Hazard Resilient Buildings Workshop Summary

Trey Bell, Caylah Cruickshank, and Rachel Riley
Southern Climate Impacts Planning Program
University of Oklahoma

SCIPP
A NOAA CAP TEAM

December 2025

Suggested Citation:

Bell, T., C. Cruickshank, and R. Riley, 2025: Hazard Resilient Buildings Workshop Summary. Southern Climate Impacts Planning Program, 17 pp. https://southernclimate.org/wp-content/uploads/Hazard-Resilient-Buildings-Workshop-Summary.pdf

Cover Photos:

Top Left & Bottom Right: Photos from the Hazard Resilient Buildings Workshop. Credit: SCIPP
Top Right: Home under construction. Credit: IBHS FORTIFIED
Bottom Left: Sealed roof deck under construction. Credit: IBHS FORTIFIED

The workshop was organized by the Southern Climate Impacts Planning Program (SCIPP; https://www.southernclimate.org/). The workshop summary was prepared by staff at SCIPP.

Executive Summary

In October of 2025, representatives from the home builder, insurance, and real estate industries in central Oklahoma participated in the Hazard Resilient Buildings Workshop, hosted by the Southern Climate Impacts Planning Program (SCIPP), a NOAA CAP/RISA team. The geographical focus was central Oklahoma – specifically the counties in and around the Oklahoma City, OK, Metropolitan Statistical Area – though participation from outside of this region was welcomed. SCIPP collaborated with individuals from several organizations on the design and goals of the workshop.

A total of 31 individuals attended the workshop, representing a diverse array of viewpoints and areas of expertise. While the original intent was to include only members of the home builder, insurance, and real estate industries, the attendee pool ultimately expanded to also include representatives from academia, city government, and roofing organizations.

Impacts from damaging wind, large hail, and tornadoes have long caused significant headache and stress for homeowners in central Oklahoma. In recent years, the cost of repairs and cost to insure these properties has risen steeply, drawing significant attention to the topic. One solution to address some of the above-described problems is to increase awareness of the importance of building homes that can better withstand known hazards, whether through new construction or through various retrofitting techniques on existing homes.

Formal presentations were given by eight individuals who represented several industries. They covered topics including how to build more structurally sound homes, National Weather Service storm survey criteria, and the Oklahoma Insurance Department "Strengthen Oklahoma Homes" program. Much of the discussion throughout the workshop focused on IBHS FORTIFIED, a voluntary, beyond-code construction standard designed to reduce losses during severe weather events. Following the practitioner presentations and a networking lunch, participants engaged in small breakout group discussions and shared several forward-looking ideas to help strengthen resilience efforts and improve communication with homeowners. Particularly, workshop participants recommended the following:

1. **Continue holding meetings like this one** - There was near unanimous interest in holding additional workshops to maintain momentum and continue building partnerships.
2. **Create homeowner education resources** - Help buyers know what to ask during the homebuying process. The group emphasized that consumers need to hear consistent messaging from all sides, including roofers, contractors, realtors, and others.

3. **Improve cross-industry collaboration** - Real progress will require working groups that keep the conversation going and ensure everyone is aligned. Risk perception was flagged as a major challenge; industries should be prepared to advertise a unified message in the immediate aftermath of a disaster.
4. **Improve the appraisal process & bundle FORTIFIED upgrades into the initial home cost** - If appraisers don't account for the added value of resilience features, buyers may be caught off guard by unexpected costs at closing.
5. **Include FORTIFIED status directly in listings in the Multiple Listing Service** - This could help normalize resilience as a selling point in the housing market.
6. **Revive a summit-style event focused on building resilience** - Similar to the 2019 National Tornado Summit, the suggestion is to expand the endeavor to include realtors and home builders alongside emergency managers, insurers, and meteorologists.

Some of the listed recommendations could be facilitated by SCIPP, including organizing additional meetings and workshops. Larger efforts, including reviving a summit-style event focused on building resilience and improving the home appraisal process would require expanded collaboration with multiple partners across multiple industries. SCIPP can provide hazard related data and resources to members of the home builder, insurance, and real estate industries in order to make informed decisions regarding building resilience, through tools like the SCIPP Simple Planning Tool.

Introduction & Workshop Motivation

Impacts from damaging wind, large hail, and tornadoes have long caused significant headache and stress for homeowners in central Oklahoma. The resulting damages can be costly for both homeowners to repair and insurance companies to insure. In recent years, however, the cost of these repairs and cost to insure these properties has risen steeply, drawing significant attention to the topic.[1]

Over the past decade, several concerning trends have increased the visibility of this issue. Across the United States, insurers are sometimes forced into bankruptcy due to insurmountable losses taken over time.[2] Insurance rates have skyrocketed, particularly in disaster-prone states such as Texas, Louisiana, and Florida.[3] In some cases, insurance providers have pulled out of state markets entirely due to unmanageable costs associated with the increasing severity and impact of climate related disasters.[4] Additionally, many insurers have imposed stricter limitations on the types of hazards covered under homeowners' policies.[5]

One solution to address some of the above-described problems is to increase awareness of the importance of building homes that can better withstand known hazards, whether through new construction or through various retrofitting techniques on existing homes. While implementing these measures can introduce additional costs, they are often marginal when compared to the full cost of repairing or rebuilding a home. This marginal cost pays off significantly through the lifespan of the structure.

