

Preparing to Thrive:  
**Resilience Building  
Coalition 5-year  
progress report**

2020

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## 00

## Progress toward a resilient future

We can never know when the next disaster will strike, only that it will. Between 2014 and 2019, the United States experienced 77 weather and climate-related disasters where the overall damage reached or exceeded \$1 billion, with total costs of over \$550 billion, nearly 4,000 lives lost,<sup>[1, 2]</sup> and hundreds of thousands of individuals and families left devastated.

Between January and September of 2020 alone, there were 16 weather and climate-related disasters in the billion-dollar-plus category, tying the records set in 2011 and 2017, with unprecedented damage in their wake.<sup>[3]</sup> And these grim figures do not even account for other natural and human-caused hazards like earthquakes and chemical spills, or the impacts of civil unrest and violent crime. Meanwhile, each new event—as we’ve so clearly witnessed from hurricanes to COVID-19—lays bare the stark

disparities among racial, ethnic, and socioeconomic divisions. Experience tells us and research has clearly shown that vulnerable populations are more likely to suffer more serious consequences in the aftermath of a disaster, from property damage to homelessness to physical and financial strains.<sup>[4]</sup>

Yet there is hope, and it comes from many quarters. In the built environment, the American Institute of Architects and the National Institute of Building

Sciences in 2014 led a coalition of 21 building industry organizations to define the goals and objectives for achieving resilience. Since then, the Resilience Building Coalition (RBC) has grown to 53 organizations representing over 1.8 million members committed to working together to manage the stresses and withstand the shocks (see sidebar) before, during, and after disasters.

The work of the Coalition is guided by the Building Industry Statement on Resilience, a framework for action and a guide to concrete steps built environment organizations and their members can take to prepare for, respond to, and mitigate the effects of disasters. The statement has been the impetus for hundreds of resilience education workshops, resources, and conferences; new resilience and adaptation certificate programs; formation of disaster-response alliances; and advocacy efforts that have passed state and federal legislation to require hazard mitigation, management, and recovery strategies.

Such efforts help to drive and complement change at local, national,

and international scales. In 2018, the [Fourth National Climate Assessment](#) for the first time included a chapter on the built environment. It highlights the reality that while damages from extreme weather events demonstrate existing infrastructure vulnerabilities, it is still too uncommon a practice to incorporate climate projections into infrastructure design, investment, and appraisal criteria, or model building codes. Also in 2018, Congress passed the [Disaster Recovery Reform Act \(DRRA\)](#). The DRRA includes multidimensional provisions like a Hazard Mitigation Grant Program for resilience. It also directs the Federal Emergency Management Agency (FEMA) to develop cohesive, federal guidance for building experts to conduct post-disaster evaluation of structures to assess safety and habitability.

Building on this success, November 2019 saw another major milestone when FEMA released the [Post-disaster Building Safety Evaluation Guidance report](#). The report identifies gaps in building safety protocols, offers best practices for post-disaster

building assessments, and makes recommendations for response program planning before and after disasters. Likewise, the [Natural Hazard Mitigation Saves: 2019 Report](#), funded by multiple federal agencies and several RBC members, represents the most exhaustive cost-benefit analysis of natural hazard mitigation to date.

These documents, and others, open the doors to real conversations among government officials, professionals, and the people they serve, at a time when public attitudes are shifting toward action for a resilient future. New research shows that Americans across the political spectrum support construction requirements and restrictions in vulnerable areas, including those that are fire- and flood-prone.<sup>[5]</sup>

Yet despite this encouraging progress, the fast pace of change has forced us to not only take stock of what we're already doing, but to bolster efforts and, in some cases, change focus. For example, the COVID-19 public health crisis has prompted the creation of a safe re-occupancy assessment tool for offices, schools, businesses, and

commercial buildings. And members' policy teams developed resources such as the Climate Change Adaptation and Climate Resilience Policy Message Toolkit to empower Coalition partners and others to advocate for inclusion of adaptation and resilience measures in the COVID-19 relief and stimulus bill. Indeed, COVID-19 has shown that massive unexpected shocks can and will occur, and are exacerbated by chronic stresses like a lack of affordable and safe housing, aging infrastructure, food insecurity, and systemic racism and inequity. This has enormous implications not just for infrastructure, but the people and systems within them. Water resources, air quality, human health, agricultural yields, natural ecosystem services, regional heritage, energy, and the economy are all at risk.<sup>[6]</sup>

The good news is that we know hazard mitigation efforts work. They can save up to \$16 billion a year<sup>[7]</sup>, prevent the loss of life, and curtail the suffering of millions of people. The Building Industry Statement on Resilience is a platform whose importance grows every year, with signatories taking real and meaningful steps to stymie climate

change, respond to COVID-19, and advance equity. While they cannot solve these issues alone, design, construction, regulation, and operations professionals are deeply connected to the solution through the very nature of their work—creating a built environment that allows communities to be prepared today to thrive into the future.

## SHOCKS & STRESSES

*Resilience works to build fortitude in the face of shocks and stresses, two components that can have damaging effects on communities.*

*Shocks are sudden events that impact the vulnerability of a system and its components. These are generally acute events such as:*

- Acts of terrorism
- Civil unrest, violence
- Earthquakes
- Epidemics
- Flooding
- Hurricanes
- Infrastructure failure
- Wildfires

*Stresses are long-term, chronic issues that reduce the capacity for resilience in the face of shocks such as:*

- Aging infrastructure
- Aging population
- Food scarcity
- Global warming
- Increasing pollution
- Lack of affordable and safe housing
- Sea level rise
- Unemployment

# 01

## Industry statement on resilience

Representing over 1.8 million professionals, America's design and construction industry is one of the largest sectors of this nation's economy, generating over \$1 trillion in GDP. We are responsible for the design, construction, and operation of the buildings, homes, transportation systems, landscapes, and public spaces that enrich our lives and sustain America's global leadership.

