

## BUILDING BACK BETTER WITH BETTER BUILDING CODES

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In less than a two-year period, North Carolina communities have faced immense damages to their infrastructure and livelihood as a result of Hurricanes Matthew and Florence. Hurricane Matthew caused an estimated \$4.8 billion in damages when it hit North Carolina in October 2016.<sup>1</sup> Though damages are still being calculated from Florence, which made landfall in September 2018, they are expected to be much higher, with early estimates predicting losses over \$15 billion.<sup>2</sup> As leaders look to rebuild communities in the wake of Florence, much conversation has focused on “building back better”: rebuilding communities in ways that are resilient in the face of a changing climate that will continue to bring extreme weather events to the state.

One of the actions identified by the North Carolina Office of the Governor in an early October 2018 press release related to the idea of developing resilient communities supports the “construction of resilient buildings.”<sup>3</sup> This paper explores the ways that the law can create resilient communities through developing, revising, and enforcing building codes. Building codes regulate construction and maintenance; with responsible, innovative, and effective codes, homes will be able to withstand extreme weather events like hurricanes, particularly those with high winds and massive flooding. To demonstrate the impact that building codes can have on the development of resilient communities, in Part I, this paper will explore how codes are created

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<sup>1</sup> *One Year Later: North Carolina Continues Recovering from Hurricane Matthew*, N.C. OFFICE OF THE GOVERNOR (Oct. 3, 2017), <https://governor.nc.gov/news/one-year-later-north-carolina-continues-recovering-hurricane-matthew>.

<sup>2</sup> See Patti Dom, *Hurricane Florence damage estimated at \$17 billion to \$22 billion and could go higher — Moody's Analytics*, CNBC (Sept. 17, 2018), <https://www.cnbc.com/2018/09/17/moodys-hurricane-florence-damage-estimated-at-17-to-22-billion.html>.

<sup>3</sup> *Governor Outlines Priorities for Hurricane Florence Recovery: Emphasis on Building Stronger and More Resilient Communities*, N.C. OFFICE OF THE GOVERNOR (Oct. 1, 2018), <https://governor.nc.gov/news/governor-cooper-outlines-priorities-hurricane-florence-recovery>.

and implemented across the United States and the competing interests that impact their development and overall effectiveness. Part II will then discuss how codes have helped other states “build back better.” Part III will provide a brief history of the North Carolina code. Finally, Part IV will propose lessons North Carolina could learn from other states and suggestions as to improvements to the North Carolina code that could mitigate hurricane damages in the future.

## I. CREATING AND IMPLEMENTING CODES ACROSS THE UNITED STATES

Building codes began to emerge in the United States in the 1800s in response to safety concerns related to fires in densely populated urban areas.<sup>4</sup> These codes, which were originally designed to address fire risk, have evolved to include provisions related to other natural hazards such as earthquakes, tornadoes, and hurricanes.<sup>5</sup> They establish procedures for the design, construction, and upkeep of buildings.<sup>6</sup> Codes also create safety standards that promote the health and well-being of building occupants, be it employees of a company in a large city or homeowners in a suburban neighborhood.<sup>7</sup> The Federal Emergency Management Agency (“FEMA”), responsible for disaster relief in the United States, says that “building code adoption and enforcement is one of the strongest strategies jurisdictions can take to protect a community against the effects of natural hazards.”<sup>8</sup>

Building codes in the United States vary among each of the 50 states, as the country spans a vast area and encompasses numerous climates, each posing unique natural hazards.

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<sup>4</sup> *Building Codes Fact Sheet*, FEMA BUILDING SCIENCE BRANCH (Feb. 5, 2013), [https://www.fema.gov/media-library-data/20130726-1903-25045-6866/building\\_codes\\_toolkit\\_fact\\_sheet.pdf](https://www.fema.gov/media-library-data/20130726-1903-25045-6866/building_codes_toolkit_fact_sheet.pdf) [hereinafter *Building Codes Fact Sheet*].

<sup>5</sup> *Id.*

<sup>6</sup> *Building Codes*, FED. EMERGENCY MGMT. AGENCY, <https://www.fema.gov/building-codes> (last updated Apr. 16, 2018, 4:01 PM).

