



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



RATING THE STATES: 2018

*An Assessment of Residential Building Code and Enforcement Systems
for Life Safety and Property Protection in Hurricane-Prone Regions*

**ATLANTIC AND GULF COAST STATES
MARCH 2018**

The 2018 Edition

The Insurance Institute for Business & Home Safety (IBHS) is a nonprofit organization, supported by property insurers and reinsurers, that conducts scientific research to identify and promote effective actions to strengthen homes, businesses, and communities against natural disasters and other causes of loss. As part of this mission, IBHS provides technical guidance to inform and improve model building codes, advocates for timely adoption of national model building codes and standards, and encourages uniform enforcement of these codes.

The importance of strong, well-enforced building codes was clearly demonstrated in 2017. Over a two-month period from August through late September, three devastating hurricanes (Harvey, Irma, and Maria) each caused more than \$1 billion in damages, and collectively affected 25 million Americans, or almost 8 percent of the U.S. population, according to the Federal Emergency Management Agency (FEMA).¹

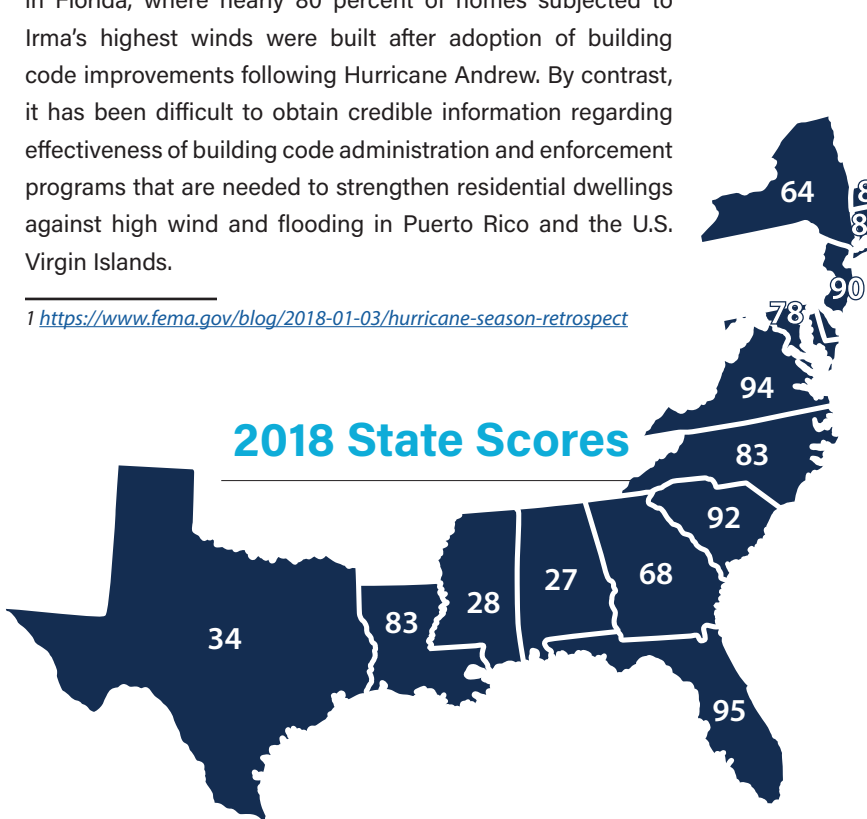
While no single meteorological, physical, or economic attribute is responsible for the damage caused by these events, evidence shows that strong, well-enforced building codes reduce loss and facilitate recovery. This was most apparent in Florida, where nearly 80 percent of homes subjected to Irma's highest winds were built after adoption of building code improvements following Hurricane Andrew. By contrast, it has been difficult to obtain credible information regarding effectiveness of building code administration and enforcement programs that are needed to strengthen residential dwellings against high wind and flooding in Puerto Rico and the U.S. Virgin Islands.

¹ <https://www.fema.gov/blog/2018-01-03/hurricane-season-retrospect>

This is the third *Rating the States* report produced by IBHS to assess elements of code enforcement and administration and contractor licensing in the 18 states most vulnerable to catastrophic hurricanes along the Atlantic Coast and the Gulf of Mexico. Each state has been assigned a score on a 0–100 point scale. Additionally, this report highlights some recent legislative/regulatory developments—both positive and negative—and includes information about building code programs in the U.S. territories of Puerto Rico and the Virgin Islands damaged by Hurricanes Maria and Irma.

This report is intended to:

- Focus public attention on the need for effective statewide building codes.
- Underscore the importance of code administration and enforcement.
- Ensure required performance standards are incorporated into construction of residential dwellings.
- Note whether states require licensing of building officials and construction contractors.
- Highlight steps states can take to improve their building code systems, providing better protection for their citizens and communities.



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2018 AND 2015 STATE SCORES

STATE	2018 SCORE (NEW)	2015 SCORE
FLORIDA	95	94
VIRGINIA	94	95
SOUTH CAROLINA	92	92
NEW JERSEY	90	89
CONNECTICUT	89	88
RHODE ISLAND	87	87
NORTH CAROLINA	83	84
LOUISIANA	83	82
MASSACHUSETTS	81	79
MARYLAND	78	78
GEORGIA	68	69
NEW YORK	64	56
MAINE	54	55
NEW HAMPSHIRE	46	48
TEXAS	34	36
MISSISSIPPI	28	28
ALABAMA	27	26
DELAWARE	17	17

The Importance of Mitigation and Resilience

According to the National Oceanic and Atmospheric Administration (NOAA), 2017 was the most costly year on record for weather-related disasters in the U.S., with damages totaling approximately \$306 billion. These events underscore the importance of mitigation for reducing property loss. Particularly relevant to this report, the catastrophic Hurricanes Harvey, Irma, and Maria affected millions of Americans. Preliminary post-storm investigations indicate that homes along the path of Hurricane Irma that were built to strong, modern building codes in Florida sustained less damage than weaker structures built to pre-Hurricane Andrew provisions.