We recognize that natural and manmade hazards pose an increasing threat to the safety of the public and the vitality of our nation. Aging infrastructure and disasters result in unacceptable losses of life and property, straining our nation's ability to respond in a timely and efficient manner.

We further recognize that contemporary planning, building materials, and design, construction and operational techniques can make our communities more resilient to these threats.

Drawing upon the work of the National Research Council, we define resilience as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.

As the leaders of this industry, we are committed to significantly improving the resilience of our nation's buildings, infrastructure, public spaces, and communities.

- We **research** materials, design techniques, construction procedures, and other methods to improve the standard of practice.
- We **educate** our profession through continuous learning. Through coordinated and continuous learning, design, construction and operations professionals can provide their clients with proven best practices and utilize the latest systems and materials to create more resilient communities.
- We **advocate** at all levels of government for effective land use policies, modern building codes, and smarter investment in the construction and maintenance of our nation's buildings and infrastructure.
- We **respond** alongside professional emergency managers when disasters do occur. Industry experts routinely work in partnership with government officials to survey damage, coordinate recovery efforts, and help communities rebuild better and stronger than before.
- We **plan** for the future, proactively envisioning and pursuing a more sustainable built environment.

The promotion of resilience will improve the economic competitiveness of the United States. Disasters are expensive to respond to, but much of the destruction can be prevented with cost-effective mitigation features and advanced planning. Our practices must continue to change, and we commit ourselves to the creation of new practices in order to break the cycle of destruction and rebuilding. Together, our organizations are committed to build a more resilient future.

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**CULTIVATORS**

*Led the effort to establish and implement the Statement with their industry peers*

The American Institute of Architects  
National Institute of Building Sciences

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**FOUNDERS**

*United to define the goals and objectives of a resilient built environment*

American Council of Engineering Companies  
American Planning Association  
American Society of Civil Engineers  
American Society of Interior Designers  
American Society of Landscape Architects  
American Society of Heating, Refrigerating, and Air-Conditioning Engineers  
American Society of Plumbing Engineers  
Associated Builders and Contractors  
Associated General Contractors of America

Building Owners and Managers Association  
International Code Council  
International Facility Management Association  
International Interior Design Association  
Lean Construction Institute  
National Association of Home Builders  
National Society of Professional Engineers  
Royal Institution of Chartered Surveyors  
U.S. Green Building Council  
Urban Land Institute

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**AMPLIFIERS**

*Joined the founding signatories in committing to the advancement of Statement goals*

AABC Commissioning Group  
The Air Barrier Association of America  
Alliance for National & Community Resilience  
American Concrete Institute  
American Society of Adaptation Professionals  
American Wood Council

American Institute of Building Design  
BuildStrong Coalition  
Congress for New Urbanism  
Concrete Reinforcing Steel Institute  
Construction Specifications Institute  
EcoDistricts  
Energy Management Association  
EPDM Roofing Association  
Federal Alliance for Safe Homes  
Flood Mitigation Industry Association  
Green Building Initiative  
Illuminating Engineering Society  
Institute for Sustainable Development  
Insurance Institute for Business & Home Safety  
International Association of Lighting Designers  
International Association of Plumbing and Mechanical Officials  
International Institute of Building Enclosure Consultants  
NACE International  
National Association of Mutual Insurance Companies  
National Concrete Masonry Association

National Fire Protection Association  
National Insulation Association  
National Ready Mixed Concrete Association  
Polyisocyanurate Insulation Manufacturers Association  
Portland Cement Association  
U.S. Resiliency Council

## ACHIEVEMENTS AND MILESTONES

Since its inception in 2014, the *Building Industry Statement on Resilience* has focused attention and spurred action on resilience across signatory organizations. In November 2016, the Resilience Building Coalition released a [progress report](#) at a White House Conference on Resilient Building Codes. Along with chronicling the work of Coalition members, the report featured results of a periodic survey of signatories on their accomplishments and experiences since signing on to the statement. Responses to the RBC's most recent survey, conducted in 2019-2020, highlight a sustained and often accelerated commitment: Half of the survey respondents reported a significant increase in the issue of resilience as an organizational priority since joining, compared to 27 percent in 2016.

Survey respondents also cited the continued role of the statement in changing their organization's objectives and policies. For instance, 59 percent of respondents said it had led to

awareness and application of new issues or resources, compared to one-third in 2016 who believed the statement had created a strategic focus on resilience within the organizations. 64% of 2020 respondents said the statement had provided support and validation for taking action on resilience initiatives, compared to 40% in 2016. The statement was also credited by more than one-third of respondents with helping to create a new strategic partnership with another signatory, up from one-fifth in 2016. But while the numbers tell a compelling story, the on-the-ground work of Coalition members demonstrates how those numbers are translated into tangible accomplishments in the five core categories laid out by the *Building Industry Statement on Resilience*.

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# 02

## Framework for proactive resilience

As leaders of the built environment industry, signatories committed to significantly improve the resilience of the nation's buildings, infrastructure, public spaces, and communities. Five actionable commitment areas are identified in the statement:

### RESEARCH

materials, design techniques, construction procedures, and other methods to improve the standard of practice.

### EDUCATE

the profession through continuous learning. Through coordinated and continuous learning, design, construction, and operations professionals can provide their clients with proven best practices and utilize the latest systems and materials to create more resilient communities.

### ADVOCATE

at all levels of government for effective land use policies, modern building

codes, and smarter investment in the construction and maintenance of our nation's buildings and infrastructure.

### RESPOND

alongside professional emergency managers when disasters do occur. Industry experts routinely work in partnership with government officials to survey damage, coordinate recovery efforts, and help communities rebuild better and stronger than before.

