 30 feet. Insured losses today from a repeat of the 1900 storm would exceed $21 billion, and it would become the 3rd most expensive hurricane in U.S. history (after Katrina and Andrew).

E. *Attributes of the Built Environment*. Vulnerability will continue to increase due to a variety of economic and other factors, including the aging of our built environment, the percentage of the built environment constructed without use of model building codes and the increased cost of new construction.

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[4] Insurance Information Institute – Presentation to the National Hurricane Conference - http://server.iii.org/yy_obj_data/binary/784319_1_0/nhc2008.pdf

[5] Source: Insurance Information Institute from "A Texas-Sized Hunger for Gulf Coast Homes," *New York Times,* March 18, 2007 and www.1900storm.com and www.twia.org accessed July 9, 2007.

III. Commentary/Response to Committee Questions

Question #1 — How can model building codes improve the resiliency of structures?

A. Model, Engineering-Based Building Codes are the Key to Resiliency

The greatest challenge in implementing improvements to new or existing buildings is a continuous breakdown in communication and knowledge transfer between homeowners, homebuilders, policymakers, regulators and the marketplace. During years of post-storm interviews and damage investigations, we have met stakeholders who are frustrated to learn of opportunities lost. They are astonished to learn that an additional handful of nails may have made a difference in keeping a roof on during a hurricane. This is especially unfortunate since loss of roof covering and roof sheathing failure during windstorms is often how a total loss of structure and contents begins.

Model building codes improve the resiliency of structures by incorporating uniform, consistently applied and continuously updated construction practices that provide protection from windstorm damage. Some of the strongest, specific attributes for high wind and water-intrusion protection include:

- Roofs - Bracing gable ends
- Roof Decks – 5/8" Thickness, Plywood v. Oriented Strand Board
- Roof Coverings – High wind shingles or tiles with mechanical attachment like nails or screws
- Secondary Water Barrier – Applied under roof covering or in attic
- Roof-to-wall connections – Metal Connectors v. Nails
- Entry doors – Impact-resistant
- Garage doors – Impact-resistant
- Window Protection – Code-approved shutters, coverings or impact-resistant window systems

Use of model codes at the time of new construction is the best means of protecting consumers from economic losses and potential injuries or even death. This was demonstrated during the 2004-2005 hurricane seasons as homes constructed to modern, model building codes outperformed those built to older, less stringent standards.

A 2005 University of Florida/Institute for Business & Home Safety/FEMA post-storm engineering study documented decreased damage vulnerability for homes with opening protection like hurricane shutters or impact-resistant windows and doors. When looking at building components, the study found damage to post-1996 homes resulted in:

- 44% fewer total roof covering replacements
- 38% fewer claims for window glass and/or frame damage
- 32% fewer total garage door replacements

Instead, newer homes needed only partial roof covering replacement, window damage was primarily limited to screens, and garage door repairs were minor, such as track adjustments or dent repairs.

Despite the clear case for strong building codes to reduce damage, model codes are not always adopted and enforced intact. Local amendments are used to weaken the code quality or the code is not updated swiftly enough to meet the threat of future storms.

B. The Challenge of Adopting and Enforcing Intact Model Building Codes

Despite the deadly and costly lessons of recent windstorms, many hurricane-prone states have adopted model codes only on a partial basis or have failed to include adequate enforcement provisions. Surprisingly, some states and local governments still lack any type of model building code.

Further, model codes are often undermined, weakened or adversely amended upon adoption at the local level. Many coastal, windstorm-exposed communities adopt the model residential codes like the International Residential Code, but then insert provisions that remove requirements for protecting windows with code-approved shutters or other opening protection.

Florida's Building Code included an "exception" along these lines for its Panhandle region until 2007. Another example of this problem is a current effort underway by a local architects' association chapter that is working to weaken windborne debris/opening protection requirements in coastal Long Island. While Long Island may not have the hurricane frequency of Florida, we believe that the tax-payer impact and financial severity for a potential Long Island strike makes a clear case for windborne debris protection. Incorporating protective devices at the time of new construction is the most affordable way to provide life and property protection.