The Southern Climate Impacts Planning Program (SCIPP) organized a workshop to bring together members of the home builder, insurance, and real estate industries to begin to address the topic. The geographical focus was central Oklahoma – specifically the counties in and around the Oklahoma City, OK, Metropolitan Statistical Area – though participation from outside of this region was welcomed. SCIPP collaborated with individuals from several organizations on the design and goals of the workshop.

Workshop Overview & Presentation Summaries

The Hazard Resilient Buildings Workshop took place on October 1, 2025, at the National Weather Center, located on the campus of the University of Oklahoma, in Norman, OK. A total of 31 individuals attended the workshop, representing a diverse array of viewpoints and areas of expertise. While the original intent was to include only members of the home builder, insurance, and real estate industries, the attendee pool ultimately expanded to also include representatives from academia, city government, & roofing practitioners.

Formal presentations were given by eight individuals who represented several industries. They covered topics including how to build more structurally sound homes, National Weather Service storm survey criteria, and the Oklahoma Insurance Department "Strengthen Oklahoma Homes" program. The full list of speakers and presentations is provided in Appendix A. The following sections provide short summaries of each presentation.

Oklahoma Weather Hazards and Their Impacts

Presented by: Trey Bell, Southern Climate Impacts Planning Program

While Oklahoma experiences a laundry list of different weather phenomena on an annual basis, including hazards like flooding rainfall and crippling winter storms, this workshop focused on three hazards that often cause immediate and significant damage to homes and other infrastructure: thunderstorm winds, large hail, and tornadoes.

Tornadoes are often the headline severe weather hazard experienced in Oklahoma. On average, 53 tornadoes occur annually across the state.[6] They cause varying amounts of damage, ranging from minimal to catastrophic, often in a very short amount of time. Severe winds do not have to be tornadic in nature to cause extensive and expensive damage to homes. One example is a 105-mph wind gust that occurred during a thunderstorm event in Moore, OK, on May 6, 2024. It caused an estimated $150,000 worth of property damage.[7] Further illustrating the need for a collaborative event like this workshop, since 1980, Oklahoma has experienced 115 billion-dollar disasters – 76 of which were linked to severe storms and cost an estimated $20–$50 billion in damage.[8]

The presentation further explained that nearly 90% of tornadoes experienced in central Oklahoma since 1950 were rated F/EF-2 or lower. Only 3% of them were F/EF-4 or higher.[9] Meteorologists have become more effective at detecting lower-end tornadoes in the last two decades compared to prior ones. An examination of tornado count and path distribution across central Oklahoma indicates a largely uniform spatial distribution, dispelling the idea that any one portion of the metro has a higher propensity of experiencing a tornadic event, even if a particular location has previously been impacted by multiple high-end tornadic events in a relatively short time frame.[10] Regarding hail, examples were shown that highlighted how extreme hail events can push damage costs into the billions of dollars. Many locations in Oklahoma experience four or more days per year with 1" or greater hail.[11] Damaging hail the size of golf balls or greater is relatively common across central Oklahoma.

IBHS Research, Experiments, and Examples of Severe Weather Mitigation Techniques

Presented by: Rachael Gauthier, Insurance Institute for Business & Home Safety

The Insurance Institute for Business & Home Safety (IBHS) is a nonprofit organization dedicated to scientific research and communication on building safety. IBHS conducts experiments in a state-of-the-art research facility in Richburg, South Carolina, where conditions such as wind, wind-driven rain, hail, and wildfire are simulated under controlled environments. These experiments have identified multiple methods for improving home and building resilience to these hazards.

Based on this research, IBHS developed a voluntary, beyond-code construction standard known as FORTIFIED, designed to reduce losses during severe weather events. Stronger building standards not only increase occupant safety but allow buildings to remain or become usable more quickly after a damaging event. In addition to research, IBHS engages in public policy efforts to advocate for stronger building codes. Despite these recommendations and significant nationwide loss reductions over the past two decades, building code implementation and enforcement remain inconsistent across the United States, as codes are determined at the state level.[12] In Oklahoma, local jurisdictions can further modify statewide codes, resulting in fragmented standards between municipalities. The various FORTIFIED building standards referenced in this presentation are outlined in Table 1.