### PLAN

for the future, proactively envisioning and pursuing a more sustainable built environment.



**ABOVE:** IBHS research has recently focused on topics such as improving the performance of asphalt shingles against hail, wildfire home protection and defensible space, and the wind resistance of garage doors. Source: Insurance Institute for Business and Home Safety





RESEARCH

- National Institute of Building Sciences – The American Institute of Architects – Insurance Institute for Business and Home Safety – International Code Council – National Fire Protection Association**  
 NIBS, AIA, IBHS, ICC, and NFPA supported an update and expansion of the [Natural Hazard Mitigation Saves Study](#) conducted by NIBS. The study examined the economic benefits of multiple mitigation strategies across five hazards. Among the study’s findings was that just adopting the latest building code requirements could save on average \$11 for every \$1 invested in mitigating riverine floods, hurricane winds, and earthquakes.

- National Ready Mixed Concrete Association and Portland Cement Association**  
 NRMCA members, through its Research and Education Foundation and with the Portland Cement Association, have supported groundbreaking exploration of concrete science, application, and economics working through the [MIT Concrete Sustainability Hub](#). Key findings, tools, and metrics are published in [City Texture and](#)

[Urban Resilience, Life Cycle Costs of Hazard Resistant Buildings,](#) and [Break Even Mitigation Percentage Dashboard](#).

NRMCA also joined a coalition launched by the National Association of State Fire Marshals Fire Research and Education Foundation to study how fire and life safety are impacted in structures equipped with multiple layers of fire-protection features through the [FAIL-SAFE](#)

[project](#). The project has led to the development of the [Fire Risk Analysis MATRIX](#), a web-based application used for quantifying fire risk in existing buildings.

- The American Institute of Architects**  
 AIA’s [Upjohn Research Grant](#) program dedicated \$100,000 to four projects, led by both architecture firms and academia, that address specific resilience and climate change

	ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
National Institute of BUILDING SCIENCES™					
<b>Overall Benefit-Cost Ratio</b>	<b>11:1</b>	<b>4:1</b>	<b>4:1</b>	<b>4:1</b>	<b>6:1</b>
<b>Cost (\$ billion)</b>	<b>\$1<sub>/year</sub></b>	<b>\$4<sub>/year</sub></b>	<b>\$520</b>	<b>\$0.6</b>	<b>\$27</b>
<b>Benefit (\$ billion)</b>	<b>\$13<sub>/year</sub></b>	<b>\$16<sub>/year</sub></b>	<b>\$2200</b>	<b>\$2.5</b>	<b>\$160</b>
<b>Riverine Flood</b>	<b>6:1</b>	<b>5:1</b>	<b>6:1</b>	<b>8:1</b>	<b>7:1</b>
<b>Hurricane Surge</b>	not applicable	<b>7:1</b>	not applicable	not applicable	not applicable
<b>Wind</b>	<b>10:1</b>	<b>5:1</b>	<b>6:1</b>	<b>7:1</b>	<b>5:1</b>
<b>Earthquake</b>	<b>12:1</b>	<b>4:1</b>	<b>13:1</b>	<b>3:1</b>	<b>3:1</b>
<b>Wildland-Urban Interface Fire</b>	not applicable	<b>4:1</b>	<b>2:1</b>	not applicable	<b>3:1</b>

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ABOVE: The Natural Hazard Mitigation Saves: 2019 Report represents the most exhaustive benefit-cost analysis of natural hazard mitigation, from adopting up-to-date building codes and exceeding codes to addressing the retrofit of existing buildings and utility and transportation infrastructure. Source: National Institute of Building Sciences

issues. These include developing and using carbon-reducing materials, creating a framework and how-to guide for resettlement from the effects of sea-level rise and climate change, enhancing adaptive building envelope design, and updating a free embodied carbon calculator.

- **American Society of Interior Designers**

ASID published the [ASID Resiliency Report](#), the first of a multi-phase study investigating interior design resilience. The report examined the experiences of interior design professionals during the COVID-19 pandemic, and expected changes in the design of the built environment, including a greater emphasis on health and wellness considerations in interior spaces.

- **ASHRAE**

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) currently has more than \$6.8 million invested in resiliency through 49 active [research projects](#). For example, ASHRAE's [Position Document](#) on Limiting Indoor

Mold and Dampness in Buildings provides help in understanding some of the complex interactions and decisions that can cause indoor dampness, which can lead to severe health risks and cost billions of dollars in repairs.

- **EPDM Roofing Association**

ERA recognizes that the roof of a building is a first line of defense, and thus plays a critical role in resilience. As such, the roofing industry is focusing on two key aspects of creating a resilient roof: durable components, and a robust design. ERA has [conducted research and issued reports](#) on roof temperatures and reflective roofing, hail performance, and performance of various types of roofs.

- **Flood Mitigation Industry Association**

The FMIA worked with the US Army Corps of Engineers (USACE) on a pilot project for the wet floodproofing of port buildings as part of the Southcentral Coastal Louisiana Flood Risk Reduction Study. As opposed to dry floodproofing, which prevents the entry of flood waters, wet floodproofing allows flood waters

to enter the enclosed areas of a structure to reduce the loads imposed on a structure during a flood, which may greatly reduce the likelihood of structural damage. The project aims to provide a model for the wet floodproofing efforts needed at hundreds of U.S. ports.

- **Insurance Institute for Business & Home Safety**

IBHS research has recently focused on topics including improving the performance of asphalt shingles against [hail](#), [wildfire](#) home protection and defensible space, and the [wind](#) resistance of garage doors.