Expanded investment into engineering research could speed the process of enhancing building codes by providing a clearer case for swift adoption of the newer, model codes and continuous updating based on real time storm findings. The current system of engineering research is inadequately funded, inconsistently funded and poorly coordinated.

C. The Challenge of Keeping Pace

Model building codes impact approximately 2% of the built environment in any non-disaster year through new construction, however that percentage can increase dramatically in a post-storm rebuilding period. As such, it is essential to put policies into place to align post-storm relief and construction with implementation of enhanced, modern building codes. Failing to embrace and enforce model codes during post-storm recovery and rebuilding represents a lost opportunity to rebuild damaged communities in a stronger way.

The private and public academic, engineering, research and scientific communities provide ongoing information regarding enhanced construction techniques to reduce windstorm hazards. This information can be integrated into model building codes eventually. However, the pace is often too slow to help storm victims make use of post-catastrophe findings.

For example, widespread loss of roof covering and failed soffits caused water intrusion into thousands of homes during 2004-2005, yet post-storm rebuilding efforts failed to promptly include new, uniform roofing standards requiring enhanced nailing and installation of secondary water barriers or bracing of soffits.

And many of these same communities still lack requirements for stronger nailing patterns and installation of secondary water barriers.

This situation perpetuates the cycle of "build-destroy-rebuild" that our organization and partners are working to suspend.

Question #2 – How can model building codes and mitigation reduce economic impacts and post-storm recovery costs overall?

A. <u>Studies Address Cost/Benefit Ratios on Mitigation & Building Codes</u>

Conservatively derived measurements of the value of mitigation deliver a compelling case for mitigation. Consider these findings from an independent study by the National Institute of Building Sciences[6]:

Mitigation provided a return on investment of up to four-to-one. A 10-year snapshot of FEMA mitigation grants and projects found that mitigation:

- Reduced human losses (death, injuries and homelessness)
- Reduced direct property damage
- Reduced direct business interruption loss
- Reduced indirect business losses
- Reduced non-market damage
- Reduced cost of emergency response

The NIBS study was the first of its kind to establish reliable cost/benefit ratios for mitigation and building codes. Additional applied science, programmatic evaluation and behavioral studies are needed to further establish the case for widespread and consistent investment in building codes and mitigation.

[6] Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities, National Institute of Building Sciences, December 2005, accessed at http://www.nibs.org/MMC/mmcactiv5.html

B. Catastrophe Modeling Identifies Potential Economic Impact of Building Codes & Mitigation

Modeling the strength of existing building stock based on the historic building code practices and structural attributes provides a compelling case for implementing windstorm mitigation; however, additional data sets of residential construction attributes on a house by house basis would provide valuable insights and afford the opportunity to verify modeled projections.

The tables in Appendix A illustrate relevant examples of scenarios projected by comparing the current dollar value of annual, expected catastrophe losses on a state-by-state basis based on:

1. Current building codes in force
2. Lowering standards to pre-1974
3. Implementation of model codes caught up to 2008
4. Implementation of code-plus programs like the FLASH Blueprint for Safety disaster-resistant construction curriculum

It is important to note that "code-plus" does not always denote construction techniques that exceed required code minimums. Typically, code-plus refers to the emerging or future code requirements and/or practices that are not yet addressed by codes and are "silent" in the body of existing model codes.

This analysis is available for the following states in Appendix A[7]:

- Alabama
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Louisiana
- Maine
- Maryland
- Massachusetts
- Mississippi
- New Hampshire
- New Jersey
- North Carolina
- Pennsylvania
- Rhode Island
- South Carolina
- Texas
- Vermont
- Virginia
- West Virginia

[7] Source: Risk Management Solutions, Inc.

C. Post-storm Forensic Engineering Studies Validate Superior Building Practices

The previous-referenced University of Florida/FEMA/Institute for Business & Home Safety post-storm engineering study found that:

- Homes built before 1996 suffered an average loss of $24 per square foot or $48,000 for a 2,000-square foot home, according to claims filed after the hurricane. Insured homeowners paid approximately $2,600 on average through their hurricane deductible.
- The average size and severity of the loss dropped by 42 percent to $14 per square foot for homes built between 1996 and 2004 when modern engineering-based building codes were in place and builders and building officials were educated about the requirements.