<sup>7</sup> *Id.*

<sup>8</sup> *Building Codes Fact Sheet*, *supra* note 4.

Unsurprisingly, these regional differences are reflected in the way building codes emerged nationwide. Building codes evolved under three main regional organizations: Building Officials and Code Administrators International, Inc. (“BOCA”), International Conference of Building Officials (“ICBO”), and Southern Building Code Congress International, Inc. (“SBCCI”).<sup>9</sup> Though regional standards are important in creating effective codes for various geographic areas, these organizations came together to establish the International Code Council (“ICC”) in 1994.<sup>10</sup> The ICC is a nonprofit organization that releases International Codes, known as I-Codes, on building, green construction, plumbing, and other areas.<sup>11</sup> The codes are modified every three years.<sup>12</sup> While codes are not binding on any state government, all 50 states have adopted the single building code created by the ICC at either a state or jurisdictional level.<sup>13</sup>

Local and state jurisdictions are responsible for adopting and enforcing building codes.<sup>14</sup> However, many groups, including developers, construction supply companies, homeowners, and insurance agencies, have an interest in building codes and can be involved in their design and implementation. Codes establish the materials that may be used for construction, the inspections required before, during, and after building projects, as well as ventilation and other safety systems, such as accessible exits, that must be integrated into designs.<sup>15</sup> Changes to codes can add costs to construction by requiring new materials or more inspections, which makes it more

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<sup>9</sup> *About ICC*, INTERNATIONAL CODE COUNCIL, <https://www.iccsafe.org/about-icc/overview/about-international-code-council/> [hereinafter *ICC*].

<sup>10</sup> *Id.*

<sup>11</sup> *Id.*

<sup>12</sup> *Building Codes Fact Sheet*, *supra* note 4.

<sup>13</sup> *ICC*, *supra* note 9.

<sup>14</sup> *Building Codes Fact Sheet*, *supra* note 4.

<sup>15</sup> *Id.*

expensive to buy a home, especially in states with strict codes like Florida.<sup>16</sup> On the reverse side, homes that are more or less equipped for storm damages can drive insurance prices and influence the market in certain areas.<sup>17</sup> Additionally, if buildings are constructed to be resilient in the face of disaster, aid costs are reduced as both the natural and built environment are preserved and people are able to stay in their communities.<sup>18</sup>

The following section explores how building codes have been changed in other states and the resulting resiliency of communities where these changes have taken place.

## **II. BUILDING BACK BETTER: BUILDING CODE CHANGES AND IMPACTS IN FLORIDA AND TEXAS**

In 1992, Hurricane Andrew became one of the most expensive disasters in United States history.<sup>19</sup> Making landfall as a Category 4 storm, Andrew caused immense damage to infrastructure.<sup>20</sup> Ninety percent of homes in the path of Andrew experienced roof damage; of these, 33% sustained severe damage.<sup>21</sup> Insurance companies went bankrupt as insured losses totaled over \$24 billion.<sup>22</sup>

When Andrew made landfall in Florida, there were reportedly up to 26 different building codes in effect in South Florida.<sup>23</sup> However, one thing was common among the various regulatory schemes: none were established that properly prepared property owners for a storm of

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<sup>16</sup> Laura Kusito and Arian Campo-Flores, *Homes Built to Stricter Standards Fared Better in Storm*, WALL STREET J. (Sept. 16, 2017), <https://www.wsj.com/articles/one-early-lesson-from-irma-hurricane-building-codes-work-1505559600>.

<sup>17</sup> Alan Gomez, *Hurricane Irma Could Test Florida's Hurricane Andrew-inspired Building Codes*, USA TODAY (Aug. 10, 2017), <https://www.usatoday.com/story/news/nation/2017/08/10/hurricane-andrew-florida-building-codes-weakened/490364001/>.

<sup>18</sup> *Building Codes Fact Sheet*, *supra* note 4.

<sup>19</sup> Gomez, *supra* note 17.