- **Illuminating Engineering Society**

IES established a Resilience Committee to research and develop best practices for lighting that must absorb, recover from, and more successfully adapt to hazards such as storms and earthquakes. The Committee's scope includes identifying suitable materials, design techniques, and construction procedures for improving the standard of practice for lighting in anticipation of adverse events.

- **International Code Council**

ICC, with code development and research organizations from Canada, Australia and New Zealand, established the [Global Resiliency Dialogue](#) to research strategies for incorporating climate risk and resilience in codes and standards.

ICC has contributed to research by the Department of Energy's national labs on energy efficiency benefits and how energy efficiency contributes to resilience.

- **National Association of Home Builders**

NAHB worked with researchers at Texas A&M University to determine how building codes impacted the amount of damage homes sustained during Hurricanes Harvey and Irma in 2017 in parts of Texas and Florida. The [study](#) found that homes built later and to more stringent codes, such as the International Residential Code or similar, performed much better than older homes.

- National Fire Protection Association**  
 NFPA's Fire Protection Research Foundation has worked with researchers to [produce findings](#) on community wildfire risk reduction as well as models for the design and practice of safer evacuation systems. In particular, the NFPA's WUI-NITY report highlights the need for a simulation framework that can more accurately assess contributing factors in wildfire evacuation and their interactions by integrating fire, pedestrian, and traffic domains. In March 2020, NFPA convened the first-of-its-kind Wildland/Urban Interface [Fire Resilience Workshop](#).
- Royal Institution of Chartered Surveyors**  
 RICS became the first professional body dedicated to the built environment to sign on as an official supporter of the Task Force on Climate-related Financial Disclosures ([TCFD](#)). TCFD's recommendations enable financial markets to address the impact of climate change through

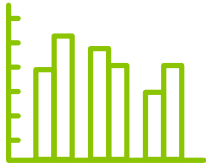
increased transparency and the promotion of more informed financial decision-making.

- Urban Land Institute**  
 ULI's Urban Resilience program produces reports on climate risk and resilience which draw from the expertise and insight of the ULI membership. Over the past 5 years, the program has addressed topics including extreme heat, green infrastructure, wildfire resilience and more. [Scorched](#), for example, presents case studies on short- and long-term solutions in the built environment to extreme heat, which now causes more deaths in U.S. cities than any other weather-related event. [Climate Risk and Real Estate](#), shows that investors are increasingly considering climate risk and resilience solutions at the regional level. Among other recommendations, the report advocates developing strategies to measure market-level climate risk and resilience considering physical risk, resilient infrastructure, and public policy. The research report

[Firebreak](#) introduced strategies to enhance wildfire resilience through building design, planning and land use strategy, drawing from the expertise and insight of wildfire experts and the ULI membership.



ABOVE: Firebreak: Wildfire Resilience Strategies for Real Estate, which explores how the real estate industry is responding to increasing wildfire risks with building design, land use policy, and community resilience solutions. Source: Urban Land Institute



## EDUCATION

- The Alliance for National & Community Resilience**  
 ANCR's executive director edited [Optimizing Community Infrastructure: Resilience in the Face of Shocks and Stresses](#). The book, aimed at both emerging and experienced professionals, is focused on building understanding of the intersections across community systems and how their interactions and a holistic vision support resilience.
- The American Institute of Architects**  
 AIA developed a nine-course [Resilience & Adaptation Certificate series](#) for architects and design professionals to holistically address growing hazard and climate risk. Additionally, AIA developed [business continuity guidance](#) to help small- and medium-size design firms develop their own capacity to withstand disruptions.
- American Institute of Building Design**  
 AIBD's conference on resilience planning in design and construction featured real-world education components including tours of a precast concrete modular building system manufacturing plant and an award-winning 6,000 square foot home built using insulated concrete forms. AIBD also partnered on member education initiatives with multiple organizations, including fellow signatories the Insurance Institute for Business & Home Safety (IBHS) and the National Ready Mixed Concrete Association (NRMCA).
- American Society of Adaptation Professionals**  
 ASAP completed a [pilot project](#) to educate firms—particularly architecture, engineering, and planning firms—on using best-available climate data and information in their client services. ASAP is conducting training on its [Living Guide to the Principles of Climate Change Adaptation](#) across many sectors, including the building sector. These trainings teach practitioners and applied researchers how to identify field-spanning best practices for quality climate change adaptation and climate resilience.
- ASAP hosts the Climate Adaptation Learning Exchange peer learning group, which highlights innovative case studies and practices on adaptation and resilience in the built environment via bi-monthly webinars.
- American Society of Civil Engineers**  
 ASCE released a manual of practice for civil engineers, [Climate-Resilient Infrastructure: Adaptive Design and Risk Management](#). This manual provides guidance and solutions for civil engineers to help them design infrastructure that is more resilient, develop methods for infrastructure analysis, and meet societal needs as changing risk profiles require a new design philosophy.
- ASHRAE**  
 ASHRAE has over the past several years developed nearly 100 courses and webinars that can help improve resilience of the built environment. In the past year, ASHRAE delivered a total of 385 courses to over 13,000 attendees. These [courses](#), such as “How Smart, Efficient, Sustainable Systems Lead to Improved Resilience,” are accessible globally and can be tailored to specific audiences, organizations, and companies.
- American Society of Landscape Architects**  
 ASLA convened an interdisciplinary group to research a bottom-up approach to climate change resilience through landscape planning and site design. The group developed [professional practice guidance and associated case studies](#), as well as *Smart Policies for a Changing Climate*. These retrofit guidance materials are intended to help communities recover more quickly from adverse events including drought, extreme heat, fire, flooding,



ABOVE: ASLA developed professional practice guidance and associated case studies for tackling shocks and stresses. This example, the Gary Comer Youth Center Roof Garden, provides healthy food access while reducing the impact of extreme heat events. Source: ASLA

landslides, and biodiversity loss. They stress that related policies should be incentive-based, promote holistic planning, address environmental justice and racial and social equity issues, adopt broad goals, engage community, and be regularly evaluated.