FORTIFIED Roof	FORTIFIED Silver	FORTIFIED Gold
• Designed the keep the roof on and the water out. • Stronger connections and 8d rink shank nails aligned in a specific pattern. • Sealed seams between roof panels keep the water out when the shingles fail. • Edges are locked down with stronger underlayment, button cap nails, and a stronger drip edge. • Impact-resistant shingles protect against large hail up to 2.0” in diameter.	• Designed to address certain damage amplifiers, which are parts of the homes that, once failed, cascade into further damage to the home, such as garage doors collapsing inward due to wind. • Includes the recommendations in FORTIFIED Roof. • Strengthens gable walls and porches. • Strengthens garage door openings.	• Designed to distribute force across the entire home instead of one section taking all the force and ultimately failing. • Includes the recommendations in FORTIFIED Silver. • Emphasizes a “Continuous Load Path (CLP)” where the home is built as a structural connection system that ties the house together from the roof down to the foundation. • Anchors the lower wall of the home to the foundation. • A separate lower wall to upper wall connection. • A separate roof to upper wall connection.

Table 1: Rating criteria for each of the three available IBHS FORTIFIED designations as described in the presentation.

As outlined in the presentation, unsealed roof decks are associated with loss estimates that are, on average, three times higher than those for sealed roof decks. Beginning in 2027, sealed roof decks will be incorporated into hurricane-prone areas under the International Building Code (IBC) established by the International Code Council (ICC). Regarding protective measures against hail, new asphalt shingles should protect against hail up to two inches in diameter, as 80% of hail losses result from hailstones with a diameter of less than two inches.[13]

In Field Observations of Damage and Building Resilience

Presented by: James Ladue, American Society of Civil Engineers & American Meteorological Society

The primary tool of evaluating the intensity of tornadoes used in the U.S. is by assigning a categorical Enhanced Fujita Scale (EF Scale) rating based on the intensity of the damage they leave behind. The National Weather Service assigns an EF-Scale rating, from 0 to 5, which provides an estimate of the most likely wind speeds for each tornado. The EF scale was deployed in 2007 and was a major improvement over the previous Fujita Scale (F scale) in assessing tornado intensity. Since its implementation, it has helped National Weather Service meteorologists more accurately rate tornadoes based on certain damage indicators, which ultimately influences what rating a tornado receives.

While the transition to the EF Scale has been largely beneficial, there are some significant flaws and a lack of process to improve the scale. Since 2014, the speaker has led a standards committee, supported by the American Society of Civil Engineers and the American Meteorological Society, to develop a revised EF Scale, in addition to several additional methods to improve the estimation of wind speeds in tornadoes and other severe windstorms. Shared in this presentation was that a new wind speed estimation standard is in development. This new standard will provide better information on the climatology of tornadoes and the risks they impose on society.

This presentation also showcased instances of certain home features acting as damage amplifiers, where failures in one part of the house cascade into much larger overall structure failures of the entire home, supported by multiple in-field examples observed throughout the speaker's career conducting damage surveys following tornado events over the last two decades. There also exists a correlation between homes built under higher standard building codes, like those implemented following the May 20, 2013, EF-5 tornado in Moore, OK, and improved loss reduction, estimated to be between 30% and 46%.[14]

Construction Practices Recommended by FORTIFIED

Presented by: Dr. Somik Ghosh, University of Oklahoma, Christopher C. Gibbs College of Architecture

This presentation summarized findings from a 2023 research study examining why FORTIFIED standards remain underutilized despite their proven effectiveness in reducing losses from hazardous weather events. Among homes with a FORTIFIED designation, market adoption rates currently stand at 56% for FORTIFIED Roof, 2% for FORTIFIED Silver, and 42% for FORTIFIED Gold designations.

The majority of FORTIFIED homes are located in Alabama and Mississippi, with very few in Oklahoma. The presentation also detailed the typical additional costs associated with implementing FORTIFIED standards, as well as the expected return on investment (ROI) for each designation.

Rating	Construction cost (% of total home value)	Return on Investment (Years to break even)
FORTIFIED Roof	1.1 – 1.3%	6-9
FORTIFIED Silver	1.6 – 1.9%	7-11
FORTIFIED Gold	2.25 – 2.8%	7-12

Table 2: Average construction cost and return on investment periods for each of the three IBHS FORTIFIED designations.[15]

Despite the relatively low cost of implementing the standards recommended by FORTIFIED and favorable payback periods, only a handful of insurance agents at the time the study was conducted knew of FORTIFIED. This lack of awareness, along with Oklahoma's frequent roof replacement cycle, limited certified inspectors, contractor training needs, and competing homeowner priorities, hinder adoption.