New research confirms the value of investing in property loss mitigation. According to a report by the National Institute of Building Sciences (NIBS), [Natural Hazard Mitigation Saves: 2017 Interim Report](#), society saves \$6 for every \$1 spent through federal mitigation grants, and \$4 for every \$1 in private sector investments that exceed select provisions in model building codes. A follow-up study on the economic benefits of model building codes is forthcoming.

As is evident once again in this newest IBHS *Rating the States* report, residential building code adoption and enforcement practices vary among states (with even greater variation in states that are not featured here). A list of current codes for each state is available at DisasterSafety.org/ibhs-public-policy/building-codes.

Following Hurricane Sandy, a comprehensive federal report² called on states to use the most current building codes to “ensure that buildings and other structures incorporate the latest science, advances in technology and lessons learned.” That admonition is even more compelling in the wake of Harvey, Irma, and Maria precisely because the building code is an active, evolving document. The application of the codes in the field reflects new knowledge and new standards of practice that have evolved from lessons learned; accordingly, their adoption and enforcement should be a priority in all communities across the U.S.

The Value of Building Codes

Building codes are regulatory standards designed to protect the health, safety, and general welfare of the public. They also ensure the soundness of buildings and their electrical, plumbing, and mechanical systems. Building codes are intended, first and foremost, to prevent deaths and reduce injuries, as well as to reduce economic losses from a wide range of hazards. However, damage reduction that results from the adoption and enforcement of building codes helps to keep people in their homes and businesses following a natural or man-made disaster, reduces the need for public and private disaster aid, and preserves natural resources and the built environment.

For example, a study conducted by IBHS following Hurricane Charley³ in 2004 found that improvements to the codes adopted in 1996 and enforced in Florida resulted in a 60 percent reduction in residential property damage frequency (number of claims) and a 42 percent reduction in damage severity (cost of claims).

Additional benefits of strong, uniform, well-enforced statewide codes include the following:

- Giving residents a sense of security about the safety and soundness of their buildings.
- Offering protection to first responders during and after fires and other disaster events.
- Promoting a level, predictable playing field for designers, builders, and suppliers.
- Allowing for economies of scale in production and building.
- Reflecting recent design and technology innovation, often incorporating newly identified best practices and cost efficiencies.
- Reducing the amount of solid waste in landfills produced by homes that are damaged or destroyed during disasters.

² Hurricane Sandy Rebuilding Strategy Report: <http://portal.hud.gov/hudportal/documents/huddoc?id=HSRebuildingStrategy.pdf>

³ Hurricane Charley Report: www.DisasterSafety.org/hurricane/hurricane-charley

Overview of the Building Code Process

While building codes apply to a wide range of buildings and address both safety and energy efficiency, the adoption and enforcement of safety codes for residential buildings is especially important because registered design professionals (such as engineers and architects) are less likely to be involved in residential design than in commercial construction. The focus of this report, therefore, is on the model building code developed by the International Code Council (ICC) known as the *International Residential Code*® (IRC).

In the U.S., building codes are adopted and enforced at the state and local levels. Rather than developing their own unique building codes from scratch, most jurisdictions base

their codes on the ICC model codes, allowing for state and local amendments as appropriate (see the model codes in effect in the 18 states reviewed in this report in Appendix C). The IRC and other model codes are developed through a public, national consensus process that provides for input and participation from a wide range of stakeholders, including state and local officials, designers, builders, contractors, insurers, and product manufacturers.

The IRC is updated on a three-year schedule; the most recently released version is the 2018 edition. As of December 31, 2017, the most recent IRC adopted by states and local jurisdictions is the 2015 edition.

Methodology and Numeric Scores

IBHS evaluated 47 data points to assess the effectiveness of the states' residential building code adoption and enforcement programs. This assessment covered important factors such as a state's current residential building code, the processes in effect to ensure universality of code application without weakening amendments, state and local level enforcement, and licensing and education of building officials, contractors, and subcontractors who implement building code provisions. A complete description of the factors included in the model is provided in Appendix B.

This report is intended to help provide a roadmap states can follow to improve their system of residential-related building regulations by following best practices. It is not intended for use in insurance underwriting or rating, or for regulatory purposes.

This report looks at state-level performance as a whole and provides a relative standing for each state. After identifying data points in each category, IBHS constructed a model that weighs the activities and/or processes associated with each element as follows:

- **50 percent** of the total score is allotted to statewide adoption and enforcement of building codes.
- **25 percent** is allotted to state-adopted requirements for building official certification, training, and continuing education.
- **25 percent** relates to state regulations for on-site implementation and proficiency, as demonstrated by contractor and subcontractor registration, licensing, and continuing education.

While this numerical scoring is relatively simple, it recognizes that building codes are the focal point of an effective state regulatory life safety and property protection system. Within each of the three main model components, there are several subcategories: whether statewide building codes can be amended at the local level; certification requirements for building officials; and the specific construction trades covered by licensing requirements. Points were assigned to these subcategories based on their relative importance to building safety and integrity, with an emphasis on wind hazard protection requirements of the building code.

NOTE: Appendices A and B describe the states and the model in more detail.

States received points based on IBHS research relating to a set of questions seeking to gauge the statutory and regulatory environment in three categories and associated subcategories identified. Points were allotted when the answer to a given question was consistent with promotion of safer residential construction. No points were allotted if the answer to a given question was inconsistent with the promotion of safer construction. No negative points were allotted.

As a result, possible scores range from 0 to 100, with 0 as the weakest and 100 as the strongest score. Actual scores ranged from 17 to 95. The complete list of states in order of highest to lowest scores follows. By examining the detailed assessment elements, policymakers and other interested parties can find a clear roadmap to strengthen their residential building code system and improve their standing in this report.

Results in Brief

During this assessment, no state achieved a perfect rating based on the IBHS 100-point scale. Several states received high scores including Florida (95 points), Virginia (94 points), South Carolina (92 points), and New Jersey (90 points). Other states that performed well were Connecticut (89 points), Rhode Island (87 points), North Carolina (83 points), Louisiana (83 points), Massachusetts (81 points), and Maryland (78 points). While all of these states have uniform statewide residential building codes and enforcement processes, some unfortunately have taken actions that may weaken their codes in the future, as described later in this report.