Expanded, reliable funding for academic institutions to perform and share post-storm forensic engineering studies and to establish a consistent, systematic approach to data gathering and analysis is needed. Each storm's finding could be banked into a database for use and information sharing. This would provide an invaluable and reliable insight into building performance in windstorm events.

Question #3 - How can assistance programs focused on improving building integrity mitigate storm damage and reduce recovery costs?

Two states (Florida & South Carolina) have implemented landmark programs to address the challenge of hardening older or non-code homes to withstand hurricanes. Several more (Alabama, Louisiana, Mississippi and Texas) are either bringing similar programs online or examining the feasibility of doing so. These programs help residents who live in harms' way that do not enjoy the benefit of modern building codes or code-plus practices.

These programs provide the following:

- Consumer Education
- Home Inspections for Wind Mitigation
- Detailed Homeowner Reports
- Matching Grants for Retrofitting
- Hurricane Resistance Ratings (0 – 100)
- Professional Education & Training

A. *Florida – My Safe Florida Home*[8] *(www.mysafefloridahome.com)*

In 2006, state lawmakers took action and appropriated $250 million to create the Florida Comprehensive Hurricane Damage Mitigation Program, and directed the Florida Department of Financial Services (DFS) to implement and administer the program. Subsequently renamed the My Safe Florida Home (MSFH) program, it was created to help Floridians identify and make improvements to strengthen their homes against hurricanes through free hurricane mitigation inspections and grant funds. Florida Statutes direct the MSFH program to target its resources to homeowners living in single-family, site-built homes in Florida by providing up to 400,000 free hurricane mitigation inspections and at least 35,000 grants.
To maximize service delivery and leverage resources, the MSFH program delivers services through the Department of Financial Services, local governments and through partnerships with non-profit organizations like Volunteer Florida and local housing organizations.

The MSFH program uses a trained workforce of more than 1,200 hurricane mitigation inspectors to perform free inspections and more than 2,000 licensed contractors to make specific improvements, including but not limited to protecting or replacing window and door openings, and strengthening roofs by bracing gable end walls. The program has developed new technology and undertaken public outreach efforts to further enhance service delivery. As of December 31, 2008:

- More than 88 percent of grant program participants were using grant monies to protect their home's openings - windows, doors and garage doors
- Ninety-nine percent of homeowners approved for a grant live in the wind-borne debris region
- Forty-four percent of homeowners approved for a grant are insured by the state-run Citizens Property Insurance Corporation
- Average home age is 25 years
- Average insured value is $272,315
- Average buying power is $7,000 (MSFH pays 1/2)
- Average savings reported by homeowners who retrofitted their home is $773
- Homes retrofitted moved an average increase of 18 points on the rating scale
- The program retrofitted an average of 258 homes per week during the past two years

Summary of My Safe Florida Home Program Outcomes

- $170 million has been set aside for grants. Of this amount, $108 million has already been paid out which has been used to buy hurricane materials (mainly opening protection) and for installation services. At an average sales tax rate of 6%, that's $6.5 million in sales tax revenue.

[8] 2009 My Safe Florida Home Annual Report

- 2,271 contractors signed up to participate in the My Safe Florida Home program. Many report that they would have gone bankrupt more than a year ago had it not been for the program.
- The MSFH inspection firms, at one point in time, employed a total of 900 inspectors to perform $58 million dollars worth of inspections. Many of these inspectors are contractors, insurance adjusters, engineers and building inspectors who experienced a slow down in their work sectors and needed the job opportunities through the MSFH program.
- Retrofitting 50 to 75 houses a week creates jobs for 160 Floridians. The My Safe Florida Home program retrofits nearly 300 homes a week, on average, so nearly 1,000 jobs are created in any given week.

According to an independent analysis of the program, the MSFH return on investment is $2.75 for each $1 spent.

