

Disaster Safety Review

TORNADOES

Preparedness and Strong
Construction Choices Can Save Lives

PAGE 4



Rating the States

A ROADMAP FOR ESTABLISHING BETTER BUILDING STANDARDS

The coastlines from Texas to Maine are home to some 50 million people and nearly \$10 trillion in insured properties. Yet, a new report by the Insurance Institute for Business & Home Safety (IBHS) finds eight of these 18 coastal states either fail to enforce or uniformly apply residential building codes, allow for weakening of the existing code, lack contractor licensing requirements or training, or are operating without a statewide code.

The lack of strong, well-enforced statewide building codes is of particular concern when considering that in the last decade, 16 of the 20 counties with the largest number of new housing units under construction were located in these same coastal states, according to the National Oceanic Atmospheric Administration (NOAA).

With more people living in harm's way than ever before, it is important to understand

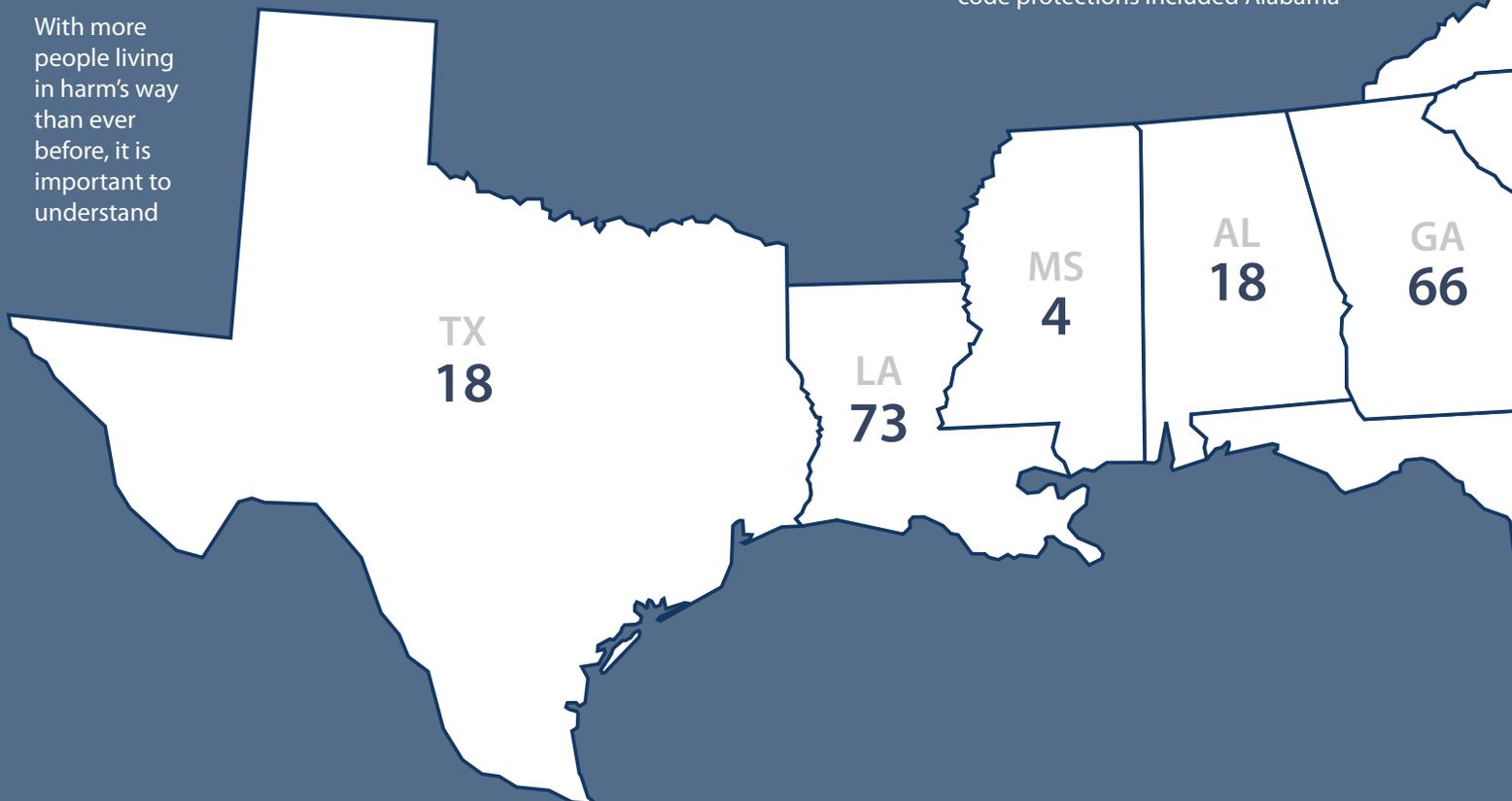
what is guiding the construction of homes in these vulnerable states. The IBHS report, "Rating the States: An Assessment of Residential Building Code and Enforcement Systems for Life Safety and Property Protection in Hurricane Prone Regions," utilizes engineering expertise and regulatory analysis to create a model that evaluates building code systems in the states located along the Gulf of Mexico and the Atlantic Coast. The report also includes information about how states can improve building code standards and reduce property damage during coastal storms.