The states that received below 70 points (Georgia, New York, Maine, New Hampshire, Texas, Mississippi, Alabama, and Delaware) have no mandatory statewide codes. That said, there are some jurisdictions within these states that have strong code adoption and/or enforcement programs, and have made improvements since the original *Rating the States* report. Under the "State-by-State Building Code System Assessment" part of this report, additional meaningful steps have been identified that could be implemented by these states to improve their statewide code adoption and enforcement programs.

APPENDIX A

State-by-State Building Code System Assessments

Florida



BUILDING CODE ADOPTION

Florida continues to be a leader in building code safety. The 6th Edition (2017) of the *Florida Building Code - Residential* (FBCR), which is based on the 2015 edition of the IRC, became effective December 31, 2017. In 2017, the State of Florida enacted legislation that makes major changes to the process the state employs to adopt building codes in the future. Under the new law, the Florida Building Commission (Commission) will update future editions of the code using the existing FBCR as the base text, with all existing Florida-specific requirements carried forward. The Commission will then consider technical amendments to the code in two phases. See **Highlights of Significant Changes** for further discussion of this legislation.

<p>CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS</p>	<p>Florida has a mandated program for building official certification and training. The program requires individuals to take code-specific courses prior to taking a certification/licensing exam, but a combination of experience and education can qualify candidates as well. The state has a one- and two-family dwelling inspector certification category, which is limited to residential dwelling inspections.</p>
<p>LICENSING OF CONTRACTORS</p>	<p>The state requires licensing of general, plumbing, mechanical, electrical, and roofing contractors. The contractor licenses require passing examinations along with continuing education in every category. Mechanisms are in place enabling the state to discipline a contractor for violations or noncompliance with the code.</p>
<p>KEY AREAS FOR IMPROVEMENT</p>	<p>The lack of requirement for continuing education of building officials specific to the residential code to maintain certification and/or a license is one area that could be improved. Also, in the future it will be necessary to pay close attention to the new code development process to ensure important improvements to the IRC are not bypassed as the state places greater emphasis on the FBCR.</p>

Virginia



BUILDING CODE ADOPTION

Virginia is currently enforcing the 2012 edition of the IRC. However, the commonwealth is in the process of updating the *Virginia Uniform Statewide Building Code* to the 2015 editions of the *ICC International Codes (I-Codes)*, which would potentially be effective in 2018. The process—which entails a review of the Virginia Base Code document and correlation with updates in the 2015 IRC—has been completed and, after a comment period and public hearing, the final regulations will be published in the Virginia Register; pending any petitions received during the 30-day comment period, it will become effective.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	<p>Virginia requires certification and training for its building officials. On-the-job training prior to sitting for examination for certification is permitted. While in training, the inspectors receive supervision; upon completion of on-the-job training and the examination, inspectors receive the official construction trade recognition. A mechanism for consumers to file complaints related to building code enforcement is available in Virginia. The rules permit the authority to apply disciplinary actions, which also can be applied at the local level.</p>
LICENSING OF CONTRACTORS	<p>Virginia issues licenses for general, plumbing, mechanical, electrical, and roofing contractors. However, general and roofing contractors are not required to complete continuing education to renew licenses.</p>
KEY AREAS FOR IMPROVEMENT	<p>Virginia has an exemplary code adoption and enforcement program. The addition of continuing education requirements for general and roofing contractors can further enhance the commonwealth's model statewide code adoption and enforcement program.</p>

South Carolina



BUILDING CODE ADOPTION

South Carolina's residential building code is based on the 2015 edition of the IRC with South Carolina modifications. The design wind speed maps have been amended to align the wind contour lines with physical boundaries such as streets, highways, streams, rivers, and lakes. The state also redrew boundaries for seismic design categories based on a state-sponsored study conducted by The Citadel. Proposed legislation in South Carolina sought to lengthen the cycle of code adoption from three to six years, which if approved would have placed the state adoption cycle behind the model code update cycle. The proposed bill did not advance during the 2017 legislative session; however, reintroduction is expected in 2018.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	<p>The state requires registration, certification, and licensing for all building officials. A nonrenewable two-year provisional license is issued to code enforcement officials who are undergoing training for certification required by the state. The state, under a new rule, requires that the chief code enforcement officer/building official must at least be certified in one trade category before hire; however, he/she would be granted a period of one year to obtain the remaining code certification categories. South Carolina has continuing education requirements for building officials.</p>
LICENSING OF CONTRACTORS	<p>The state requires licensing of general, plumbing, mechanical, electrical, and roofing contractors, but does not mandate continuing education for renewal of licenses in any category.</p>
KEY AREAS FOR IMPROVEMENT	<p>South Carolina's on-schedule code adoption process has helped position it among the top three states with the best building code systems in this report. However, passage of any legislation that could place the state code adoption cycle behind the model code adoption cycle could negatively affect the state's rating. Also, a meaningful change for the state would be to require continuing education for licensed contractors.</p>

New Jersey



BUILDING CODE ADOPTION

The state has adopted and is currently enforcing the 2015 edition of the IRC, without any modification or weakening of the code requirements.

As a result of devastating flooding caused by storm surge from Hurricane Sandy in October 2012, the state adopted FEMA's updated Advisory Base Flood Elevation maps as the rebuilding standard for the state—a change that has enhanced property protection in the state, not only from coastal storm surge but also from riverine flooding.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	New Jersey has a state program for building official certification and training with continuing education requirements that is modeled after the certification program administered by the ICC.
LICENSING OF CONTRACTORS	The state requires registration for homebuilders; however, an exam is not required for obtaining a license and there is no continuing education requirement for renewal. Similarly, registered roofing contractors are not required to take an exam, or complete any continuing education. In contrast, the state has a good system in place for licensing and continuing education of electrical, mechanical, and plumbing contractors.
KEY AREAS FOR IMPROVEMENT	The state would benefit from continuing education for building officials specifically dealing with the residential code.