<sup>20</sup> *Id.*

<sup>21</sup> Nick Meloy et al., *Roof Damage in New Homes Caused by Hurricane Charley*, J. PERFORMANCE OF CONSTRUCTED FACILITIES, 97 (Mar./Apr. 2007).

<sup>22</sup> Gomez, *supra* note 17.

<sup>23</sup> *Id.*

that strength.<sup>24</sup> In response to the devastating losses suffered in both the public and private sectors, Florida drafted statewide codes in 2001 which created more stringent requirements for building.<sup>25</sup> These codes were adopted in 2002 and remain some of the strictest in the nation; they were ranked as the most effective in the southeast in a recent report published by the Insurance Institute for Business and Home Safety.<sup>26</sup>

Florida's 2002 code required not only different materials for construction, but also created different, often more extensive, processes for inspection and maintenance.<sup>27</sup> As a result, builders have complained of the cost of compliance with the stricter regulations.<sup>28</sup> In Florida, regulatory compliance adds more than 20% to the price of a home than in most other areas of the United States.<sup>29</sup> However, these up-front costs have saved Floridians money in the long run, limiting property losses from hurricanes rivaling Andrew in both 2004 and 2017.<sup>30</sup>

In 2004, Florida was hit with four hurricanes in one season.<sup>31</sup> The first and most severe of these storms, Hurricane Charley, made landfall as a Category 4 storm, surprising forecasters as it changed path and strength quickly.<sup>32</sup> A study was conducted to assess the effectiveness of the post-Andrew building codes following Charley in Charlotte County, Florida.<sup>33</sup> A main focus of the study was to determine if the codes resulted in fewer insurance claims per policy and lower

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<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

<sup>26</sup> *Rating the States: An Assessment of Residential Building Code and Enforcement Systems for Life Safety and Property Protection in Hurricane-Prone Regions*, INS. INST. FOR BUS. & HOME SAFETY (Mar. 2018), <http://disastersafety.org/wp-content/uploads/2018/03/ibhs-rating-the-states-2018.pdf> [hereinafter *Rating the States*].

<sup>27</sup> Kusito and Campo-Flores, *supra* note 16.

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

<sup>30</sup> *Id.*; *Hurricane Charley: Nature's Force v. Structural Strength*, INS. INST. FOR BUS. & HOME SAFETY (2004), <http://disastersafety.org/wp-content/uploads/hurricane-charley-report.pdf> [hereinafter *Hurricane Charley*].

<sup>31</sup> *Id.*

<sup>32</sup> *Id.*

<sup>33</sup> *Id.*

severity of such claims.<sup>34</sup> Researchers discovered that homes built under the new codes had a reduced claim frequency of 60%.<sup>35</sup> When losses did occur, the claims were 42% less severe for homes that were built with the modern codes.<sup>36</sup>

Florida did not experience another hurricane rivaling the strength of Andrew or Charley until 2017, when Hurricane Irma hit the state as a Category 4 storm.<sup>37</sup> Once again, it appeared that homes built with the codes adopted and revised since 2002 fared better in the storm.<sup>38</sup> A Wall Street Journal article written just days after the storm described the reactions of homeowners who had rebuilt in the aftermath of Andrew whose homes were virtually untouched by Irma.<sup>39</sup> Naples homeowners Stephany and Michael Carr said that though there were tree branches bouncing off their roof, their house remained unscathed in the storm.<sup>40</sup> This was quite a contrast to Andrew, when the roof (built under the old standards) was nearly blown completely off their home.<sup>41</sup> Ms. Carr expressed confidence in the new codes, saying, “For anyone who doubts these codes, I invite them to sit in a pre-code structure in a Category 3 storm or higher.”<sup>42</sup>

As structures become safer and more disaster-resistant in Florida, they appear to be saving consumers money.<sup>43</sup> Austin College professor Kevin Simmons, who led research that examined the insured-loss data from 2001-2010, found that for every additional \$1 spent in

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<sup>34</sup> *Id.*

<sup>35</sup> *Id.*

<sup>36</sup> *Id.*

<sup>37</sup> Perry Stein et al., *Destructive Winds, Rain Hit Florida as Hurricane Irma Makes Landfall in the Keys*, WASH. POST (Sept. 10, 2017), <https://www.washingtonpost.com/news/post-nation/wp/2017/09/09/destructive-winds-rain-hit-florida-as-hurricane-irma-approaches/>.