B. South Carolina – South Carolina Safe Home (www.scsafehome.sc.gov)

This program, while smaller than Florida's program, is ongoing and provides a steady source of home hardening opportunities for low income residents of South Carolina while increasing market attractiveness to private insurance capital. These inspections are fee-based and retrofits include roof and window replacements, roof to wall tie-downs, gable-end bracing and storm shutters. As of June, 2009:

- **761** grants totaling approximately $4 million awarded
- Workforce includes:
  - 119 SC Safe Home Certified Wind Inspectors
  - 57 SC Safe Home Certified Contractors
  - 3 SC Safe Home Staff Members
- Approximately **65%** of the applicants qualify as low-income
- Average age of home retrofitted is **27 years**
- Average value of home retrofitted is **$91,786**
- Approximately **76%** of the grantees elected to retrofit their roof
- New windows and/or hurricane shutter systems for more than **150** homes
- New hurricane rated building code compliant roofing systems for more than **500** homes[9]
- Homeowners report insurance savings up to **23 %**
- Homeowners report an average **29%** savings in their energy costs after replacement windows are installed

Both of these programs lack necessary resources and funding despite the fact that they widely acclaimed and considered successful. These state program models should be examined and considered as a framework for national best practices or model policy programs for all hurricane-

[9] The majority of homes receiving new roofing systems are replacing roofing systems installed following Hurricane Hugo in 1989. These older roof systems were constructed prior to the adoption of the statewide building code in 1998.

prone states. Research could facilitate this evaluation and ensure that the final program fits into existing FEMA, HUD and DOE program guidelines.

IV. The Case for Integration: Strong Building Codes and Mitigation are Green & Energy Efficient

Consider the environmental value following catastrophic windstorms of building structures sturdy enough to survive instead of becoming storm debris that clog landfills. Hurricane Katrina destroyed homes, buildings, forests, and green spaces and left behind 118 million cubic yards of debris, more than enough to fill the Louisiana Superdome 22 times over at a cost of $4 billion. One year earlier in 2004, workers removed more than forty million cubic yards of debris from Florida counties that would have filled 75 college football stadiums from top to bottom. The storms dumped debris on the streets, highways, curbsides and private yards and included fallen trees, limbs and trash from damaged buildings on private and public property.

According to local residents on Galveston Island, each high tide immediately following Hurricane Ike in 2008 seemed to dump a load of debris on the beaches. One four-mile stretch produced enough debris to fill 3,000 industrial-size trash bags just two week after the storm.

Eliminating roof shingles and tiles, framing, decking, siding, windows, and personal property from the debris field would reduce the post-storm relief costs, accelerate recovery and provide beneficial environment protection.

Weatherization & Mitigation Activities Can & Should Be Combined

Mitigation inspections complement energy audits as it is financially cost-effective and practical to inspect housing components such as the roof, attic, windows and doors for both energy and wind mitigation during one inspection. Further, existing products in the marketplace meet the requirements of both energy and mitigation.

Product examples include windows that deliver debris impact-resistance as well as energy efficiency; closed cell spray foam insulation for attics that save energy and provide a secondary water barrier for wind-driven rain; and spray foam and comparable insulation products that provide additional wind uplift resistance by helping strengthen joints between roof decking and framing members.

Research to identify and refine synergies between disaster mitigation and energy efficiency products and techniques would be invaluable. Further, protecting taxpayers' dollars invested in weatherization of homes in hurricane-prone regions by mitigating those same homes for wind and flood damage is sound. If we do not, weatherized homes destroyed in the next hurricane or flood could represent a waste of taxpayer dollars.