Connecticut



BUILDING CODE ADOPTION

The state is currently enforcing the 2012 edition of the IRC and as of December 2017, was in the process of updating to the 2015 edition of the code. The Connecticut Division of Construction Services has been developing initiatives to improve resilience of the residential dwellings in the state, focusing in particular on properties located in coastal areas at risk for high wind, flooding, and storm surge.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	<p>The state has a program for certifying building officials. The program requires education classes prior to becoming certified as a residential code inspector.</p>
LICENSING OF CONTRACTORS	<p>Although Connecticut requires licensing for all construction trades, only electrical and plumbing contractors are required to take continuing education to maintain their licenses. The state has a system for consumers to file complaints against licensed contractors and may institute disciplinary action as appropriate.</p>
KEY AREAS FOR IMPROVEMENT	<p>The state should consider requiring continuing education for all contractors.</p>

Rhode Island



BUILDING CODE ADOPTION

The state is currently enforcing the 2012 edition of the IRC with Rhode Island State amendments. The Rhode Island code still contains a deficiency that was highlighted in prior editions of the IBHS *Rating the States* report. Specifically, Section R301.2.1.1 of the code has been modified to allow buildings to be designed as partially enclosed in windborne debris regions in lieu of protecting glazed openings. Although such a design methodology results in a building designed for generally higher wind loads, it increases the likelihood that wind-driven rain could enter a home in the event windows and glazed areas are broken during a storm, which is a concern. The partially enclosed building design was eliminated long ago as an option in the IRC. Also, the state-published prescriptive method for high-wind design (i.e., Appendix AA of *Rhode Island State Building Code, SBC-2*) has several weak provisions for roof truss-to-wall connections, as well as design and anchorage of shear walls.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	<p>Rhode Island has a program for building official certification and licensing and includes code-specified training courses prior to certification. The state also has requirements for continuing education of its building officials.</p>
LICENSING OF CONTRACTORS	<p>In Rhode Island, general and roofing contractors are required to be registered, and the state issues licenses for plumbing, mechanical, and electrical contractors. However, only electrical and plumbing contractors are required to complete continuing education classes to renew licenses.</p> <p>Roofing contractors are required to be registered and are governed by a licensing board.</p>
KEY AREAS FOR IMPROVEMENT	<p>The state should consider updating the residential statewide code based on the latest edition of the IRC. Another meaningful step would be to eliminate the option to design a building as partially enclosed in lieu of protecting glazed openings from the state amendments applicable to coastal zones, and to reevaluate some of the recommendations in Appendix AA of SBC-2 for high-wind design areas.</p>

North Carolina



BUILDING CODE ADOPTION

The state is currently enforcing the 2009 edition of the IRC with *North Carolina Building Code* amendments. There are no significant changes in the state amendments since last published (2012–2017). In 2015, the North Carolina Building Code Council deleted the requirement in the 2009 IRC that anchorage for wood structural panels used for opening protection in windborne debris regions be permanently installed on the building. This amendment makes it less likely that wood structural panel opening protections will be adequately anchored in coastal windborne debris regions of the state. In 2013, North Carolina changed the adoption cycle of the state residential code from three years to six years. As a result, the North Carolina Building Code Council does not intend to update the statewide residential building code until 2018. This change means the state residential code will always be one or two cycles behind the latest national model codes.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	The state has a program for building official certification/licensing and includes code-specific training courses prior to certification with continuing education requirements.
LICENSING OF CONTRACTORS	Licenses are required for general, plumbing, mechanical, and electrical contractors in North Carolina. However, except for electrical contractors, trades are not required to complete continuing education classes to renew licenses. There are no licensing requirements for roofing contractors.
KEY AREAS FOR IMPROVEMENT	North Carolina needs to reinstate regular updates of the state residential code and ensure that statewide requirements are consistently updated based on national model codes and standards published by the ICC every three years. Other meaningful changes the state should take include requiring continuing education for plumbing and mechanical contractors, as well as instituting licensing requirements for roofing contractors.

Louisiana

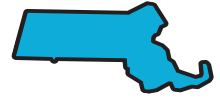


BUILDING CODE ADOPTION

In June 2017, the Louisiana governor issued Executive Order 17-14 suspending adoption of the 2015 editions of the I-Codes until June 1, 2018. However, this order was rescinded in December 2017. Accordingly, the Louisiana State Uniform Code Council voted to adopt the 2015 edition of the IRC and the *National Electrical Code*® (NEC), effective February 1, 2018. Adoption of the 2015 edition of the IRC removes the deficiency that resulted from an Emergency Declaration in 2013 that weakened the wind design provisions of the residential building code by not adopting the appropriate “trigger” for high-wind design in the 2012 edition of the IRC.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	Louisiana has a state program that requires building official certification; however, no mandatory code education classes are included in the certification process.
LICENSING OF CONTRACTORS	The state requires licensing of general, plumbing, mechanical, electrical, and roofing contractors, with continuing education for renewal of licenses for general and plumbing contractors. The electrical, mechanical, and roofing contractors are not required to take continuing education classes.
KEY AREAS FOR IMPROVEMENT	The state may want to require continuing education classes for electrical and mechanical contractors as a part of its licensing requirements.

Massachusetts



BUILDING CODE ADOPTION

In 2017, the Commonwealth of Massachusetts adopted the ninth edition of the statewide building code based on the 2015 IRC. While this move is positive overall, the now-current Massachusetts building code—either through error or a simple failure to update—has amendments to wind design requirements and exposure category classifications that are below specifications for high wind and coastal areas.

Specifically, Massachusetts-specified amendments regarding wind design requirements in the 2015 IRC are based on ASCE 7-05 (*Minimum Design Loads for Buildings and Other Structures*) and use ASD-level wind speeds (V_{asd}). However, the design wind speeds in the 2015 IRC and its referenced standards such as *Wood Frame Construction Manual* (WFCM) are strength-level wind speeds (V_{ult}) consistent with ASCE 7-10.