<sup>38</sup> *See generally* Kusito and Campo-Flores, *supra* note 16.

<sup>39</sup> *Id.*

<sup>40</sup> *Id.*

<sup>41</sup> *Id.*

<sup>42</sup> *Id.*

<sup>43</sup> *Id.*

construction costs in Florida, \$6 was saved in losses.<sup>44</sup> Florida's revised code also reduced windstorm losses by over 70%.<sup>45</sup>

In 2017, Hurricane Harvey made landfall in Texas, surpassing Andrew in disaster costs.<sup>46</sup> Texas does not have a statewide building code, but a study of 213 impacted homes conducted by the Insurance Institute for Business & Home Safety (IBHS) found that generally, new homes built according to modern codes, fared better than those built to older standards.<sup>47</sup> Asphalt shingles were used on 85% of the homes studied; the high winds of Harvey were more likely to damage homes with lower-quality asphalt roof shingles.<sup>48</sup> Lead study author and IBHS vice president Dr. Tanya M. Brown-Giammanco, shared the following regarding Harvey damages:

If the homes and businesses we investigated had been built to more resilient standards, recovery in these wonderful communities would not have been as painful or as prolonged. We urge homeowners and business owners to look at the science and make the choice to build stronger as they repair or replace their homes or business facilities in this special part of Texas...<sup>49</sup>

Brown-Giammanco's perspective highlights the importance of building and modifying homes to be resilient in our changing climate. An August 2018 survey found that 10% of Texans whose homes were impacted by Harvey were still displaced.<sup>50</sup>

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<sup>44</sup> *Id.*

<sup>45</sup> Kusito and Campo-Flores, *supra* note 16.

<sup>46</sup> Angela Fritz, *Harvey, Irma and Maria Now in the Top 5 Costliest Hurricanes on Record, NOAA Says*, WASH. POST (Jan 30, 2018), <https://www.washingtonpost.com/news/capital-weather-gang/wp/2018/01/30/harvey-irma-and-maria-now-in-the-top-5-costliest-hurricanes-on-record-noaa-says/>.

<sup>47</sup> Stephanie K. Jones, *IBHS Study Chronicles Hurricane Harvey Wind Damage, Provides Takeaways*, INS. J. (Aug. 8, 2018), <https://www.insurancejournal.com/news/southcentral/2018/08/08/497491.htm>.

<sup>48</sup> *Id.*

<sup>49</sup> *Id.*

<sup>50</sup> Brandon Formby, *Survey: 10% of Texans Displaced by Harvey Still Haven't Gone Home*, INS. J. (Aug. 23, 2018), <https://www.insurancejournal.com/news/southcentral/2018/08/23/498985.htm>.

Adopting and enforcing modern building codes can reduce these displacement costs and limit the disruption that natural disasters have on people's livelihood and overall welfare.<sup>51</sup> Florida's post-Andrew hurricane damages provide a clear indication that structures built under the modern codes fare better in disaster. The struggles faced by Texas in the wake of Harvey highlight the need for responsible and resilient construction.

The following sections explore how North Carolina has created and implemented its building codes and what these codes could contribute to Governor Cooper's goal of achieving greater resiliency as the state rebuilds its communities.

### **III. NORTH CAROLINA'S CODE: PAST AND PRESENT**

North Carolina is one of the states that has adopted a statewide building code and enforcement process. The North Carolina Building Code Council was established by the North Carolina General Assembly in 1933 and released the first set of state codes in 1935, which were approved by the General Assembly in 1941.<sup>52</sup> Today, the North Carolina Building Code Council, housed in the Office of the State Fire Marshal, is a bipartisan group of 17 members selected by the governor to be in charge of the state's codes.<sup>53</sup>

In 2013, the council voted to require revisions to the building code every six years rather than three, the aforementioned industry standard.<sup>54</sup> This means that the state is currently

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<sup>51</sup> See *Hurricane Charley*, *supra* notes 30-36.