V. Conclusion

Immediately enhancing our nation's building practices with better adoption and enforcement of model building codes for new construction and mitigation programs to retrofit existing structures will reduce impacts from windstorm damage to families and communities. Specific strategies should:

- Provide increased funding for scientific research, innovation, behavioral research and public awareness programs regarding building structure performance
- Accelerate adoption of new construction technology findings into model building codes
- Establish an integrated, standardized approach to conducting and sharing post-storm forensic research findings to support a better understanding and acceptance of the value of adoption of strong building codes for windstorm
- Enhance and accelerate the knowledge transfer of all research findings to ensure that communities benefit from findings and codes are updated on a timely basis
- Enhance federal disaster mitigation and relief funding for communities that enact intact, model building codes and resist efforts to weaken codes upon adoption at the local level

It is our belief that this country needs to embrace a high-quality system of research-informed, engineering-based building codes and mitigation programs to ensure optimal construction practices and windstorm damage prevention that benefit all citizens. Research can improve and sustain model building codes and mitigation programs in a manner that enhances our built and natural environment. When that happens, we will prevent deaths, reduce injuries and avoid needless economic ruin for families and communities from disasters of all kinds.

VI. Appendix A – State Analysis

Key Alabama Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	0.294	0.564	5.87	15.4
What if: Pre-1974	0.339	0.683	6.67	16.9
What if: 2008	0.212	0.382	4.26	12.3
What if: BLUEPRINT for Safety Home	0.0793	0.128	1.57	5.17

* Ground-up economic losses, in $ billions

Key Alabama Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	15.1%	21.1%	13.6%	9.48%
What if: 2008	-27.9%	-32.2%	-27.5%	-20.6%
What if: BLUEPRINT for Safety Home	-73.1%	-77.3%	-73.3%	-66.5%

Key Connecticut Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	92.2	1.45	2,510	11,700
What if: Pre-1974	96.6	1.65	2,670	11,900
What if: 2008	59.0	0.827	1,560	7,890
What if: BLUEPRINT for Safety Home	20.7	0.436	499	2,940

* Ground-up economic losses, in $ millions

Key Connecticut Risk Metrics –
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	4.75%	13.7%	6.58%	1.59%
What if: 2008	-36.1%	-43.1%	-37.8%	-32.7%
What if: BLUEPRINT for Safety Home	-77.6%	-70.0%	-80.1%	-74.9%

Key Delaware Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	12.3	2.16	285	1,590
What if: Pre-1974	15.6	3.52	367	1,890
What if: 2008	7.39	0.970	167	1,030
What if: BLUEPRINT for Safety Home	3.58	0.677	81.3	467

* Ground-up economic losses, in $ millions

Key Delaware Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	26.8%	63.0%	28.7%	19.0%
What if: 2008	-39.8%	-55.0%	-41.4%	-35.2%
What if: BLUEPRINT for Safety Home	-70.9%	-68.6%	-71.5%	-70.7%

Key Florida Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	5.48	14.8	67.8	150
What if: Pre-1974	6.74	18.4	80.4	180
What if: 2008	1.53	3.46	23.5	75
What if: BLUEPRINT for Safety Home	0.959	2.09	14.9	53

* Ground-up economic losses, in $ billions

Key Florida Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	23.0%	24.4%	18.7%	-
What if: 2008	-72.1%	-76.6%	-65.3%	-
What if: BLUEPRINT for Safety Home	-82.5%	-85.9%	-78.0%	-

Key Georgia Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	0.0932	0.110	2.07	6.25
What if: Pre-1974	0.109	0.143	2.38	7.05
What if: 2008	0.0644	0.0694	1.44	4.56
What if: BLUEPRINT for Safety Home	0.0251	0.0283	0.552	1.84

* Ground-up economic losses, in $ billions

Key Georgia Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	17.5%	30.0%	15.1%	12.8%
What if: 2008	-30.8%	-37.1%	-30.6%	-27.1%
What if: BLUEPRINT for Safety Home	-73.1%	-74.3%	-73.3%	-70.6%

Key Louisiana Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	0.634	1.84	9.53	22.7
What if: Pre-1974	0.707	2.11	10.4	24.2
What if: 2008	0.430	1.22	6.59	16.2
What if: BLUEPRINT for Safety Home	0.160	0.413	2.60	6.50

* Ground-up economic losses, in $ billions

Key Louisiana Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	11.5%	14.5%	8.78%	6.74%
What if: 2008	-32.1%	-33.7%	-30.8%	-28.3%
What if: BLUEPRINT for Safety Home	-74.8%	-77.6%	-72.7%	-71.3%