Also, parts of Cape Cod and portions of Southeastern Massachusetts where design wind speeds are 140 mph may be considered Exposure Category C (open terrain) or Exposure Category D (coastal exposure). However, the state amendments classify all coastal areas as Exposure Category B, which applies only to urban/suburban areas where many buildings and structures are closely spaced.

On a positive note, new residential townhouses constructed in Massachusetts are required to be equipped with automatic fire sprinkler systems.

<p>CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS</p>	<p>Although there is a program for building official certification, it does not require individuals to complete training classes prior to the certification exam. Also, the commonwealth does not require a continuing education program specifically related to the residential dwelling code.</p>
<p>LICENSING OF CONTRACTORS</p>	<p>Massachusetts requires licensing of general, plumbing, electrical, and roofing contractors along with continuing education requirements. However, no licensing is required to perform heating, ventilation, and air conditioning work for lower than ten-ton HVAC units, which are almost always used in one- and two-family dwellings subject to IRC requirements.</p>
<p>KEY AREAS FOR IMPROVEMENT</p>	<p>To avoid confusion, the Massachusetts-amended design wind speeds for coastal and high-wind areas need to be specified in strength-level values (V_{ult}) aligned with ASCE 7-10. Also, the commonwealth should consider including the 140 mph Exposure C High-Wind Guide for areas that need to be classified as Exposure C, and should require design in accordance with the WFCM or ASCE 7 for areas classified as Exposure Category D.</p>

Maryland



BUILDING CODE ADOPTION

Maryland was one of the first states that adopted the 2015 edition of the IRC as a part of *Maryland Building Performance Standards*, which is the designated code for enforcement throughout the state. Local jurisdictions may modify provisions of the *Maryland Building Performance Standards*—except for wind design requirements; however, through amendments, they can address conditions specific to the local jurisdiction's needs. The state strives to be recognized as a leader in life and public safety by requiring automatic residential fire sprinklers in all new residential dwellings.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	<p>Maryland does not license inspectors separately for residential construction, or require completion of code training classes prior to certification. Nor does it have a mechanism for the public to file complaints against inspectors.</p>
LICENSING OF CONTRACTORS	<p>The state requires licensing of general, plumbing, mechanical, electrical, and roofing contractors with continuing education required only for electrical contractors.</p>
KEY AREAS FOR IMPROVEMENT	<p>While the Maryland Office of Code Administration provides a voluntary training program for building officials throughout the state, mandating certification and licensing for residential inspectors would further reinforce Maryland's commitment to an even stronger building and safety code program. Such a program would improve the capabilities of the code enforcement personnel, improve the uniformity of enforcement, and help elevate their recognition as professionals throughout the state.</p>

Georgia



BUILDING CODE ADOPTION

The state is currently enforcing the 2012 edition of the IRC, with state amendments consistent with the major provisions of the model code, except that the requirements for automatic residential fire sprinklers are optional in new one- and two-family dwellings and townhouses. In Georgia, the decision to enforce the code is left up to local jurisdictions.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	Georgia has a program for certification of building officials, but does not require code classes prior to certification. Their program requires continuing education but there is no mechanism for taking disciplinary action against an inspector by the state.
LICENSING OF CONTRACTORS	General contractors, plumbing, mechanical, and electrical contractors are required to be licensed in Georgia. Exams and continuing education are a part of licensing programs. There are no licensing requirements for roofing contractors.
KEY AREAS FOR IMPROVEMENT	To strengthen its building code system, Georgia should make adoption and enforcement of the statewide code by all jurisdictions throughout the state mandatory.

New York



BUILDING CODE ADOPTION

In 2017, the state adopted the 2015 edition of the IRC along with the 2016 supplement as the *New York State Uniform Code* for residential construction. The *New York State Uniform Code* requires that any single-family dwelling or a townhouse over two stories in height be equipped with an automatic fire sprinkler system conforming to the NFPA 13D standard.

The New York City building regulatory system remains exempt from the New York State requirements. In the aftermath of Hurricane Sandy, the New York City Department of Buildings took major positive steps in updating and strengthening their building codes, especially for wind and wind-driven rain resistance. Additionally, based on the recommendations of FEMA's Mitigation Assessment Team, the city made several improvements to its building code consistent with FEMA's NFIP requirements. The October 1, 2014 amendments brought the *New York City Building Code* in line with the 2009 edition of the *International Building Code (IBC)* with city-specific residential code requirements.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	New York State has a mandated program for certification of building officials including code classes prior to certification. However, its program does not require that continuing education be specifically on the residential code.
LICENSING OF CONTRACTORS	The state does not require licensing of general, plumbing, mechanical, electrical, or roofing contractors and leaves the decision of whether to require regulations for licensing of construction trade contractors to local jurisdictions.
KEY AREAS FOR IMPROVEMENT	New York State should consider adopting a state-mandated certification and licensing program for construction trade contractors.

Maine



BUILDING CODE ADOPTION

There have been no significant changes in the *Maine Uniform Building Code* since the last published edition of the *Rating the States* report. The state is still on the 2009 edition of the IRC. Based on the latest information obtained from the Maine Office of Community Development, Bureau of the Building Codes, the state is currently in the rule-making process to adopt the 2015 edition of the IRC; however, as of December 31, 2017, the adoption process was not completed. A major weakness in state regulations allows municipalities with fewer than 4,000 people to choose not to have or enforce a building code.