Mitigation from OID's Perspective: Strengthen Oklahoma Homes Program

Presented by: Ashley Scott, Oklahoma Insurance Department

The OKReady: Strengthen Oklahoma Homes Program is a state grant initiative that provides homeowners in approved zip codes with up to $10,000 to implement IBHS high wind and hail mitigation measures on roofs. These upgrades can be applied to both new and existing homes that meet specific eligibility criteria. The program launched three pilot phases in 2025. Under the program, evaluators visit each property three times: first to verify eligibility, then to inspect building materials upon delivery, and finally to conduct a post-installation inspection to confirm compliance. All steps must be completed within six months of initial approval for the homeowner to receive the grant.

At the time of this presentation, lower-income properties were prioritized during the selection process. The program remains open to all residents in designated zip codes. As of

October 1, 2025, 46 homes had been completed, 339 applications were in progress, and 615 application slots remained available. Participating homeowners have saved an average of $730 annually on insurance premiums.

Putting a Bow on It: Smart Home America's Role in Building Resilience & Hazard Mitigation

Presented by: Brooke Troxmondo, Smart Home America

Smart Home America, a 501(c)(3) organization based in Mobile, Alabama, provides education to stakeholders on creating disaster-resilient communities. Their mission is to engage all parties involved in the lifecycle of a built structure, from home builders and engineers to contractors, insurance agents, elected officials, and city planners. To guide this effort, Smart Home America outlines four foundational levels for building resilient communities:

1. Risk assessment, building codes, flood risk ordinances, community risk analysis, and stakeholder education.
2. FORTIFIED Home, Multifamily, and Commercial standards, the Resilient Housing Planning Guide, and Wildfire Prepared Home initiatives.
3. Mitigation funding and incentivizing policy.
4. Insurance as a mechanism for economic resilience.

Significant gaps remain in insurance coverage. Approximately 64% of homes are underinsured by an average of 24%, while businesses are underinsured by about 40%.[16] In Oklahoma, the average business value is $973,000, leaving an estimated $389,000 uncovered, a shortfall that many small businesses cannot absorb in the aftermath of a disaster.

In the aftermath of Hurricane Sally in 2020, approximately 17,000 FORTIFIED homes were exposed to sustained hurricane-force winds for four to eight hours. Of these, 95% experienced little to no damage and did not file an insurance claim. Homes with FORTIFIED Roof certifications performed 50% better than those without, and overall, FORTIFIED homes in the damage path were 70% less likely to file a claim.[17]

The presentation also highlighted other states with grant programs similar to the Strengthen Oklahoma Homes Program, including Alabama, Louisiana, North Carolina, and South Carolina. Arkansas, Maine, Kentucky, Minnesota, and Mississippi are in the process of developing their own programs. The speaker concluded by introducing the Resilient Housing Planning Guide and a free online course offered by Smart Home America. These resources help communities reduce damage and loss through improved land-use

planning, assess housing vulnerabilities, guide developers, and streamline grants and aid in post-disaster recovery.[18]

Building Resilience: A Roofing Practitioner's Perspective on What Works and What Doesn't

Presented by: Scott McCollum, McRoof.us & Oklahoma Roofing Contractors Association

While severe weather hazards in Oklahoma cannot be prevented, society can influence how construction practices and building resilience are approached. This presentation emphasized the need to shift the conversation toward saving lives and protecting property rather than simply replacing structures, homes, and roofs. It also outlined common perspectives from various stakeholder groups regarding roofing and home construction.

A recurring view among homeowners is that installing a new roof is "just a roof" and that "another storm will come, and the insurance company will pay for it." The speaker shared from experience that contractors often express sentiments such as, "Why should I build better when I can gain business from rebuilding?" and "That means I have to learn how to sell something other than price?" Adjusters frequently offer the perspective, "We play by the rules set by the insurance carrier" and sometimes view contractors as adversaries.

The solution, as outlined in the presentation, begins with educating key stakeholders, including homeowners, builders, roofing contractors, legislators, regulators, building code officials, and members of the legal system. Clear and consistent messaging from carriers, producers, agents, roofing and restoration contractors, code officials, and policymakers about the importance of mitigating risk through resilient practices and "building better" is essential to shift prevailing attitudes and overcome the cost-focused mindset in the marketplace.

Mitigation from a Real Estate Perspective: Communication and Advocacy

Presented by: Jessica Thompson, Oklahoma City Metropolitan Association of Realtors (OKCMAR)

This presentation examined the role of real estate agents in promoting home and building resilience to weather and climate hazards. As one of the most public-facing professionals in the homebuying process - and often the last point of contact for buyers - real estate agents must be informed about strategies to improve building resilience, including the FORTIFIED standards discussed earlier in this report. Increasing climate risk is reshaping traditional real estate fundamentals and several concerning trends were highlighted by the speaker.