Key Massachusetts Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	228	83.3	5,840	22,700
What if: Pre-1974	239	93.0	6,150	23,100
What if: 2008	147	46.5	3,760	15,600
What if: BLUEPRINT for Safety Home	50.2	16.8	1,210	5,790

* Ground-up economic losses, in $ millions

Key Massachusetts Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	5.0%	11.6%	5.20%	1.94%
What if: 2008	-35.4%	-44.2%	-35.7%	-31.4%
What if: BLUEPRINT for Safety Home	-78.0%	-79.8%	-79.2%	-74.5%

Key Maryland Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	13.7	2.21	261	2,050
What if: Pre-1974	15.6	3.07	307	2,260
What if: 2008	8.84	1.11	161	1,380
What if: BLUEPRINT for Safety Home	3.91	0.684	73.6	590

* Ground-up economic losses, in $ millions

Key Maryland Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	14.3%	39.4%	17.8%	10.4%
What if: 2008	-35.4%	-49.5%	-38.0%	-32.3%
What if: BLUEPRINT for Safety Home	-71.4%	-69.0%	-71.7%	-71.1%

Key Maine Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	14.7	1.46	374	1,870
What if: Pre-1974	16.6	1.91	430	2,010
What if: 2008	9.77	0.840	244	1,290
What if: BLUEPRINT for Safety Home	4.01	0.458	94.3	539

* Ground-up economic losses, in $ millions

Key Maine Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	12.6%	31.5%	14.9%	7.65%
What if: 2008	-33.5%	-42.3%	-34.8%	-30.7%
What if: BLUEPRINT for Safety Home	-72.7%	-68.5%	-74.8%	-71.2%

Key Mississippi Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	273	449	5,090	19,800
What if: Pre-1974	310	537	5,740	21,200
What if: 2008	201	305	3,630	16,900
What if: BLUEPRINT for Safety Home	75.7	98.9	1,330	7,680

* Ground-up economic losses, in $ millions

Key Mississippi Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	13.4%	19.7%	12.8%	6.77%
What if: 2008	-26.6%	-31.9%	-28.6%	-14.9%
What if: BLUEPRINT for Safety Home	-72.3%	-77.9%	-73.9%	-61.2%

Key North Carolina Risk Metrics State-wide losses

(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	0.352	1.01	5.05	15.3
What if: Pre-1974	0.460	1.39	6.33	18.3
What if: 2008	0.187	0.469	2.90	10.5
What if: BLUEPRINT for Safety Home	0.0910	0.217	1.44	5.43

* Ground-up economic losses, in $ billions

Key North Carolina Risk Metrics - Percent reduction in State Wide Loss

(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	30.7%	37.3%	25.4%	19.3%
What if: 2008	-46.9%	-53.7%	-42.6%	-31.3%
What if: BLUEPRINT for Safety Home	-74.1%	-78.6%	-71.5%	-64.6%

Key New Hampshire Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	11.1	-	232	2,020
What if: Pre-1974	12.3	-	269	2,180
What if: 2008	7.55	-	150	1,410
What if: BLUEPRINT for Safety Home	3.04	-	58.6	549

* Ground-up economic losses, in $ millions

Key New Hampshire Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	10.9%	-	16.3%	7.95%
What if: 2008	-32.1%	-	-35.3%	-30.1%
What if: BLUEPRINT for Safety Home	-72.7%	-	-74.7%	-72.9%

Key New Jersey Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	134	8.84	3,340	18,100
What if: Pre-1974	143	10.1	3,620	18,800
What if: 2008	85.7	5.10	2,070	12,100
What if: BLUEPRINT for Safety Home	32.1	2.84	735	4,500

* Ground-up economic losses, in $ millions

Key New Jersey Risk Metrics –
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	6.76%	14.5%	8.47%	3.91%
What if: 2008	-36.1%	-42.3%	-38.0%	-33.0%
What if: BLUEPRINT for Safety Home	-76.1%	-67.9%	-78.0%	-75.1%