<p>CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS</p>	<p>Maine has a program for certifying building officials, but does not require code-specific education courses prior to certification. The state requires continuing education, but it is a minimal requirement of nine hours every six years. The state has a certification category for residential construction inspectors, but there is no process for filing complaints or disciplinary action against inspectors.</p>
<p>LICENSING OF CONTRACTORS</p>	<p>The state requires licensing for plumbing and electrical contractors, but not for other trades. Plumbing and electrical contractors are required to take an exam prior to licensing and they are subject to disciplinary action. Electrical contractors are required to obtain continuing education for license renewal.</p>
<p>KEY AREAS FOR IMPROVEMENT</p>	<p>Maine's long delay in code adoption is an area of concern. Considering the model residential code is updated every three years, the state should consider regular adoption and enforcement of the IRC, and require all municipalities throughout the state, regardless of population size, to adopt and enforce the <i>Maine Uniform Building Code</i>.</p>

New Hampshire



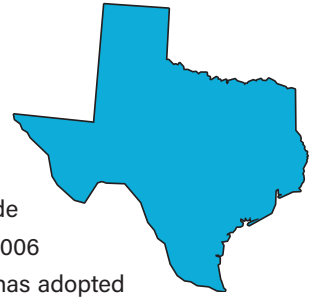
BUILDING CODE ADOPTION

New Hampshire is still enforcing the 2009 edition of the IRC. The state is working to update the residential building code to the 2015 edition of the IRC. Adoption and enforcement of the residential code, however, is not mandatory throughout the state; rather, it is at the discretion of the local jurisdictions.

A bill signed by the governor on June 26, 2017, permits removal and replacement of arc-fault circuit interrupter (AFCI) devices with non-AFCI devices from electrical circuits that demonstrate repetitive tripping. This action constitutes a weakening of the electrical safety requirements of the NEC.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	New Hampshire has no statewide program to license building officials.
LICENSING OF CONTRACTORS	Contractor licensing is required for plumbing and electrical contractors, but not for other trades. Plumbing and electrical contractors are required to take an exam prior to licensing, are subject to disciplinary action, and are required to take continuing education classes.
KEY AREAS FOR IMPROVEMENT	New Hampshire should consider mandatory enforcement of the statewide residential code and establish a building official certification and licensing program throughout the state.

Texas



BUILDING CODE ADOPTION

Texas does not require mandatory adoption and enforcement of its residential building code throughout the state. However, the law states that municipalities may adopt and enforce the 2006 IRC as a minimum residential construction code. In addition, the Texas Department of Insurance has adopted windstorm building standards that homes must meet to obtain windstorm and hail insurance from the Texas Windstorm Insurance Association (TWIA), the state wind catastrophe pool.

In 2017, the legislature in Texas enacted a law that requires builders to provide an inspection report to the county—in unincorporated areas of certain counties—indicating that the construction complies with the building code. In accordance with this law, failure to provide an inspection documentation to the county could result in prosecution of the builder.

Post-event investigations by teams that consisted of IBHS staff and other stakeholders revealed that several jurisdictions struck by high winds in the primary landfall locations of Hurricane Harvey (August 2017, Category 4) had adopted more recent editions of the IRC (2012 or 2015). In general, it was observed that there was limited wind damage to construction built to newer building codes; however, damage due to the amount of rain accumulated from Harvey and catastrophic flooding was extensive around Houston and coastal bayous of Southeast Texas.

<p>CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS</p>	<p>Texas has no statewide program to license building officials.</p>
<p>LICENSING OF CONTRACTORS</p>	<p>The state requires licensing for plumbing, mechanical, and electrical contractors, and contractors are required to take continuing education classes for license renewal.</p>
<p>KEY AREAS FOR IMPROVEMENT</p>	<p>Hurricane Harvey and other events during the past have demonstrated that Texas is vulnerable to a wide range of natural disasters including hurricanes, flooding, wildfires, hail, and severe convective storms. Adoption of a mandatory statewide code system throughout the state would help establish uniformity in enforcement and application of the code provisions, and reduce losses in areas that have not adopted building codes.</p> <p>The extensive damage and loss of life that resulted from Hurricane Harvey—one of the costliest hurricanes on record, inflicting nearly \$200 billion in damage to Houston and surrounding areas—necessitates stringent control of future land development and residential building construction, especially in flood-prone areas.</p>

Mississippi



BUILDING CODE ADOPTION

There have been no significant changes in the state code adoption since the last published edition of the *Rating the States* report. Mississippi took an important step forward in 2014 by adopting a building code law that governs construction of most residential buildings in the state. The law allows municipalities to adopt one of the last three effective IRC editions. However, municipalities could opt out of the requirements for adoption and enforcement within 120 days of the effective date (i.e., November 30, 2014). Based on previous data available to IBHS, it appears that approximately 90 percent of the population within Mississippi's municipalities lives in areas that have not opted out of the building code law. However, approximately 50 percent of the state's population lives in unincorporated areas, which are governed by the respective county board of supervisors. To this date, data associated with these unincorporated areas has not been available, so it is not possible to fully determine what percentage of the entire state's population is covered by a building code law.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	Mississippi has no statewide program to license building officials. However, the state has allocated funding for training of building officials and inspectors through local governments.
LICENSING OF CONTRACTORS	General contractors are the only trade required to obtain a license and continuing education is required. Also, the state has a mechanism to register complaints from the public and discipline contractors, if needed.
KEY AREAS FOR IMPROVEMENT	Establishment of a State Construction Code Council with the primary function of administering (i.e., reviewing, adopting, maintaining, and providing guidance for staff qualification/certification and training, as well as direction for contractors) up-to-date codes throughout the state would be highly beneficial in promoting the Mississippi statewide building code program.

Alabama



BUILDING CODE ADOPTION

Alabama does not have a mandatory statewide building code system. The state Department of Economic and Community Affairs (ADECA) updated the *Alabama Energy and Residential Codes* (AERC) to the 2015 edition of the IRC for voluntary adoption by jurisdictions in the state. Although the energy portion of the code is mandatory at the local level, local jurisdictions are permitted to continue enforcing the residential code edition they had already adopted. The law requires that if a jurisdiction has not previously adopted a residential building code and decides to adopt one, they must now adopt the AERC codes. It should be noted that enforcement aspects of the AERC are not clearly defined in the rule and/or can be considered nonexistent.

On a more positive note, several coastal communities within the state are to be applauded for adopting and enforcing strong code programs.