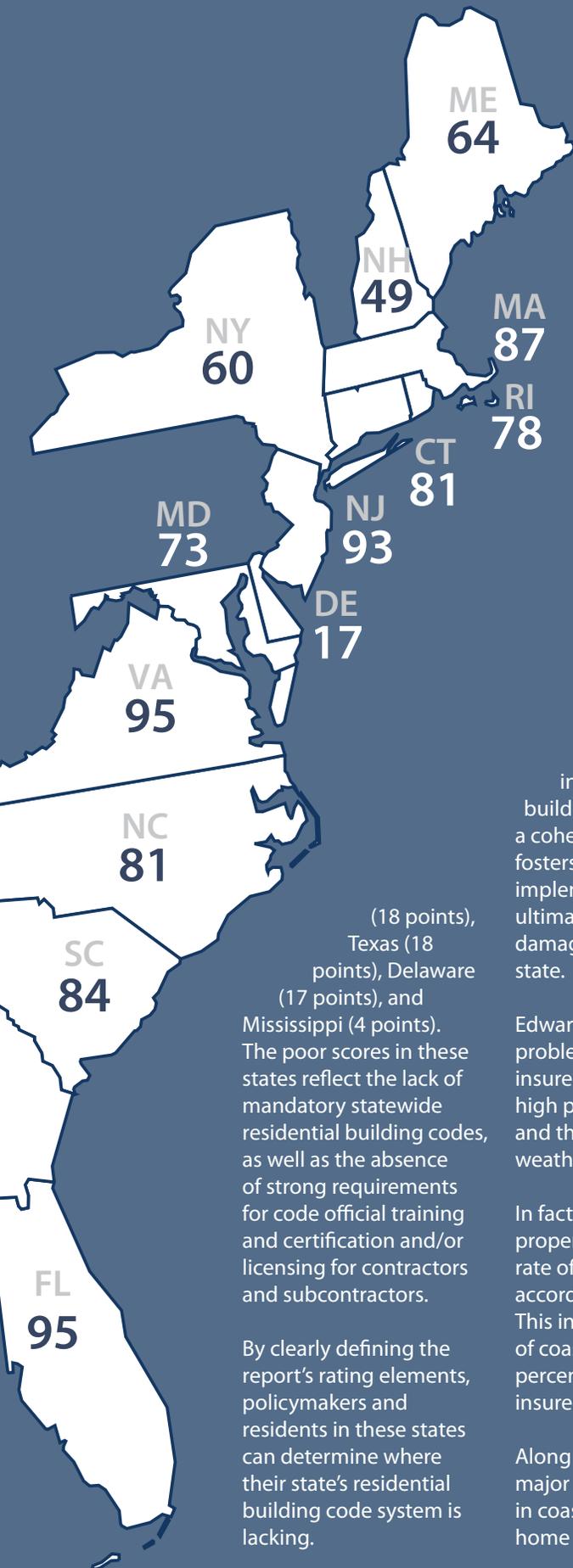
"The report goes beyond just assessing each state's code system," said Julie Rochman, IBHS president and CEO. "By providing each state with specific information and the tools needed to improve its building code regime, this study seeks to help states better protect their citizens. It also gives interested residents useful data so that they can understand the need for, and demand, better building codes."

