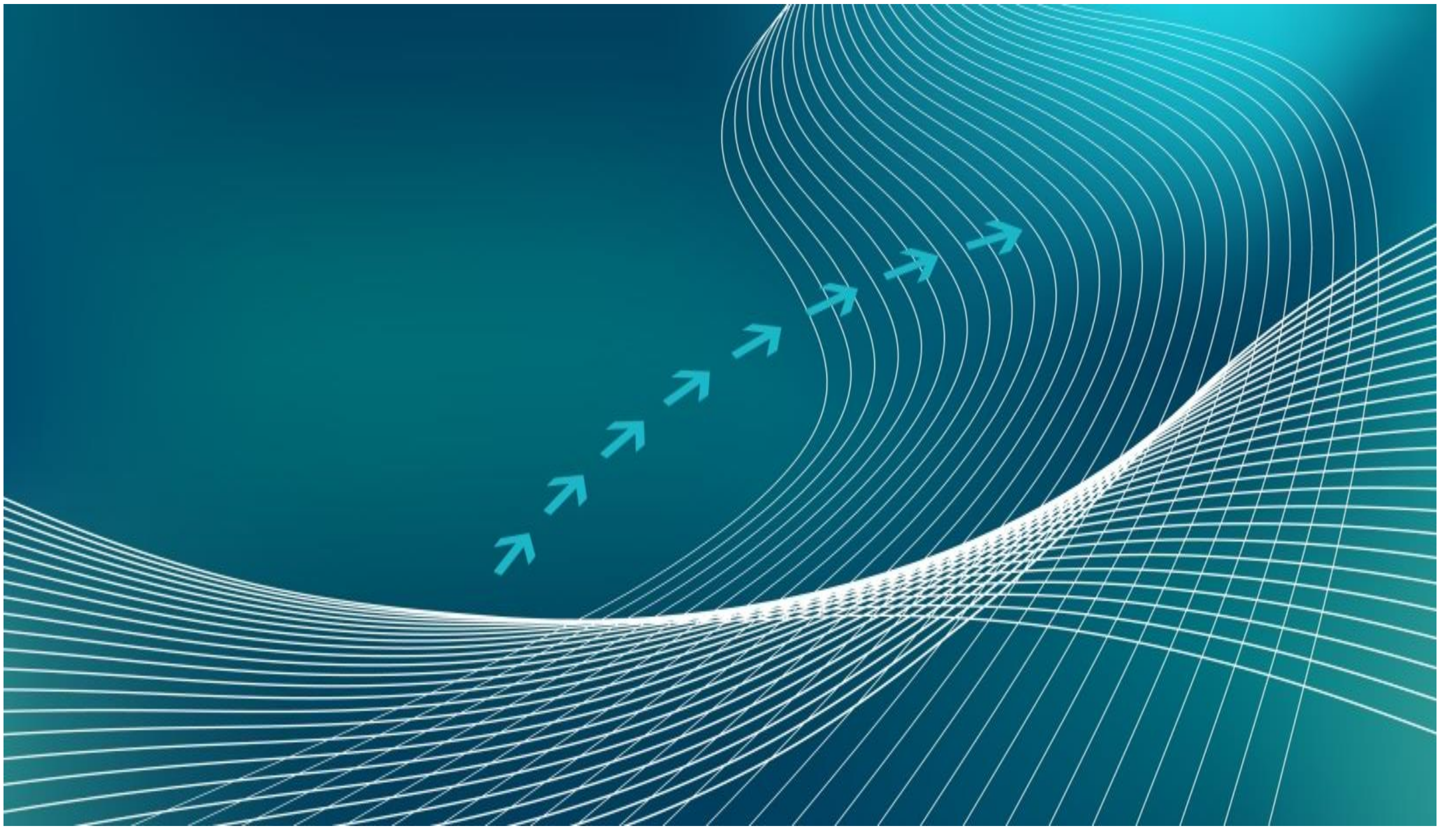


REGULATORY ANALYSIS OF RI STATE BUILDING CODES

Building Code Standards Committee

Contents

Introduction and Executive Summary

The Rhode Island Building Code Standards Committee (RIBCSC), pursuant to R.I. General Laws § 23-27.3, has the statutory authority to promulgate and amend rules and regulations related to the state building code. The current building codes are filed with the Rhode Island Secretary of State's office. Each of the RI State Building Codes includes:

- An underlying base code incorporated by reference, from a national/international organization; and
- Rhode Island-specific amendments to these base codes that are developed by the RIBCSC.

The RIBCSC is proposing changes to the Rhode Island State Building Code Regulations. These changes include updating the base codes to a more recent version of the relevant national/international base codes; specifically, updating from the ICC 2015 family of model codes to the ICC 2018 model codes, and the 2017 NEC electrical code to the NEC 2020 code. The RIBCSC is proposing very few RI-specific amendments to the model codes this adoption cycle

Building codes have a significant impact on the state. The following economic analysis will explain the process of regulatory development and the potential impacts that these regulations will have on Rhode Islanders. Those impacts include:

- Safety, health, livability, and environmental impacts related to increased protective requirements;
- Building quality and resiliency impacts related to higher-quality construction and energy savings requirements;
- Construction cost impacts related to the cost of construction and compliance with the state building code requirements; and,
- Procedural and administrative impacts related to the management and application of the code requirements.