• **Associated Builders and Contractors**

ABC has emphasized apprenticeships as a key part of its commitment to developing a safe, skilled and productive workforce that meets the current and future needs of the construction industry, which, [by some estimates](#), may experience a loss of 80 percent of its existing workforce by 2034. In 2018, ABC signed the Pledge to America’s Workers at the White House, promising to educate and develop at least 500,000 construction workers by 2023. In 2019, ABC members invested \$1.5 billion to provide craft, leadership, and safety education to more than 1.1 million course attendees.

• **Building Owners and Managers Association**

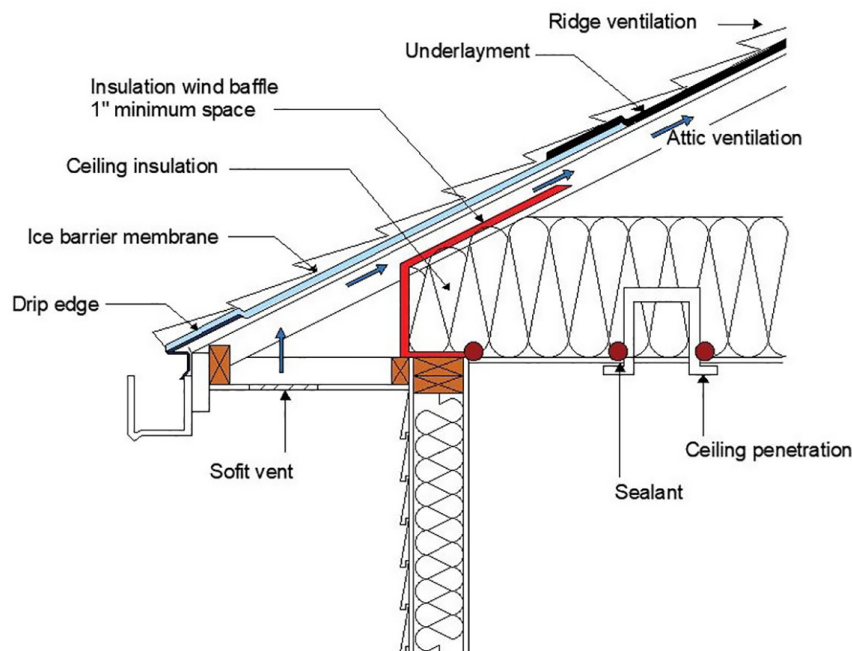
BOMA International produces education and training each year covering a range of resilience topics. Industry experts present the programs via online webcasts or at the annual BOMA International Conference & Expo, and webcasts are archived in BOMA’s [learning portal](#).

The I-Codes are the most widely used and adopted set of building safety codes in the world. They help protect our homes from structural collapse and natural disasters.

ABOVE: Building Safety Month is an international campaign celebrated in May to raise awareness about building safety. Source: International Code Council

- Federal Alliance for Safe Homes**  
 FLASH developed *No Code. No Confidence* at [Inspect2Protect.org](https://inspect2protect.org) to increase community resilience through greater transparency on the status of building code adoption. The initiative features a digital look-up tool allowing users to identify current residential building codes in their

community through an interactive, color-coded map based on verified national data. Phase II of the program was completed with funding from FEMA and the Systems Engineering and Standards Division of the Department of Homeland Security's Technology Directorate.



ABOVE: Solution for Vented Attics to prevent ice dams is just one retrofit detail in guidelines for homeowners. Source: Home Innovation Research Labs, a subsidiary of NAHB

- Insurance Institute for Business and Home Safety**  
 IBHS conducts a series of webinars and Disaster Dynamics Academies for its members to improve their understanding of resilience. Topics have included suburban wildfire adaptation, hurricanes, and commercial hazards.

- International Code Council**  
 ICC regularly provides building code-related education and training to code officials, designers, and other building industry practitioners. The organization also supports [Building Safety Month](#), an international effort to improve public understanding of the importance of building safety and the role of building safety professionals in their lives.

ICC has highlighted resilience-focused messages in external publications, including [The Hill](#) and [Domestic Preparedness](#), and in a series of [white papers](#) on how codes such as the International Building Code, International Energy Conservation Code,

and the International Wildland Urban Interface Code contribute to resilience.

- National Association of Home Builders**  
 NAHB developed a [series of two-page guidelines](#) for homeowners to illustrate retrofitting techniques to improve protection against natural hazards. Each guide highlights the hazards addressed, considerations to discuss with a builder or remodeler, and the benefits and incremental costs of implementing the practice. In many cases, these practices are cost-effective, especially when incorporated as part of routine maintenance or a planned home improvement project.

NAHB [provided resources to members](#) to support community outreach efforts on emergency preparedness and response, including scripts for community public service announcements on rebuilding and choosing qualified contractors.