Key New York Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	213	13.7	5,710	25,400
What if: Pre-1974	222	15.0	6,010	25,800
What if: 2008	132	7.68	3,440	16,600
What if: BLUEPRINT for Safety Home	46.1	3.52	1,120	6,150

* Ground-up economic losses, in $ millions

Key New York Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	4.17%	9.73%	5.29%	1.46%
What if: 2008	-38.2%	-43.9%	-39.7%	-34.7%
What if: BLUEPRINT for Safety Home	-78.4%	-74.3%	-80.4%	-75.8%

Key Pennsylvania Risk Metrics State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	18.9	-	297	3,740
What if: Pre-1974	20.0	-	321	3,950
What if: 2008	12.6	-	197	2,480
What if: BLUEPRINT for Safety Home	5.45	-	98.7	977

* Ground-up economic losses, in $ millions

Key Pennsylvania Risk Metrics – Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	5.72%	-	7.99%	5.76%
What if: 2008	-33.1%	-	-33.6%	-33.6%
What if: BLUEPRINT for Safety Home	-71.1%	-	-66.8%	-73.8%

Key Rhode Island Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	59.1	5.99	1,650	6,130
What if: Pre-1974	62.4	6.80	1,740	6,280
What if: 2008	35.8	3.30	990	3,860
What if: BLUEPRINT for Safety Home	11.8	1.56	295	1,440

* Ground-up economic losses, in $ millions

Key Rhode Island Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	6%	14%	5%	2%
What if: 2008	-39%	-45%	-40%	-37%
What if: BLUEPRINT for Safety Home	-80%	-74%	-82%	-77%

Key South Carolina Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	206	402	4,010	11,000
What if: Pre-1974	271	586	5,090	13,300
What if: 2008	107	173	2,140	6,940
What if: BLUEPRINT for Safety Home	48.0	74.4	969	3,200

* Ground-up economic losses, in $ millions

Key South Carolina Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	31.5%	45.8%	27.0%	20.8%
What if: 2008	-48.4%	-57.0%	-46.6%	-36.9%
What if: BLUEPRINT for Safety Home	-76.8%	-81.5%	-75.8%	-70.9%

Key Texas Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	0.932	2.14	16.3	47.6
What if: Pre-1974	1.09	2.60	18.5	52.7
What if: 2008	0.562	1.12	10.7	32.8
What if: BLUEPRINT for Safety Home	0.206	0.398	3.85	12.7

* Ground-up economic losses, in $ billions

Key Texas Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	17%	21%	14%	11%
What if: 2008	-40%	-48%	-35%	-31%
What if: BLUEPRINT for Safety Home	-78%	-81%	-76%	-73%

Key Virginia Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	56.8	40.0	1,380	5,130
What if: Pre-1974	63.9	48.2	1,550	5,530
What if: 2008	37.2	24.5	907	3,520
What if: BLUEPRINT for Safety Home	14.5	12.4	323	1,389

* Ground-up economic losses, in $ millions

Key Virginia Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	12.6%	20.5%	12.2%	7.87%
What if: 2008	-34.4%	-38.8%	-34.3%	-31.3%
What if: BLUEPRINT for Safety Home	-74.5%	-69.1%	-76.6%	-72.9%

Key Vermont Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	1.06	-	2.46	217
What if: Pre-1974	1.18	-	3.14	245
What if: 2008	0.706	-	1.45	141
What if: BLUEPRINT for Safety Home	0.291	-	0.725	56.9

* Ground-up economic losses, in $ millions

Key Vermont Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	10.8%	-	27.5%	12.6%
What if: 2008	-33.6%	-	-41.0%	-35.0%
What if: BLUEPRINT for Safety Home	-72.6%	-	-70.6%	-73.8%

Key West Virginia Risk Metrics
State-wide losses
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	40.4	-	-	5,590
What if: Pre-1974	46.5	-	-	7,000
What if: 2008	25.7	-	-	3,360
What if: BLUEPRINT for Safety Home	13.0	-	-	2,020

* Ground-up economic losses, in $1,000

Key West Virginia Risk Metrics -
Percent reduction in State Wide Loss
(Single family homes only)