Over recent decades, insurance costs have grown significantly, rising from 7-8% of mortgage expenses in the 2000s and 2010s to 20% as of 2022.[19] In 2023, home insurers experienced their deepest losses in a decade, paying out 10.5% more in incurred losses and expenses than they collected in premiums.[20] These financial pressures are prompting

insurers to withdraw from high-risk areas, as noted earlier in this report. Additionally, unexpected increases in labor and material costs since 2020 have further driven up homebuyer expenses, and the frequency of "roof concessions" during purchase negotiations has also increased, as buyers seek new roofs while sellers avoid filing insurance claims before closing.

The presentation concluded by highlighting resources available to stakeholders, including the U.S. Department of Energy State and Local Communities Page, the Oklahoma Secretary of Energy & Environment Energy Efficiency Page, First Street, and the Oklahoma Insurance Department Strengthen Oklahoma Homes Program.

Group Discussion

Figure 1: Scott McCollum presenting to Hazard Resilient Buildings Workshop attendees on October 1, 2025.

Following the practitioner presentations and a networking lunch, the workshop attendees participated in small breakout group discussions. In these groups, participants reviewed and discussed the predetermined workshop questions and provided feedback relevant to the material discussed during the presentations. Each breakout group included four to seven individuals from a variety of affiliations and industries. Many of the participants worked in home construction & roofing, insurance, and real estate in central Oklahoma. The breakout session was about 45 minutes in length. The questions and summarized responses are provided below.

1. *What industry do you work in?*

▪ American Society of Civil Engineers ▪ Big I Oklahoma ▪ Canadian County ▪ City of Moore ▪ City of Norman ▪ City of Oklahoma City ▪ D&J Realty ▪ Home Creations ▪ Insurance Institute for Business and Home Safety ▪ McRoof.us ▪ National Association of Mutual Insurance Companies	• National Weather Association • Norman Board of Realtors • Oklahoma City Metropolitan Association of Realtors • Oklahoma Climatological Survey • Oklahoma Insurance Department • Oklahoma Mesonet • Platinum Realty • Smart Home America	• Southern Climate Impacts Planning Program • University of Oklahoma Christopher C. Gibbs College of Architecture • University of Oklahoma Division of Construction Science • University of Oklahoma Institute for Public Policy Research and Analysis

Table 3: Organizations represented at the Hazard Resilient Buildings Workshop.

2. *Prior to this workshop, have you ever considered how weather hazards affect buildings and human infrastructure?*

When asked whether they had considered how weather hazards affect the built environment, most said yes, but the degree to which this consideration was a factor varied. Following three violent tornado events between 1999 and 2013, in the city of Moore, OK (most notably the May 3, 1999, and May 20, 2013, F/EF-5 tornadoes), city officials and the public reevaluated local construction practices. The City adopted the strongest building code for wind hazards in the nation in 2014[21]. Workshop participants agreed that reevaluating practices was common across jurisdictions after tragic events. However, participants also noted that when severe weather has not occurred for a while, there is often pressure to relax building codes and regulations, which can undermine long-term resilience efforts.

A common theme was the role of consumer perception. Several participants pointed out that homeowners often rely on the mindset of "this is the way we've always done it," which can be a barrier to adopting better building practices. From this, there was agreement that consumers need to ask more informed questions about the safety and durability of their homes.

3. *What resources do you and/or your industry colleagues need in order to be able to make more informed decisions pertaining to hazard mitigation practices? What hazard mitigation resources does your organization offer, if any?*

Workshop participants identified critical gaps and opportunities in hazard mitigation education and implementation across industries. A recurring theme was the need for broader awareness and access to resources, particularly among realtors, builders, and insurance agents.

- **Builder Incentives and Barriers**: Builders face financial and logistical challenges in adopting FORTIFIED standards. While these certifications may improve marketability, they do not necessarily increase home value, making them less appealing to a home builder from a cost-benefit perspective. The lack of certified inspectors and the complexity of final inspections were cited as bottlenecks. As a result, suggestions included streamlining inspection processes and more effectively stressing to home builders why these changes are important.
- **Data Accessibility**: Concerns were raised about the limited public awareness of both hazard and insurance related data used by government agencies. Making these data more widely available could improve decision-making on behalf of the home builders and homebuyers. This may also help to better educate consumers and insurance

agents about FORTIFIED. To help bridge the awareness and knowledge gap regarding hazard-related data in Oklahoma, the SCIPP Simple Planning Tool offers a host of resources and tools available at no cost to home builder, insurance, and real estate representatives.[22]