In order to achieve an accurate assessment of all 18 states, IBHS developed a list of 47 objective questions. The questions were divided into three main areas, beginning with the most heavily weighted area of code adoption and enforcement, which comprised 50 percent of the scores given. The remaining two areas were code official training and certification and licensing requirements for construction trades, each of which accounted for 25 percent of the scores. States were awarded the value of a question when their answer was consistent with promoting life safety.

Although no state earned a perfect score of 100 points, three states achieved more than 90 points: Florida (95 points), Virginia (95 points), and New Jersey (93 points). These states scored high due to a combination of strong statewide residential building codes and comprehensive building code regulatory processes.

States with the weakest building code protections included Alabama





By clearly defining the report's rating elements, policymakers and residents in these states can determine where their state's residential building code system is lacking.

"The primary objective of this study was to highlight the most important residential building code standards and enforcement mechanisms," said Wanda Edwards, IBHS director of code development. "We wanted to show states what they are doing right and where they can improve."

At its core, a residential building code is a minimum building standard used in the design, construction and maintenance of homes. The intent of residential building codes is to increase the safety and integrity of homes to reduce deaths, injuries and property damage from a wide range of hazards.

Failure to implement a statewide code results in a hodgepodge of different standards and levels of enforcement that can change from city to city and county to county. This increases construction costs for builders and designers. The lack of a cohesive building code system also fosters confusion and leads to the implementation of weaker codes, ultimately raising the risk of property damage during severe weather in the state.

Edwards notes this is particularly problematic in coastal states, where insured property values are highest, high population density is common, and the potential for catastrophic weather-related losses is greatest.

In fact, the insured value of coastal properties grew at a compound annual rate of 7 percent from 2004 to 2007, according to a study by AIR Worldwide. This increase makes the insured value of coastal properties account for 17 percent of the insured value of all insured properties in all states.

Along with insurance risks, there are major economic and life safety concerns in coastal communities, which often are home to residents, who have moved to

hurricane-prone areas with little prior experience with such powerful storms. Without a strong building code to govern the properties where these new residents are living, the potential for the fabric of the community to be torn apart by a hurricane is very real, says Edwards.

"When people are displaced, it has a direct impact on the local economy," said Edwards. "When a storm strikes, it creates a cascading effect on that area, making it important for people to return home after a disaster."

This report presents a valuable opportunity for discussions about the path forward to create stronger, safer communities, says Edwards. Now that the report has been made public and a clear roadmap toward improvement has been identified, we are hopeful that states will take the necessary steps to more widely adopt and enforce modern codes.

"This will help save lives, reduce future disaster recovery costs, and limit insured losses in the long-term. In the short-term, the study provides a forum for discussions to begin," said Edwards.

Media stories about the report have helped to foster these discussions. Coverage has been quite strong since the report's release and interest is continuing to grow. Newspapers in two of the states that received among the lowest ratings – Alabama and Mississippi – have shown considerable interest in the report's findings. IBHS met with editors and reporters at the Mobile Press-Register in Alabama and the Biloxi Sun-Herald in Mississippi, and both papers subsequently published an editorial and a strong article, respectively, outlining the need for strong, well-enforced building codes in their states. This kind of coverage helps advance our building code agenda forward.

Learn more about IBHS' building code and other public policy work at www.DisasterSafety.or/PublicPolicy/BuildingCodes.

TORNADOES

Preparedness and Strong Construction Choices Can Save Lives

The science of predicting tornadoes got a boost recently with a new study by Columbia University's International Research Institute for Climate and Society, where researchers are using computer models to understand how past climate shapes future tornado activity. However, IBHS scientists say forecasting models are a long way off and they stress that preparedness and strong construction choices offer the best defense against tornadoes.

This year has gotten off to a fast and deadly start for tornado activity with a record 383 preliminary reports of tornadoes and a total of 57 deaths through April 6, 2012, according to National Weather Service (NWS) data. The 20-year average is 144 tornadoes for the first 90 days of the year.