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	Alabama has no statewide program to license building officials.
LICENSING OF CONTRACTORS	The state requires licensing for general, plumbing, mechanical, and electrical contractors, but not for roofing contractors. Mechanical and electrical contractors are required to obtain continuing education for license renewal.
KEY AREAS FOR IMPROVEMENT	Over the last several years, Alabama has experienced repetitive devastating inland tornadoes and storms, and was in the potential path of Hurricanes Harvey, Irma, and Nate in 2017. Adoption of a modern mandatory statewide residential code throughout the state would help establish uniformity in enforcement and application of the important code provisions. Further, it would reduce losses to life and property in the event of severe storms, to which the state is highly vulnerable.

Delaware



BUILDING CODE ADOPTION

Delaware does not have a statewide residential building code, except for a plumbing code, which is based on the 2015 edition of the *International Plumbing Code*® (IPC).

CERTIFICATION AND EDUCATION OF BUILDING OFFICIALS	Delaware has no statewide program to license building officials.
LICENSING OF CONTRACTORS	Delaware requires licensing for plumbing, mechanical, and electrical contractors, while general and roofing contractors are not licensed. Electrical contractors are required to obtain continuing education for license renewal.
KEY AREAS FOR IMPROVEMENT	Delaware should consider adoption and enforcement of a model statewide residential code system throughout the state and a program to license building officials and construction trade contractors.

U.S. Virgin Islands

Based on the information available from public resources, the territory of the U.S. Virgin Islands has adopted the 2003 IRC for residential one- and two-family dwelling construction. Title 29 (Public Planning and Development), Chapter 5 (Building Code) of the U.S. Virgin Islands' laws requires a minimum design wind speed of 145 mph (ASD-level wind speed consistent with ASCE 7-05 or earlier editions) for buildings throughout the territory. The laws have provisions for permit requirements as well as inspections of construction work by representatives of the territory's building commissioner.

In early September 2017, prior to striking the mainland U.S., Hurricane Irma made landfall in the U.S. Virgin Islands as a Category 5 storm. Irma caused significant and catastrophic damage on the island, leaving many buildings totally or partially destroyed. Power outages resulting from

Hurricane Irma hampered post-hurricane repair and reconstruction operations. The findings from the FEMA mitigation assessment team that visited the territory in December 2017 should identify systemic deficiencies observed in construction techniques throughout the territory and could provide mitigation strategies for improving the resilience of future construction. The update of the territory's building codes based on the latest U.S. model building codes and standards should be emphasized as well.

Puerto Rico

Puerto Rico has adopted the 2011 Puerto Rico Building Code (PRBC), which is based on the 2009 edition of the IRC. The Office of Permit Management is tasked with implementation of the PRBC. As evidenced by Category 4 Hurricane Maria in September 2017, Puerto Rico is vulnerable to high wind speeds that fall outside the prescriptive standards of the IRC. As such, to reduce wind damage, higher-level design and construction standards are needed to address the increased wind speeds. Examples of what is referenced in the Puerto Rico residential code include design of the building wind loads based on the IBC, *ICC Standard for Residential Construction in High-Wind Regions* (ICC 600) and designs based on ASCE 7. IBHS was not able to determine the extent to which these standards are being applied throughout Puerto Rico while developing this report.

The only amendment in Division III of the PRBC, which specifically governs residential construction, is to Section R301.2.1.2 regarding protection of openings (i.e., windborne debris protection). This section has been modified to include requirements in the 2015 edition of the IRC with respect to standards for testing of garage doors with glazing, predrilling requirements of the protective panels, and use of corrosion-resistant fasteners to secure the panels over openings. Tested and certified storm shutter systems are also included as alternatives to wood structural panels for protection of openings from windborne debris.

Appendix R in the PRBC provides alternate structural provisions—reinforced concrete structural design as well as masonry construction based on a wind speed of 145 mph (3-second gust) as defined in ASCE 7-05—for one- and two-story buildings, which also covers residential construction. However, based on Section R102.5 of the PRBC, this appendix is not mandatory. The code has provisions for permit requirements as well as inspections

of construction work by representatives of the territory's municipalities. It needs to be emphasized that Puerto Rico is also located in a high seismic activity zone and is consequently vulnerable to seismic forces as well. Accordingly, the designs should factor in seismic vulnerabilities.

Puerto Rico permitting laws require sign-off by licensed professionals for all construction; however, there is evidence of what is referred to as informal construction or construction without a permit throughout the territory.

The extent of damage to buildings in Puerto Rico during Hurricanes Maria and Irma in 2017 was widespread and devastating. In general, preliminary investigations revealed that most light-frame construction—which includes residential dwellings—performed poorly and there were significant property losses. On a more positive note, reinforced concrete structures performed well. There was evidence of widespread damage to building envelope systems (i.e., roof covering, windows and doors, and deteriorated shutters), regardless of light-frame or reinforced concrete construction. Flood damage, which includes coastal erosion, storm surge and riverine damage, was extensive. It should also be noted that widespread power losses and damage to power generation and distribution systems resulting from Maria and Irma have been a significant roadblock to post-hurricane repair and reconstruction efforts in the territory.

The findings from the FEMA mitigation assessment team that visited the territory in December 2017, should provide a better picture of how the residential building stock performed during the massive hurricane forces, and of the systemic deficiencies observed in construction methods and code enforcement throughout the territory. The report could provide mitigation strategies for improving the resilience of future construction in Puerto Rico.

APPENDIX B

Highlights of Significant Changes

The numeric scores in this report are important in understanding how states are addressing the key components of an effective building code system: adoption and updating of mandatory statewide codes; proper enforcement of building code requirements by building officials; and licensing of contractors and subcontractors who are responsible for complying with building code requirements. Beyond the changes reflected in these scores, the following three states took actions that could affect their current or future building code adoption processes.