The Rhode Island Building Code Standards Committee reviewed the significant changes to the Rhode Island State Building Codes in both the updated incorporated model codes and the newly proposed Rhode Island-specific amendments and conducted the following regulatory analysis. This report includes the following sections:

- An overview of the regulatory development process;
- An overview of the significant revisions to the Rhode Island Building Codes;
- An overview of the RI-specific changes to the Rhode Island Building Codes;
- An economic analysis that reviews the impacts of a selection of the changes to the codes; and
- Appendices that includes a list of the significant changes and information about those changes.

This analysis estimates the statewide annual construction cost impact related to the changes to the provisions in the state building codes to be approximately $745 thousand, for a 5-year net present value cost of $3.3 million.

Health, Safety, Building Resiliency & Other Benefits

The costs and benefits of adopting newer model codes are not easy to quantify. While new building and fire codes are oftentimes associated with an increase in the cost of construction, the significant health, safety, building resiliency, and other benefits, associated with the latest codes are often overlooked. This is understandable because the benefits, often dependent on the contingency of future events such as weather-related catastrophes, can be difficult to assess. However, as will be shown below, there can be no doubt that citizens of states with strong building codes benefit from their implementation. Modern building codes have immediate, and long-term, beneficial effects which offset the initial cost of building to updated standards.

Protecting Life

At the federal level, not all proposed rules are required to pass a cost-benefit analysis to be promulgated; particularly those which will not have a significant economic impact on a substantial number of small entities, as certified by the agency head, or those promulgated by independent regulatory agencies. However, a proposed rule has a much better chance of going into effect if the agency can prove that the benefits of the policy outweigh the costs.

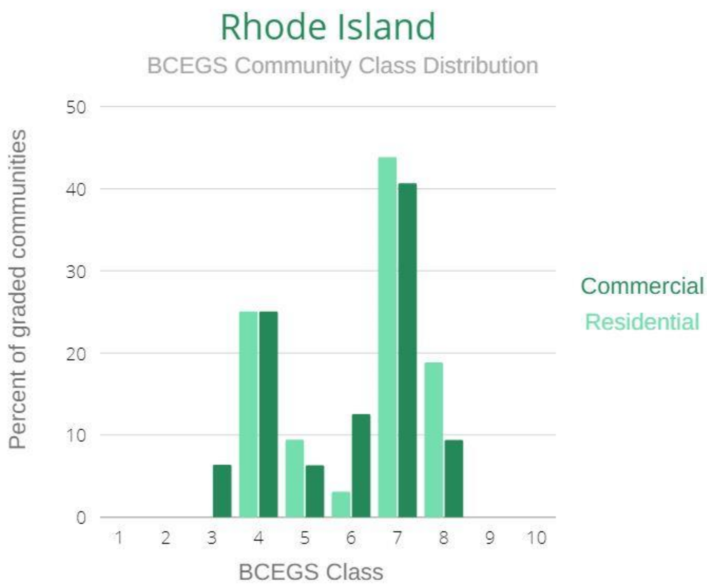
Value of Statistical Life (VSL) estimates play an important role in determining the benefit vs. cost of a regulation. When the VSL is used in a regulatory analysis, it is a valuable benchmark in offsetting the anticipated costs of the regulation. VSL estimates represent how much individuals are willing to pay for a very small reduction in the probability of death, paid for by forgoing the consumption of other goods and services. For example, if a regulation reduced the risk of death by 0.00001 per person, then it would take 100,000 people to accumulate a collective risk reduction of one "statistical life". If, on average, everyone is willing to pay $100 per year to reduce the probability of dying by 0.00001, then collectively the group would be willing-to-pay $10 million per year to prevent the loss of one "statistical life". This is the value of a statistical life. Over time, as wages and the public's willingness to pay for safety measures have grown, so has the VSL. The Environmental Protection Agency fixes the VSL at about $10 million. Although the Office of Management and Budget hasn't set a government-wide VSL, for purposes of cost-benefit analyses on proposed regulations, it has generally endorsed agency VSLs as high as that.

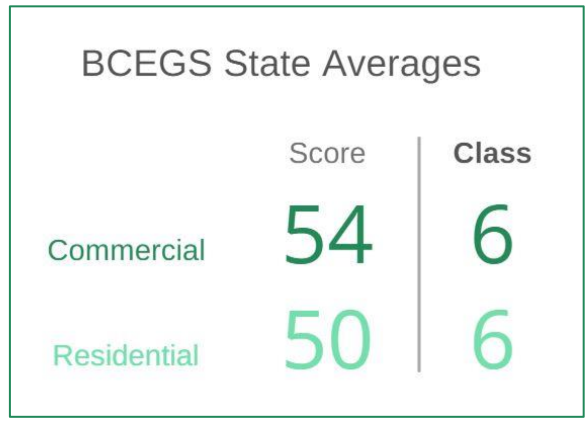
Considering a VSL pegged at $10 million, the monetary benefit from potential deaths prevented by robust building codes, each time Rhode Island is hammered by a hurricane, flood, earthquake, tornado, or other nature disaster, is staggering.