- **National Association of Mutual Insurance Companies**  
 NAMIC is conducting a series of events through the BuildStrong Coalition to educate stakeholders on the Federal Emergency Management Agency (FEMA)'s Building Resilient Infrastructure and Communities (BRIC) program. The program supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.
- **National Fire Protection Association**  
 NFPA's [Fire & Life Safety Policy Institute](#) has developed a number of reports and white papers on fire resilience and safety, including community wildfire preparedness, minimizing fire risk on building sites, and fire and life safety codes.
- **National Ready Mixed Concrete Association**  
 NRMCA delivers numerous education programs for members, specifiers, and decision-makers to help them better utilize concrete for resilient applications. These programs include its [Build with Strength](#) campaign featuring resilience-related courses such as *Pathway To Resilience*, *The Balanced Design Approach to Fire Safety*, and *Concrete Innovations*. Many of these programs are also offered through professional organizations such as the American Concrete Institute, AIA, Structural Engineers Association of California, and USGBC.
- **U.S. Green Building Council**  
 USGBC offers a number of resilience education opportunities, including continuing education courses on the [RELi Rating System](#) (resilient buildings), [PEER](#) (resilient power infrastructure), and [SITES](#) (resilient land development) rating systems, as well as on the unique needs of cities, local communities, and schools. USGBC also sponsors resilience-focused sessions at the [Greenbuild Conference Resilience Summit](#), and is a co-host of the [Resilient Cities Summit](#), which brings together elected local government officials and senior staff with leading practitioners and academics engaged in climate resilience issues.
- **Urban Land Institute**  
 ULI launched "[Developing Urban Resilience](#)," a platform for ULI members to learn about real estate development projects showcasing best practices in resilient design. Featured projects and policies address climate shocks and stresses at the site scale, proactively considering environmental vulnerabilities such as sea level rise, storms, heat, drought, and earthquakes. ULI has also increasingly incorporated resilience education into national conferences, including its [Resilience Summit](#) on climate risk and resilience for real estate and land use leaders.



## ADVOCACY

- The Alliance for National & Community Resilience – The American Institute of Architects – American Society of Civil Engineers – ASHRAE – EPDM Roofing Association – International Code Council – National Association of Mutual Insurance Companies**  
 ANCR, AIA, ASCE, ASHRAE, ERA, ICC, and NAMIC supported development, passage and implementation of the Disaster Recovery Reform Act (DRRA) in 2018. Within its 56 provisions, the [law](#) “acknowledge[s] the shared responsibility for disaster response and recovery, aim[s] to reduce the complexity of [the Federal Emergency Management Agency (FEMA)], and build[s] the nation’s capacity for the next catastrophic event.”
- The American Institute of Architects – International Code Council – National Association of Home Builders**  
 AIA, ICC, and NAHB worked with FEMA, the National Institute of Standards and Technology (NIST), and other stakeholders on a Functional Recovery Report mandated by the 2018 reauthorization of the National Earthquake Hazards Reduction Program (NEHRP). The legislation required FEMA and NIST to convene experts representing federal agencies, nongovernmental organizations, and relevant industry and professional groups “to assess and recommend options for improving the built environment and critical infrastructure to reflect performance goals stated in terms of post-earthquake re-occupancy and functional recovery time.” The final report, “[Recommended Options for Improving the Functional Recovery of the Built Environment](#),” was published in September 2020.
- The American Institute of Architects – International Code Council**  
 AIA and ICC advocated for best practices for building safety assessments, including adding architects, engineers, and building officials to the [National Incident Management System](#) (NIMS) resource types, as part of the DRRA. The two organizations helped draft the new NIMS definitions, recognizing building design professionals as a resource to assist with post-disaster building evaluation in states and territories under federal disaster declarations. AIA and ICC also assisted in producing [FEMA P-2055: Post-disaster Building Safety Evaluation Guidance](#), under the DRRA requirement for the federal government to work with architects and engineers to develop best practices for building-safety assessments focused on structural integrity and post-disaster livability.



### Post-disaster Building Safety Evaluation Guidance

Report on the Current State of Practice, including Recommendations Related to Structural and Nonstructural Safety and Habitability

FEMA P-2055 / November 2019



ABOVE: Resilience Building Coalition members contributed to this report under the Disaster Risk Reduction Act requirement for the federal government to work with architects and engineers to develop best practices for building safety assessments focused on structural integrity and post-disaster livability. Source: FEMA



- American Society of Interior Designers**  
ASID includes resilience as one of its core public policy positions, emphasizing its support for “policies that promote pre-disaster mitigation, resilience, adaptability, and historic preservation in the built and rebuilt environment.”
- The Alliance for National & Community Resilience**  
ANCR testified before the House of Representatives Committee on Science, Space and Technology on the importance of the [National Windstorm Impact Reduction Program](#)—a cooperative program between federal agencies, other levels of government, academia, and the private sector—focused on better understanding windstorms and developing cost-effective mitigation measures to reduce loss of life and property.
- American Society of Adaptation Professionals**  
ASAP’s Policy Practice Group collaborated to create a Climate Change Adaptation and [Climate Resilience Policy Message Toolkit](#) to empower members to advocate for inclusion of adaptation and resilience measures in COVID-19 relief and stimulus bills.
- American Society of Landscape Architects**  
ASLA targets legislation that encourages resilient and sustainable building as well as more mitigation using green or natural infrastructure. Multiple ASLA-supported bills have become law, including legislation on parks, transportation, and water and stormwater management.
- ASHRAE**  
ASHRAE co-authored with Chartered Institution of Building Services Engineers (CIBSE) a [position document on resiliency in the built environment](#) that provides context, supporting documentation, and analysis on resiliency for policymakers. The statement also makes recommendations for increasing resiliency, including cross-disciplinary collaboration, research, and education.
- ASHRAE’s [Epidemic Task Force](#) has conducted significant government outreach to promote healthy buildings and provide the most up-to-date expertise to minimize indoor environmental risks, including a briefing for the House of Representatives Energy and Commerce Committee. ASHRAE’s COVID-19 guidelines have also been cited by the Centers for Disease Control and Prevention (CDC) and the Environmental Protection Agency (EPA). ASHRAE plans to build upon this outreach with more information on how indoor air quality—a key component of building resiliency—can influence productivity, learning, and health outcomes.
- Insurance Institute for Business and Home Safety**  
IBHS helped to advance the inclusion of requirements for sealed roof decks—which can reduce water entry by as much as 95 percent—in the International Residential Code and the Florida Building Code. IBHS testified before the House of Representatives Special Committee on the Climate Crisis and provided input to the committee’s [recently published report](#).
- International Code Council**  
ICC has supported the incorporation of minimum design criteria in all federally funded infrastructure programs, federal codes and standards guidance updates, energy and water efficiency policy, and housing affordability measures.
- National Association of Home Builders**  
NAHB advocated for various resilience policies and programs, the National Flood Insurance Program, and climate change response through Congressional testimony, agency meetings, grassroots activities, and comment letters.
- National Fire Protection Association**  
NFPA is working to advance safety by focusing on the top causes of fire, addressing emerging issues, and meeting the needs of underserved areas. Some key advocacy efforts include the Fire Sprinkler Initiative, Firewise (Wildfire) Program, Alternative Fuel Vehicle Safety