Scenario	Average Annual Loss	10 yr loss	100 yr loss	1,000 yr loss
Current Bldg Stock	-	-	-	-
What if: Pre-1974	15.2%	-	-	25.2%
What if: 2008	-36.4%	-	-	-39.9%
What if: BLUEPRINT for Safety Home	-67.7%	-	-	-63.8%

VII. Appendix B – Leslie Chapman-Henderson Biography

Leslie Chapman-Henderson
President/CEO
Federal Alliance for Safe Homes, Inc. - FLASH®
& Managing Consultant – ICC Foundation

Leslie Chapman-Henderson is President/CEO of the Federal Alliance for Safe Homes, Inc. - FLASH®, an award-winning national, non-profit corporation founded in 1998 by a collaborative of organizations dedicated to strengthening homes and safeguarding families from disaster. Today, FLASH is the fastest growing disaster safety education organization in the United States with more than 100 partners, including FEMA, Georgia Pacific, Institute for Business & Home Safety, International Code Council, Mercedes Homes, NeighborWorks, NOAA, RenaissanceRe, South Carolina Insurance Department, State Farm Insurance Companies, Texas Department of Insurance, Texas Tech Wind Science & Engineering, The Home Depot, University of Florida, USAA and WeatherPredict Consulting, Inc.

Ms. Chapman-Henderson and FLASH have championed the cause of disaster-resilient construction methods through the creation of groundbreaking consumer awareness programs like the recently-launched StormStruck: A Tale of Two Homes® at INNOVENTIONS at Epcot® at the Walt Disney World Resort and Blueprint for Safety®, an educational program on disaster-resistant construction techniques for homebuilders, homeowners and design professionals.

Among Ms. Chapman-Henderson's civic, community and professional awards are the 2008 National Hurricane Conference Outstanding Achievement in Mitigation Award, 2008 Governor's Hurricane Conference Corporate Award, 2006 Texas Silver Spur Award for Public Education Excellence, 2006 Governor's Hurricane Conference Public Information/Education Award, 2005 National Hurricane Conference Outstanding Achievement in Public Awareness Award, 2005 National Weather Association Walter J. Bennett Public Service Award, 2005 NOAA Environmental Hero Award, 2002 National Hurricane Conference Outstanding Achievement in Mitigation Award, 2002 FEMA Special Recognition Award, 2002 Florida Fire Chiefs Association Excellence in Community and Public Education Award, 2002 Florida Emergency Preparedness Association Corporate Award, and 2001 Governors Hurricane Conference Public Education Award.

Additional award-winning FLASH outreach projects include two seasons of television with the nationally-syndicated programs *Bob Vila* and *Home Again with Bob Vila;* a one-hour, nationally televised multi-hazard PBS Special entitled, *Blueprint for Safety … Disaster-resistant Homes;* and "A Tale of Two Houses," a multi-media awareness campaign, showcasing code and code-plus construction success stories in wildfire and high wind zones.

Ms. Chapman-Henderson currently serves as co-chair of the legislatively-created My Safe Florida Home Advisory Council, as a board trustee for Florida International University - International Hurricane Research Center, as advisory council member for the newly-created Florida State University Catastrophic Storm Risk Management Center and as managing consultant for the International Code Council Foundation.

Her past service includes consumer representative and chair for the Florida Hurricane Catastrophe Fund Advisory Council under Governor Charlie Crist and former Governor Jeb Bush, guest lecturer at the University of Florida - School of Construction and as a Florida representative to the Federal Communications Commission WARN Committee.

Other past service includes trustee for the Florida Fire and Emergency Services Foundation; consumer representative to the Louisiana Uniform Building Code Task Force; consumer representative and vice chair on the 2005 Florida Legislative Task Force on Long Term Solutions for Florida's Hurricane Insurance Market; and insurance consumer representative to the 2006 Property and Casualty Insurance Reform Committee chaired by former Lt. Governor Toni Jennings.

Ms. Chapman-Henderson has a bachelor's degree from the University of Florida and resides in Tallahassee. She is married to Robert A. Henderson and has one child.