"A warmer than normal winter will often lead to an earlier start and an earlier end to tornado season. But it's very hard to predict more than two weeks out whether we are going to have the right conditions for severe thunderstorms, and it's even more difficult to pinpoint tornadoes," said Dr. Ian Giammanco, IBHS research scientist and meteorologist. "The Columbia study begins to scratch the surface of tornado forecasting, and is headed in the right direction by identifying the environmental characteristics that have caused tornadoes in the past and providing forecasts based on those, but we have a very, very long way to go."

With the peak of tornado season still ahead in May, there are plenty of reasons for residents to be on-guard when the weather turns severe. IBHS has been sharing its guidance through traditional and social media channels in an effort

to provide information to people who may face future storms, and to reach those who are repairing and rebuilding following the tornadoes that have already done so much damage this year. Early preparation and making smart construction choices, when building a new home or renovating an existing one, are critical steps toward becoming as prepared as possible for tornadoes.

Begin by creating a plan for where you will seek shelter if a tornado threatens. If you don't have a safe room and cannot get to a community shelter, seek refuge in an interior area of the building you are in and stay away from windows.

"The more walls between you and the outside, the better," said Dr. Timothy Reinhold, IBHS chief engineer and senior vice president for research. "We know that particularly in the middle of the country, homes have little resistance to uplift and lateral loads and the connections tend to be more brittle than homes built in coastal areas."

If you're rebuilding after a tornado, re-roofing or renovating your existing home, seize the opportunity to strengthen the connections. According to IBHS research, homes that have been strengthened at connection points between the roof and walls and walls and foundation have a better chance of surviving intact or with minor cosmetic damage, if subjected to lower-level tornadoes or on the outer edges of stronger tornadoes.

"While only a few specialty buildings are designed to withstand the direct impact of a severe tornado, good construction choices can give added protection and increase the likelihood that at least

part of a home will remain standing to provide some shelter," Reinhold said.

IBHS Research Engineers Dr. Tanya Brown and Dr. Zhuzhao Liu recently returned from a post-tornado field investigation, where they got an up-close look at the value of strong construction. The pair joined a NWS team to survey properties in an area hit by an EF-2 tornado outside Columbia, S.C.

There was a stark contrast in the varying performance of two homes, which were subjected to similar tornado condition, built about three years apart, and located less than a mile from each other, Brown said.

"One of the homes was not well anchored and the construction was poor. I did not see evidence of any real connections. That home was destroyed," Brown said. "And half a mile down the road, we saw a similarly-aged home with some damage to the roof structure, but the interior walls were all there and a large portion of the roof was still there. It was remarkable the difference in performance due to the quality of construction."

Looking ahead, there is still plenty of opportunity for tornadoes to cause widespread damage. Tornado season's migratory pattern means a number of states likely will face the risk of tornadoes between now and summer.

"Severe thunderstorms will continue to be a feature of interest in the coming months. The peak time for tornado activity is May," Giammanco said. "The location of severe thunderstorm activity shifts with time. You see it start out in the southeast and then it migrates

back to the traditional tornado alley, to Texas and Oklahoma, and then into Kansas and Nebraska and finally into the Dakotas before moving into Canada.”

To keep track of the changing weather conditions, see eight-day advance weather forecasts, and sign up for RSS feeds about tornado warnings, visit the Storm

Prediction Center created by the National Oceanic Atmospheric Administration (NOAA) at www.spc.noaa.gov.

Find resources to help strengthen the connections in your home or business, prepare your family and employees for severe weather, and guidance for building a safe room in the special section Reality of Tornadoes at the IBHS website www.disastersafety.org, or visit the IBHS Facebook page at www.facebook.com/disasterprep.

2012 TORNADOES BY THE NUMBERS

383

Preliminary reports of tornadoes through April 6, 2012¹

Fatalities linked to tornadoes

57

MARCH 2012

128

 Tornadoes in 22 states²

Number of tornadoes by state in March (top five)

Kentucky 21

Alabama 14

Louisiana 14

Tennessee 14

Mississippi 12

¹20-year average for first three months of the year is 144 tornadoes.