ABOVE: NRMCA advocated for, and helped pass into law, a bill allowing an insurance rebate for compliance to the IBHS Fortified program for commercial construction.  
Image credit: NRMCA Build With Strength

Training Program, and Energy Storage Systems Safety Training Program. NFPA also [addresses](#) fire protection through media and public outreach, strategic partnerships, and [educational efforts](#).

- **National Ready Mixed Concrete Association**

NRMCA helped reintroduce the Disaster Savings and Resilient Construction Act, bipartisan federal legislation that established a tax credit for resilient construction to incentivize higher standards of building or rebuilding after a disaster.

NRMCA and its affiliate in Mississippi authored, advocated for, and helped pass into law Senate Bill 2709. The bill was the first of its kind in the U.S. to allow an insurance rebate for compliance to the IBHS Fortified program for commercial construction. The legislation followed a successful expansion of Mississippi's residential construction program. NRMCA also supported passage of Mississippi House Bill 887, which extends the Comprehensive Hurricane Damage Mitigation Program.

- **National Society of Professional Engineers**

NSPE advocated for state and federal legislation encouraging the use of sustainable and resilient design and construction. Its Committee on Policy and Advocacy developed a [position statement](#) speaking both to the role played by professional engineers in sustainability, and to their ethical responsibility to use resilience and sustainability best practices in their work.

- **U.S. Green Building Council**

USGBC has supported federal proposals including the continuation of the EPA [WaterSense](#) program, the Congressional Climate Crisis Action Plan, and the 2020 infrastructure bill. USGBC also supports resilience at the state and local levels, including providing relevant potential policy options, such as how states can support schools with post-disaster recovery plans, and how cities can address resilience shortcomings.



## DISASTER RESPONSE

- **The American Institute of Architects**

AIA's [Disaster Assistance Program](#) provides training in post-disaster building safety assessments to architects, engineers and building officials so they can provide volunteer services to municipalities

and states in the aftermath of disasters. Architects have responded to hurricanes, floods, tornadoes, earthquakes, and wildfires across the country including recent events in Texas, Louisiana, California, Iowa, Alaska, and Tennessee. Lessons learned have informed building design guidance and policy initiatives.

AIA responded in 2020 to COVID-19 with its [Reopening America: Strategies for Safer Buildings Initiative](#), which included a risk management process, a re-

occupancy assessment tool, and building type-specific guidance.

- **American Society of Adaptation Professionals**

ASAP created two new staff-supported, member-led groups, [one](#) focused on what climate resilience professionals can learn from pandemic recovery, and [another](#) focused on supporting members who lost their jobs due to economic impacts of the COVID-19 pandemic.

- **ASHRAE**

ASHRAE established an Epidemic Task Force in March of 2020, released leading-edge statements in April about the possibility of COVID-19 spreading via airborne routes, and provided thousands of pages of [free online guidance](#) for building systems to minimize the risk of viral transmission through HVAC systems. ASHRAE participated in numerous webinars in partnership with external organizations, and the Task Force has answered hundreds of questions submitted by facility managers and other stakeholders.

ASHRAE is continually updating its materials and sharing these resources worldwide, including through a webinar targeted at emerging economies. All of this work has been provided free of charge to help communities fight the spread of this pandemic.

- **Building Owners and Managers Association**

BOMA coordinates closely with affected local associations during each major hurricane by participating on Federal Emergency Management Agency (FEMA) conference calls related to critical infrastructure, sharing daily Department of Homeland Security (DHS) situation reports, promoting the FEMA online “dashboard” resource when activated, and coordinating emergency requests for building space. In addition to hurricane response, BOMA has also worked closely with DHS to promote the [Crisis Event Response and Recovery Access](#) (CERRA) program among local associations and worked with them to advocate for the program in their areas.



ABOVE: Architects perform building safety assessments after Hurricane Harvey.  
Source: The American Institute of Architects

BOMA responded in 2020 to the COVID-19 public health crisis by producing nine new education programs and [seven guides](#) addressing the pandemic's impact on commercial real estate and the industry's response and recovery strategies, including re-entry procedures for commercial and industrial properties.



ABOVE: The findings of the COVID-19 Commercial Real Estate Impact Study provide a clear picture as to the pandemic's broader transformational effects on the office sector and what measures owners and operators

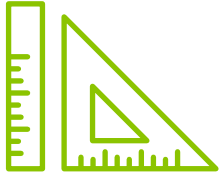
can leverage to mitigate downstream risk. Source: Building Owners and Managers Association International

- Federal Alliance for Safe Homes**  
 FLASH's Strong Homes Initiative provides resources and training necessary to incorporate best practices and beyond-code construction methods into post-disaster rebuilding and repair projects for low-income survivors. The homes are built and repaired using FEMA guidance and the Insurance Institute for Business and Home Safety (IBHS) [FORTIFIED construction standards](#), providing society's most vulnerable populations with stronger, safer homes. The projects also advance resilience practices by validating resilience upgrade costs, providing opportunities to investigate roof shingle performance, delivering innovative training for approximately two dozen nonprofit rebuilding organizations, and showcasing best practices for local officials.
- International Code Council**  
 ICC co-created the [Disaster Response Alliance](#) (DRA) to help

communities get up and running as quickly as possible after a major disaster. The DRA maintains a national database of trained architects, engineers, inspectors, and building officials willing to assist with post-disaster activities, including rapid safety assessments, detailed safety assessments, inspections, and other code-related functions in the aftermath of a disaster. The DRA's national database is available to local and state jurisdictions as well as federal government agencies for pre- and post-disaster assistance.