- **Insurance Industry Needs**: Insurance agents often lack knowledge about FORTIFIED options. Resources such as out-of-the-box educational materials and state-specific training were recommended to bridge this gap. The Smart Home America representative indicated that the organization is developing an Oklahoma-focused course outlining available FORTIFIED options and their applicability within the state.
- **Policy and Certification Challenges**: Some participants advocated for mandated building codes aligned with FORTIFIED standards but acknowledged that enforcement alone may not shift industry behavior. Changing mindsets and improving education around the value of required FORTIFIED inspections, described by workshop attendees as a persistent roadblock, were seen as equally, if not more, important and effective.
- **Public Education and Messaging**: Frequently cited was a need to use creative communication strategies to meet consumers where they are. An example of this strategy includes utilizing social media platforms like Facebook and TikTok to educate consumers about FORTIFIED and highlight the importance of making their homes more resilient to severe weather hazards. Emphasizing the long-term benefits of mitigation practices, such as improved safety, cost savings, and community resilience, was supported by nearly all of the workshop attendees. FORTIFIED is actively being advertised through various channels, including on the nightly news, radio, home and garden shows, and social media. The Oklahoma Insurance Department is also now working on engaging with municipal development agencies. Despite the reaches of this advertisement campaign, there remains a disconnect, especially in the real estate sector, regarding awareness and understanding of these initiatives.
- **Realtor Engagement**: There is a lack of awareness among real estate professionals regarding hazard mitigation practices. Participants suggested that organizations like OKCMAR could play a role in developing or distributing online educational materials or continuing education (CE) courses in an effort to close this knowledge gap. Including FORTIFIED certification as a searchable field in property listings was also proposed for home buyers to be informed about resilience features included in their home. The National Tornado Summit, last held in 2019, primarily targeted emergency managers, insurance agents, and meteorologists, but did not explicitly include real estate representative or home builders. Future summits or broader events could formally include these groups.

4. *How can you convince your stakeholders that an upfront or early-stage investment will be greatly beneficial and cost-effective in the long term? Further, what challenges do you face communicating the importance of or in implementing these investments?*

Each small group discussion highlighted several challenges in communicating the importance of investments like FORTIFIED. A common theme was the difficulty in framing long-term benefits over short-term costs. The additional upfront cost, $3,000 on average (in addition to the base roof cost), was seen as a common barrier to adoption, with suggestions to integrate it into home loans to make it more palatable for homeowners and homebuyers.

Resistance from home builders and contractors was identified as a major hurdle, as their business models often prioritize quantity of completed roofs over their durability. Many builders fail to present FORTIFIED options to homeowners, further highlighting the need for better education and outreach. A proposed solution was to develop a clear, visual one-pager for homeowners that quickly shows how small changes upfront can yield significant long-term benefits and reduce long term costs, especially after a severe weather event. Participants also emphasized strategic communication, including the use of social media and enhanced communication in post-disaster windows to capitalize on recency bias, when homeowners are often most receptive to considering resilience measures. Building trust within communities and aligning messaging with city leadership is important in achieving this end.

A common theme across all groups was the need to improve education for all stakeholders. Several groups also suggested that insurance incentives and potential mandates could help normalize the adoption of FORTIFIED standards. Reframing homeownership as a long-term investment, as opposed to being a large upfront cost, and emphasizing the cost savings from avoided repairs, were provided as effective messaging strategies. Since older homes are harder to retrofit, participants suggested that OID support homeowners through grant programs like Strengthen Oklahoma Homes.

Barriers to implementation were also discussed, particularly the reluctance of some construction companies to adopt new practices. Even with statewide code enforcement, participants noted persistent loopholes and enforcement challenges, with a need to better support code officials in the field.

5. *Are there established communication channels between the Home Builder, Insurance, and Real Estate industries in central Oklahoma? Are there improvements in inter-industry communications you'd like to see?*

Participants generally agreed that there are few, if any, established communication channels between the home building, insurance, and real estate industries in central Oklahoma. This lack of coordination was seen as a major barrier to implementing mitigation strategies like FORTIFIED, especially in post-disaster rebuilding efforts. One participant noted the absence of a consistent method for providing tornado survivors with guidance to rebuild more resiliently, rather than simply restoring their homes to their previous state. This perpetuates the cycle of building homes that are ill-equipped to withstand sever weather impacts in central Oklahoma.

Suggestions for improvement included hosting regular meetings, like monthly coffee meetings with the Norman Board of Realtors (which could be implemented in other jurisdictions), leveraging relationships formed at events like the Hazard Resilient Buildings Workshop, and offering continuing education credit training to encourage cross-industry engagement.

It was noted that realtors often have different relationships with various builders, which further complicates unified messaging. Insurance companies were seen as prime messengers for promoting FORTIFIED standards during roof replacement discussions.

Several participants described the current communication landscape as fractured and siloed, with each industry pursuing its own interests. However, there was consensus that all sectors ultimately serve the same customer, the homeowner, and should align efforts accordingly. Roofing was identified as a promising entry point for collaboration and public education, with the potential to lead broader adoption of improved building standards and technologies.