²20-year average for April is 155 tornadoes.

Source: National Weather Service, Storm Prediction Center

The Year of the ROOF

2011 was a record-setting year for weather disasters. Sadly, the records set involved fatalities as well as property damage amounts, locations and times of year. To combat such losses going forward, the Insurance Institute for Business & Home Safety (IBHS) is conducting building science at its world-class Research Center. This research will produce effective, workable real-world solutions to make homes and businesses stronger and safer in the face of Mother Nature's wrath.

The initial primary area of IBHS focus is roofing systems; in fact, IBHS has dubbed 2012 its "Year of the Roof." Roof damage is the most frequent source of property damage. Once the roof fails during almost any kind of natural disaster, whether caused

by wind, water or fire, it is likely that the rest of the building will suffer significant damage.

"The roof is a building's first line of defense against the elements, yet it too often is also the most vulnerable point on a home or commercial building," said Julie Rochman, IBHS president and CEO. "Roof cover damage occurs in the vast majority of wind-related property insurance claims. As a result, insurers replace and repair millions of roofs and roof components each year. Insurers also spend countless claims dollars on interior water damage, which occurs when roof cover is blown off."

Roof-related precautions are necessary virtually everywhere across the U.S., because high winds can be present during many different severe weather events including hurricanes, tornadoes, thunderstorms, wildfires, tropical storms and straight-line

windstorms. While IBHS has always made roof systems a priority, this year, the Institute has brought new focus to the issue and laid out a research and communications campaign designed to make short- and long-term improvements in both new and existing roofing systems.

"We are conducting several field and laboratory roofing research programs, and then translating what we learn into actionable information for insurers, consumers and roofing professionals," explained Rochman. "We are aggressively promoting use of stronger materials, effective construction techniques when new homes are built and when roofs are repaired or replaced due to age and wear, as well as after disaster strikes."

Inside the large test chamber at the IBHS Research Center, engineers are putting roofs, roofing components and rooftop



equipment to the test against realistic wind events. In addition, IBHS is advancing the lab's ability to replicate full-scale hailstorms, including using hundreds or thousands of hailstones in each test. This unprecedented research will build on work done in other labs that use single steel balls or ice balls to replicate hail. Other research will build on last year's IBHS work demonstrating the importance and benefits of: 1) sealing the roof deck to prevent water damage; and, 2) using ring shank nails to strengthen the connection among roof system elements.

"Because pieces of roofs – and entire roofs – are replaced so frequently, both relatively small and large improvements in roofing products and installation techniques can produce significant cost savings to building owners and insurers in a relatively short period of time," said Rochman. "The number and variety of severe weather events in 2011 gave us a lot of hooks to hang our information on for media and consumers. 2012 has already started off with a bang, and we plan to leverage events again this year to further raise IBHS' profile as a credible source of loss mitigation information both before and after severe weather strikes."

The roofing theme is front and center for IBHS communications this year, added Brenda O'Connor, IBHS Senior vice president of public affairs.

"We have developed great resources to educate consumers about how different hazards affect roofs. We can also give them the tools they need to make good choices when they repair or replace their roof," O'Connor said.

IBHS also recognizes the value of having other credible organizations carry the Institute's information, data or other material to a broader audience. One example is the work the Institute is doing with roofing industry allies. "We are working to develop and strengthen relationships with national roofing organizations," notes Dr. Timothy Reinhold, IBHS senior vice president of

research and chief engineer. "We are also talking to Owens Corning – a major manufacturer of asphalt shingles – so that we can discuss areas of mutual interest and research concerning high-wind shingle performance."

IBHS also is working closely with the Roofing Industry Committee on Weather Issues (RICOWI). In addition to cooperating on post-storm investigations, IBHS serves on the RICOWI Executive Committee.

"Should a major hurricane strike the U.S. in 2012, IBHS and RICOWI will go out into the field once again to investigate what worked and what did not work to protect lives and property in the affected areas," Reinhold said. "Our organizations also will be working to develop a guide to help with identification of a variety of roofing products, to assess the roof's condition and guidance on repair or replacement of specific types of roof cover."