- National Fire Protection Association**  
 NFPA's [Firewise USA](#) recognition program has approximately 1,700 participating communities across the country. During significant wildfires, NFPA monitors the fires' proximity to these sites, and provides messaging and information around evacuation and recovery.
- Royal Institution of Chartered Surveyors**  
 RICS collected and shared [a series](#)

[of case studies](#) from around the world—focusing on such issues as “using data to inform remote working strategy and culture” and “leveraging technology to keep essential workers safe in the U.S.”—to share best practices, innovative solutions, and lessons learned for built environment response to COVID-19.



## PLANNING

- **The Alliance for National & Community Resilience**

ANCR has been engaging communities to pilot its first two Community Resilience Benchmarks (CRBs), in buildings and housing. The [CRB system](#) will help communities assess resilience and undertake practical actions to become more resilient. Pilot communities will receive support to further their resilience initiatives while assisting ANCR in advancing the CRB system as a whole.

- **American Society of Civil Engineers**

ASCE published [Resilience-Based Performance: Next Generation Guidelines for Buildings and Lifeline Standards](#) which focuses on the enhancements needed

in the design and construction of buildings and lifeline systems to support a community's social stability, economic vitality, and environmental sustainability.

- **Green Building Initiative**

GBI released [ANSI-GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings](#) as an ANSI Standard, which includes language on resilience, lifecycle cost analysis, moisture-control analysis, and health and effectiveness. GBI is also developing a new ANSI Standard, Green Globes Assessment Protocol for Existing Buildings. The standard will feature language on resilience (including multi-hazard risk assessment), renewable and alternative energy, water conservation, and cycle renovations. It will also address economic and social resilience, including social benchmarks, cleaning and disinfection, and health and wellness.

- **U.S. Green Building Council**

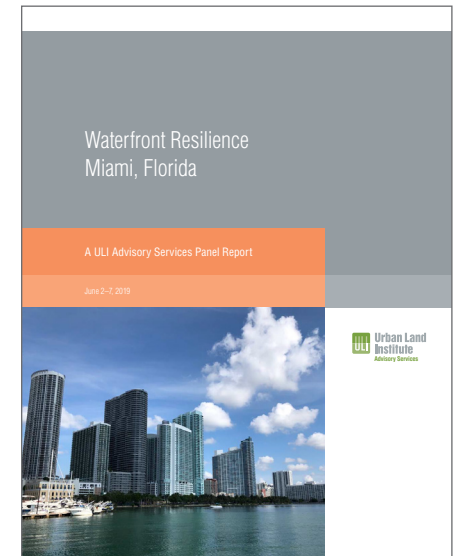
USGBC harmonized its recently revised LEED Resilient Design pilot credits with the [RELi rating](#)

[system](#), a holistic, resilience-based rating system that includes a robust integrative process, acute hazard preparation, adaptation, and mitigation of chronic risks at the building and neighborhood scale. USGBC conducts training workshops on RELi, aiming to encourage innovative design criteria with the latest in integrative design processes for next-generation neighborhoods, buildings, homes, and infrastructure. USGBC recently [outlined an expanded suite of tools](#) and resources to guide building industry professionals in planning, designing, and operating resilient and reliable buildings and infrastructure.

- **Urban Land Institute**

ULI provides technical assistance for cities to increase resilience. Its [Resilience Advisory Services panels](#) bring together ULI member experts in the real estate and development fields with community stakeholders for two- to five-day workshops. These workshops propose resilient land use solutions to decrease community vulnerability to climate-related risks, and to capitalize

on opportunities for improved environmental performance, economic development, and quality of life. ULI's [Resilient Land Use Cohort](#) is another project providing technical assistance on land use and resilience to a network of cities over a two-year period.



ABOVE: ULI provides technical assistance for cities to increase resilience. Source: Urban Land Institute

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## Future Endeavors

The imperative to move toward more resilient buildings and communities continues to grow, providing the impetus and opportunity for signatories to work both individually and collaboratively as the Resilience Building Coalition.

In our two-year report, signatories reported plans to focus on topics including code development, high performing buildings, climate data-informed design standards, existing building retrofits and regulations, financial incentives for resilience, and business continuity in the built environment. At the five-year mark, signatories have reported plans to expand upon those priorities to include social equity and justice, the long-term impacts of COVID-19, affordable housing and its connection to community resilience, system-wide resilience against wildfires, using natural systems to better mitigate and adapt to climate change, and greater advocacy

work, particularly at the federal level. The complex and systemic challenges our built and natural environment face demand the kind of wide-ranging and multidisciplinary collaboration embodied by the Resilience Building Coalition. Working together, we can fulfill professional obligations to public health, safety, and welfare, and find creative, integrated, and ever-evolving solutions to address a multitude of ongoing stresses and potential shocks. Our collective efforts in research, education, advocacy, disaster response, and planning will amplify our ability to improve resiliency at the local, state, national, and global levels, and help communities be prepared to thrive.



To learn more about the Resilience Building Coalition, the Building Industry Statement on Resilience, and the vital role the design and construction industry plays in building safer communities, visit [aia.org/resilience-building-coalition](https://aia.org/resilience-building-coalition).

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