Florida

Hurricane Irma demonstrated the effectiveness of Florida's strong, up-to-date, mandatory statewide code in reducing wind damage. Timely adoption of the sixth edition of the FBCR in 2017 further illustrates the state's commitment to maintaining the latest modern codes and standards for residential construction. Against this backdrop, there has been considerable controversy surrounding a new 2017 law that changed the process the state employs to adopt building codes in the future. Prior to the new legislation, the Florida Building Commission (Commission) used the IRC model code as the base code for developing the FBCR with any statutory requirements merged into the base code.

Under the new law, the Commission will update future editions of the code using the existing FBCR as the base text with all Florida-specific requirements carried forward. The Commission will then consider technical amendments to the code in two phases. During the first phase, the Commission will consider for approval all amendments to the IRC that were approved for the 2018 IRC and any other nationally recognized code. During the second phase, the Commission will consider for approval any new Florida-specific amendments that are proposed. The new legislation requires the Commission to adopt, at a minimum, any updates to the IRC or any other code necessary to maintain eligibility for federal funding and discounts from the National Flood Insurance Program (NFIP), FEMA, and the U.S. Department of Housing and Urban Development (HUD).

The new legislation also provides the authority for the Commission to change the threshold voting requirement—for the Technical Advisory Committees and the Commission—to approve technical amendments from a three-quarters to two-thirds majority (Note: the Technical Advisory Committees provide recommendations on code changes to the Commission). While the voting threshold for the Technical Advisory Committees has been reduced to a two-thirds majority, the Commission opted to maintain the three-fourths majority for approval of code changes by the Commission.

Supporters of the new process argue that using the existing edition of the FBCR as the base is a more commonsense approach than starting with an ICC model residential code that was designed for broad adoption across the country in states that have different risks from those in Florida, especially with regard to high wind and water intrusion. They also note that the legislation specifically prohibits the FBCR from weakening any wind resistance or water intrusion standards and requirements, the two greatest concerns regarding hurricanes to which the state is especially vulnerable. Also, the bill explicitly requires the Commission to adopt updates that preserve federal funding or discounts linked to minimum building code requirements, such as those required for participation in the NFIP, eligibility for hazard mitigation assistance and grants, and so forth.

That said, there also was strong opposition to the bill by many stakeholders, who voiced concerns that the bill could weaken the FBCR or undermine advances made in triennial updates of the model building codes. Critics also suggested that 25 years after Hurricane Andrew, which resulted in adoption of strong Florida statewide codes, memories are fading and the proposed changes to the code adoption process are dangerous.

Regardless of whether the FBCR or the IRC is used as the base text for updating building codes in Florida, in the past, the state has utilized a combined approach that is consistent with the most recent national model codes and standards while adding in stronger wind and water intrusion protections. Just as the previous approach required careful attention to make sure that older provisions of the FBCR were carried forward, advocates of building safety will need to stay engaged in the new process to make sure that important advancements and requirements in published editions of the model codes and standards are added to future editions of the FBCR.

Louisiana

In June 2017, the Louisiana governor issued an Executive Order suspending adoption of the 2015 editions of the I-Codes and the NEC. This delay continued a problem in Louisiana's building code resulting from a 2013 Emergency Declaration that weakened the wind design provisions of the residential building code by reducing the area of the state where specific wind design and windborne debris protection was required. After extensive efforts by many stakeholders and supporters of the up-to-date codes, Governor Edwards rescinded the executive order, allowing adoption of the 2015 codes to proceed. The Louisiana State Uniform Construction Code Council subsequently voted to adopt the codes and Louisiana amendments, effective February 2018.

Although the statewide code is now a well-established and important component of the state's improved hurricane defense system, regulatory actions over the past several years directly threaten progress made in a state that is especially vulnerable to hurricanes and flooding.

New York

After many years with a residential building code that was based on the 2006 IRC, New York State finally adopted the 2015 edition of the IRC in 2017. The *New York State Uniform Residential Code* is now in conformance with one of the latest editions of the IRC. The update also eliminated provisions that weakened opening protection requirements in the IRC, thereby improving protections in windborne debris regions. The new code also requires any single-family dwelling or a townhouse over two stories in height above grade to be equipped with automatic fire sprinkler systems; this is one of the stronger fire sprinkler requirements in the states covered by this report.

APPENDIX C

Residential Codes in Effect for States in Rating the States Report

FLORIDA	2015 <i>International Residential Code</i> ® with state amendments
VIRGINIA	2012 <i>International Residential Code</i> ® with state amendments
SOUTH CAROLINA	2015 <i>International Residential Code</i> ® with state amendments
NEW JERSEY	2015 <i>International Residential Code</i> ® with state amendments
CONNECTICUT	2012 <i>International Residential Code</i> ® with state amendments
RHODE ISLAND	2012 <i>International Residential Code</i> ® with state amendments
NORTH CAROLINA	2009 <i>International Residential Code</i> ® with state amendments
LOUISIANA	2015 <i>International Residential Code</i> ® with state amendments
MASSACHUSETTS	2015 <i>International Residential Code</i> ® with state amendments
MARYLAND	2015 <i>International Residential Code</i> ® with state amendments
GEORGIA	2012 <i>International Residential Code</i> ® with state amendments, if code is to be adopted at a local level
NEW YORK	2015 <i>International Residential Code</i> ® with state amendments, except New York City which adopted 2009 <i>International Building Code</i> ® with residential construction provisions
MAINE	2009 <i>International Residential Code</i> ® with state amendments; municipalities with populations less than 4,000 may opt out
NEW HAMPSHIRE	2009 <i>International Residential Code</i> ® with state amendments, but local enforcement not mandatory
TEXAS	No mandatory statewide code; the 2006 <i>International Residential Code</i> ® is optional
MISSISSIPPI	One of the latest three editions of the <i>International Residential Code</i> ®; a number of counties and municipalities have opted out
ALABAMA	No mandatory statewide code; jurisdiction may continue with any code editions currently being enforced; however, if a code is to be adopted at local level for the first time, it shall be the 2015 IRC
DELAWARE	No mandatory statewide residential code