<sup>52</sup> *N.C. State Bldg. Code 1967 Edition*, N.C. DEP'T OF INS., Foreword, [http://www.ncdoi.com/OSFM/Engineering\\_and\\_Codes/Documents/State\\_Building\\_Codes/PastCodes/1967/Section\\_1.pdf](http://www.ncdoi.com/OSFM/Engineering_and_Codes/Documents/State_Building_Codes/PastCodes/1967/Section_1.pdf).

<sup>53</sup> *Engineering and Codes*, N.C. DEP'T OF INS., [https://www.ncdoi.com/OSFM/Engineering\\_and\\_Codes/Default.aspx?field1=Building\\_Code\\_Council\\_USER&user=Building\\_Code\\_Council](https://www.ncdoi.com/OSFM/Engineering_and_Codes/Default.aspx?field1=Building_Code_Council_USER&user=Building_Code_Council).

<sup>54</sup> Ari Natter, *North Carolina Weakened Its Building Codes in 2013*, BLOOMBERG (Sept. 13, 2018), <https://www.bloomberg.com/news/articles/2018-09-13/north-carolina-may-regret-weakening-its-building-codes-in-2013>.

enforcing 2009 I-Codes and will stay one or two cycles behind the national model codes released by the I.C.C.<sup>55</sup> Additionally, in 2015, North Carolina removed a requirement in its code related to the permanent installation of shutters in high-wind areas.<sup>56</sup> Flying debris is a large cause of hurricane and other windstorm related damage, and removing this requirement increases the possibility of wind damage should homeowners and builders in the state choose not to take additional precautions outside of those required by the code in order to secure their properties.<sup>57</sup> In its 2018 report, the Insurance Institute for Business and Home Safety criticized these North Carolina Building Council decisions and encouraged the state to integrate more stringent requirements into its codes in the future.<sup>58</sup>

The following section contains suggestions as to actions North Carolina should take to build back better. It explores the Insurance Institute recommendations, lessons from other states, and other considerations for state leaders as they work to create resilient communities.

#### **IV. NORTH CAROLINA CODE: FUTURE**

To improve the North Carolina code in the future, the Insurance Institute suggests that North Carolina require continuing education for contractors and plumbers and implement licensing requirements for roofing contractors in order to improve its code.<sup>59</sup> According to the report, there are little to no continuing education programs for these kind of industry professionals required in any state.<sup>60</sup> Creating educational programs would allow professionals to keep up with trends and best practices and model for other states ways to engage builders with the concept of resilient construction outside of the formal building code.

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<sup>55</sup> *Rating the States*, *supra* note 26.

<sup>56</sup> *Id.*

<sup>57</sup> Kusito and Campo-Flores, *supra* note 16.

<sup>58</sup> *Rating the States*, *supra* note 26.

<sup>59</sup> *Id.*

<sup>60</sup> *Id.*

To promote resilient construction, the Insurance Institute suggests restoring the more stringent requirements into the code and keeping up with the national ICC models instead of operating two cycles behind. Right now, homes rebuilt after Florence will be constructed in compliance with the codes adopted by the state six years ago, two cycles behind the national model. To create resilient communities in the wake of this disaster, North Carolina needs to ensure reconstructed buildings can withstand heavy wind and rain and reflect the most innovative industry standards.

More stringent requirements for construction, particularly on the coast, may have mitigated damages from Matthew and Florence. Moving forward, however, it is important to focus on how to protect our communities from future damages, not merely reflect on what should have been done to protect them in the past. Building back better will help reduce future losses. As the state looks to create resilient communities through resilient construction in the aftermath of Florence, it should consider what it is willing to ask of consumers now to prevent devastation in the future. The demonstrated success of Florida's more stringent codes in the face of strong storms indicates that up-front costs to builders and homebuyers can save a large amount of disaster relief and insurance costs long-term. While these changes seem expensive now, they will save more in the future, particularly in disaster relief and displacement costs. If we better prepare our codes for disaster, we better prepare our citizens, too.