6. *In addition to the topics presented at today's workshop, what else would you like to know about? Is there a need for additional education material? E.g., in-depth benefit cost analysis case studies, cataloging known resilience actions that are possible?*

Workshop participants strongly agreed that a resilience action database would be helpful in identifying measures to improve building resilience. This resource could also demonstrate to stakeholders that several resilience actions are already in use and could be integrated into comprehensive and emergency management plans. There was also clear support for in-depth benefit-cost analysis case studies, which participants felt would strengthen the case for proactive investment. One participant noted difficulty in locating relevant studies for the workshop, highlighting a gap in accessible, location specific data.

Large Group Discussion & Key Takeaways

Participants shared several forward-looking ideas to help strengthen resilience efforts and improve communication with homeowners:

Figure 2: Hazard Resilient Buildings Workshop participants in the National Weather Center, October 1, 2025.

- **Revive a summit-style event focused on building resilience** - This concept is similar to the 2019 National Tornado Summit. The suggestion is to expand the endeavor to include realtors and home builders alongside emergency managers, insurers, and meteorologists.
- **Improve cross-industry collaboration** - Real progress will require working groups that keep the conversation going and ensure everyone is aligned. Risk perception was flagged as a major challenge. People are most receptive right after a disaster, but that urgency fades quickly - industries should capitalize on this recency bias.
- **Create homeowner education resources** - Help buyers know what to ask during the homebuying process. The group emphasized that consumers need to hear consistent messaging from all sides, including roofers, contractors, realtors, and others.
- **Include FORTIFIED status directly in listings in the Multiple Listing Service** - This could help normalize resilience as a selling point in the housing market.
- **Improve the appraisal process & bundle FORTIFIED upgrades into the initial home cost** - If appraisers don't account for the added value of resilience features, buyers may be caught off guard by unexpected costs at closing.
- **Continue holding meetings like this one** - There was near unanimous interest in holding additional workshops to maintain momentum and continue building partnerships.

Acknowledgements

We would like to thank the following organizations for their support in making this workshop an informative and collaborative success: American Society of Civil Engineers, Insurance Institute for Business and Home Safety, McRoof.us, Oklahoma City Metropolitan Association of Realtors, Oklahoma Insurance Department, Smart Home America, & the University of Oklahoma College of Architecture. Financial support for this workshop was provided by NOAA Climate Program Office grant NA21OAR4310306.

Appendix A – Workshop Agenda

The Hazard Resilient Buildings Workshop Event Page on SCIPP's Website is available here.

Hazard Resilient Buildings Workshop Agenda

October 1st, 2025, 9 a.m. - 3 p.m.

Agenda subject to change; current as of 09/26/2025

TIME	TOPIC	SPEAKER
8:30-9:00 a.m.	Check-in: National Weather Center Atrium	
9:00-9:15 a.m.	Welcome & Introduction	Rachel Riley, SCIPP
9:15-9:30 a.m.	Oklahoma Weather Hazards and Their Impacts	Trey Bell, SCIPP
9:30-10:00 a.m.	IBHS Research, Experiments, and Examples of Severe Weather Mitigation Techniques	Rachael Gauthier, Insurance Institute for Business & Home Safety
10:00-10:30 a.m.	In-Field Observations of Hazard Mitigation Techniques & Damage Survey Examples	Jim Ladue, American Society of Civil Engineers & American Meteorological Society
10:30-10:45 a.m.	**Break**	
10:45-11:00 a.m.	Construction Practices Recommended by FORTIFIED	Dr. Somik Ghosh, OU College of Architecture
11:00-11:15 a.m.	Mitigation from OID's perspective: Strengthen Oklahoma Homes Program	Ashley Scott, Oklahoma Insurance Department
11:15-11:30 a.m.	Putting a Bow on it: Smart Home America's Role in Building Resilience & Hazard Mitigation	Brooke Troxmondo, Smart Home America
11:30 - 11:45 a.m.	Building Resilience: A Roofing Practitioner's Perspective on What Works and What Doesn't	Scott McCollum, McRoof & Oklahoma Roofing Contractors Association
11:45 a.m. - 12:00 p.m.	Mitigation from a Real Estate Perspective: Communication and Advocacy	Jessica Thompson, Oklahoma City Metropolitan Association of Realtors
12:00 - 1:00 p.m.	**Networking Lunch (provided)**	
1:00 - 1:45 p.m.	Small Group Discussions (prompts provided)	Group Discussion
1:45 - 2:00 p.m.	**Break**	
2:00 - 2:50 p.m.	Full Workshop Group Discussion	Group Discussion
2:50 - 3:00 p.m.	Closing Remarks	Trey Bell, SCIPP
3:30 - 5:00 p.m.	National Weather Center Tour (Optional)	