Throughout 2012, IBHS experts will be attending roofing industry conferences and meeting with organizations, such as the Roofing Contractors Institute (RCI) and Asphalt Roofing Manufacturers Association (ARMA), to present IBHS research findings and discuss opportunities to work together. IBHS also is continuing a longtime partnership with the National Roofing Contractors Association (NRCA). Prior projects with NRCA include IBHS funding to develop a training and certification program for installers of impact-rated roofing product installers, and an educational program for home owners.

Roofing-related research has been ongoing at the IBHS Research Center for more than a year. The asphalt shingle testing program is well underway. So far, researchers have laid down necessary foundational work that underpins a long-term research program. This program is aimed at improving the industry's ability to predict shingle performance in high wind events and, ultimately,

improve shingle performance in such events. This testing will enable IBHS scientists to further investigate patterns witnessed in post-disaster hurricane field investigations into shingle roofing performance. In addition, IBHS has initiated a program of testing designed to explore the effects of aging on roof cover performance.

Commercial rooftop equipment testing is being conducted to help validate existing guidance for proper anchorage/attachment methods.

"Rooftop equipment is frequently poorly attached to roofs, often simply weighed with cinder blocks or other ballast. As a result, this expensive, important equipment is often damaged in high wind events, becoming debris that damages property, or leaving a commercial space unconditioned and uninhabitable" Reinhold said. "Damage to rooftop equipment also can cause small or large openings in the roof that allow water penetration, which can prolong business interruption and displacement."

Generally accepted wind engineering standards, such as American Society of Civil Engineers (ASCE) 7 – and the building codes that reflect these standards – have only recently begun to provide guidance on wind loads for rooftop equipment. "So far, all of this guidance is based on wind tunnel tests with very small models. As a result, there can be some issues with the adequacy and applicability of the resulting information," Reinhold said.

Reinhold noted, "IBHS is seeking to validate and improve existing guidance and help manufacturers and engineers provide adequate anchorage for these items. In addition, FEMA has provided some simple retrofit guidance. We will work to assess that as well."

This summer, IBHS will conduct a high wind/hurricane demonstration for media at the Research Center. The test specimen will be two 30 ft. by 20 ft., 1-story masonry specimens, one of

» *Continued on back cover*

» *The Year of the Roof, continued*

which will include typical vulnerabilities and one of which will be appropriately reinforced in those same areas. The two structures will be placed side by side on the turntable in front of the large test chamber fans, which then will be cranked up to over 120 mph. The test will be stopped at lower wind speeds if there is failure of some key aspects of the less resilient structure.

This demonstration is designed to highlight several relatively low-cost mitigation opportunities for a strip mall type building. These features include: perimeter edge flashing and single-ply roof membranes; top-of-wall connections in masonry structures; roof-mounted equipment; and, overhead rollup doors. Target audiences for this

demo include consumers and building owners, designers and engineers and contractors

Everything IBHS learns in the Research Center and through field research is publicly shared through real-world applications in the Institute's signature programs that reach consumers, public policymakers and other allies in the effort to create stronger, safer communities.

"One major driving force in the move toward stronger roofing practices is the IBHS FORTIFIED program," Rochman said. "For example, whether it's building a new house or business or retrofitting an existing home, FORTIFIED requires a stronger nailing pattern, a sealed roof deck and a roof covering that will

perform better during the particular weather conditions that property is likely to face."

Throughout 2012, IBHS members can expect a variety of initiatives to focus public attention on solutions to improve the quality of new and existing roofing systems. You can join IBHS in this campaign by using roofing resources located on the IBHS website at www.DisasterSafety.org.

"While this is 'The Year of the Roof,' I can assure you that IBHS will be focused on improving roofing systems in this country for years to come," said Rochman.



The Insurance Institute for Business & Home Safety (IBHS) mission is to conduct objective, scientific research to identify and promote effective actions that strengthen homes, businesses, and communities against natural disasters and other causes of loss. Please visit our web site at www.DisasterSafety.org.

Insurance Institute for Business & Home Safety
4775 East Fowler Ave.
Tampa, FL 33617
(813) 286-3400
DisasterSafety.org