Appendix B - References

[1] Kousky, C., 2024: Why we need to fix disaster insurance markets this year and how to do it. Earth.Org, Accessed 30 September 2025, https://earth.org/why-we-need-to-fix-disaster-insurance-markets/.
[2] Insurance Information Institute, 2023: Trends and insights: Louisiana insurance crisis. Tripe-I Issues Brief, 2, https://www.iii.org/sites/default/files/docs/pdf/triple-i_trends_and_insights_louisiana_03282023.pdf.
[3] Woleben, J., 2023: Farmers, USAA boost homeowner insurance rates by double digits in 2023. S&P Global, Accessed 30 September 2025, https://www.spglobal.com/market-intelligence/en/news-insights/articles/2023/10/farmers-usaa-boost-homeowner-insurance-rates-by-double-digits-in-2023-77690424.
[4] Blood, M. R., 2023: California insurance market rattled by withdrawal of major companies. AP News, Accessed 30 September 2025, https://apnews.com/article/california-wildfire-insurance-e31bef0ed7eeddcde096a5b8f2c1768f.
[5] Schwarcz, D., 2011: Reevaluating standardized insurance policies. *The University of Chicago Law Review,* **78**, 1263–1348, https://chicagounbound.uchicago.edu/uclrev/vol78/iss4/3/.
[6] Oklahoma Climatological Survey, 2025: Climate of Oklahoma. Accessed 16 December 2025, https://www.ou.edu/ocs/oklahoma-climate.
[7] National Centers for Environmental Information, 2025: Storm Events Database. Accessed 30 September 2025, https://www.ncei.noaa.gov/stormevents/eventdetails.jsp?id=1188041.
[8] Climate Central, 2025: U.S. Billion Dollar Weather and Climate Disasters. Accessed 30 September 2025, https://www.climatecentral.org/climate-services/billion-dollar-disasters.
[9] Storm Prediction Center, 2025: Tornado Risk Assessment. Accessed 30 September 2025, https://www.spc.noaa.gov/climo/online/probs/?zip=73102&rad=50.
[10] Midwestern Regional Climate Center, 2025: Tornado Tracks Tool. Perdue University, Accessed 30 September 2025, https://mrcc.purdue.edu/gismaps/cntytorn#.
[11] Oklahoma Mesonet, 2025: Severe weather climatologies. Accessed 16 December 2025, https://www.mesonet.org/past-data/severe-weather-climatologies/1-inch-hail-days-1986-2015?ref=1780.
[12] Insurance Institute for Business & Home Safety, 2025: IBHS building code progress. Accessed 30 September 2025, https://ibhs.org/building-codes/building-codes-progress/.
[13] Meisenzahl, B., Giammanco, I., and Hedayati, F., 2025: Sub-severe hail: the missing piece in assessing asphalt shingle risk in North America, *Frontiers in Materials,* **12**, 1-14, https://doi.org/10.3389/fmats.2025.1603074.
[14] Simmons, K. M., P. Kovacs, and G. A. Kopp, 2015: Tornado damage mitigation: benefit–cost analysis of enhanced building codes in Oklahoma. *Wea. Climate Soc.*, **7**, 169–178, https://doi.org/10.1175/WCAS-D-14-00032.1.
[15] Ghosh, S., B.F. Bigelow, A. Smith, and O. Omole, 2023: A cost-benefit analysis of FORTIFIED home designation in Oklahoma. *Cityscape*, **25**, 1, 303–314, https://www.jstor.org/stable/48725047.
[16] Corelogic, 2023: *Marshal & Swift residential cost handbook,* Corelogic.
[17] Alabama Department of Insurance and Center for Risk and Insurance Research, 2025: Performance of IBHS FORTIFIED home construction in Hurricane Sally, 41, https://aldoi.gov/PDF/News/PerformanceIBHSFortifiedHomeConstructionHurricaneSally.pdf.
[18] Smart Home America, 2024: Resilient housing planning guide, 83, https://www.smarthomeamerica.org/assets/uploads/RHPG_digital_final_draft.pdf.
[19] First Street Foundation, 2025: The 12th national risk assessment: property prices in peril. 44, https://assets.riskfactor.com/media/The%2012th%20National%20Risk%20Assessment.pdf.
[20] First Street Foundation, 2025: The 12th national risk assessment: property prices in peril. 44, https://assets.riskfactor.com/media/The%2012th%20National%20Risk%20Assessment.pdf.
[21] Simmons, K. M., and P. Kovacs, 2018: Real estate market response to enhanced building codes in Moore, OK. *International Journal of Disaster Risk Reduction*, **27**, 85-93, https://doi.org/10.1016/j.ijdrr.2017.09.040.
[22] Southern Climate Impacts Planning Program, 2025: Simple planning tool: Oklahoma. Accessed 17 December 2025, https://southernclimate.org/spt/oklahoma/.