In fact, monetary damages to structures aside, if in a three-year period, just 0.33 statistical lives are saved because of the adoption of these proposed codes, the monetary benefit of their adoption would equal the calculated cost.

Insurance Premiums

The strength of building codes in a state is carefully examined by the insurance industry and factors into each insurer's decision on whether to write in a state, and the premium to charge individual insureds. The Insurance Services Organization (ISO) publishes the National Business Code Assessment (NBCA) report each year. The NBCA is referenced by insurers in making these decisions. ISO assigns a Building Code Effectiveness Grading Schedule (BCEGS) to every state on a scale of 1 to 10, with 1 being the highest and 10 being the lowest. The 2019 edition of the NBCA assigns Rhode Island an average score of 6. The report notes that Rhode Island has not adopted the most recent code revisions. Adoption of the proposed codes will have a beneficial effect on the BCEGS score which in turn will have a beneficial effect on insurance premiums and availability of insurance in Rhode Island.





In addition to their effect on insurance premiums, updated and robust building codes have an extreme effect on losses after a catastrophe. A study done by the Insurance Institute for Business & Home Safety (IBHS), the University of Florida, and the FEMA Mitigation Assessment Team following Hurricane Charley, which struck Florida in 2004, found that modern building codes reduced the severity of insurance losses by 42 percent and the frequency by 60 percent. In that same vein, studies on the effect of enhanced building codes on energy efficiency have shown beneficial effect in this area as well.

Natural Disasters in the US

There is little doubt that 2020 will go down in history as the year of the great Coronavirus Pandemic. All other events were overshadowed by the virus. Nevertheless, a record number of natural disasters struck the United States in 2020, including wildfires, hurricanes, drought, and floods. In 2020 alone, the National Oceanic and Atmospheric Administration (NOAA) reported 16 weather and climate disasters that caused over $1 billion in damage, on top of the immeasurable loss of lives (see Resources section at the end of this report).

However, 2020 is not an outlier; the last few years has seen an increase in both severity and frequency of natural disasters, in addition to a greater number of people living in high risk areas. In the US alone, from 1980 to date, losses from natural disasters exceed $1.6 trillion (Resource number 2).

This degree of loss is not inevitable. The Federal Emergency Management Agency (FEMA) conducted a study that found that robust building codes greatly reduce damage from flooding, earthquakes and hurricane-scale winds.

What FEMA Learned About Building Codes

FEMA works with local and state authorities to reduce natural disaster risks and has investigated construction materials and standards for the last 30 years. Their investigations analyze even the smallest factors, like the nails joining wood frames, to evaluate the buildings' capacity to withstand the growing catastrophes hitting the country.

As a result of this investigative analysis, FEMA published *Building Codes Save: A Nationwide Study of Loss Prevention* in November 2020, which studied 18.1 million buildings constructed post 2000. The study included structures throughout all 50 states and found that half – 9.1 million – avoided losses of $1.6 billion due to their construction under stringent building codes.

Building Codes Save started as a pilot project in 2011 and concluded with the 2020 report. It initially tested the theory that communities in disaster-prone areas could benefit in saving lives and cost of structures with stricter building codes. FEMA referenced the standards of the International Building Code and the International Residential Code, set by the International Code Council in 2000 (known as I-Codes).

The theory of stronger building codes producing financial benefits was proven, and FEMA found the following conclusions in their study:

- For the buildings already adhering to standards, by 2040 cumulative losses circumvented will reach $132 billion.
- Nationwide, 65% of municipalities have yet to adopt current building codes, presenting further opportunities for financial savings.
- Between 2016 and 2040, 9.7 million of the 13.9 million buildings (about 70%) in the US are anticipated to be built using I-Codes.

Effective Building Code Enforcement

To shield communities from the adverse effects of natural disasters and save municipalities from crippling re-build costs, stringent building codes provide a compelling solution. Adopted and enforced standards are effective, as demonstrated by the chart below that depicts the Average Annualized Losses Avoided (AALA) against the hazard types the US faces today.

Hazard *	Post-2000 buildings modeled	Annual savings
Flood	786,000	$484 million
Earthquake	2.4 million	$60 million
Hurricane	9.2 million	$1.1 billion
Total AALA	→	**$1.6 billion**

- Source: Building Codes Save: A Nationwide Study, November 2020

Calculated Savings from Building Codes

Costly repairs avoided: If an average home costs $300,000 to construct, the cost to protect that home against high wind speeds and hurricanes is around $4,500, or 1.5% of the total. FEMA's estimate is around $1,600 per year in losses avoided, totaling $48,000 in 30 years. The long-term savings exceed the initial construction costs significantly.

Complying with current building codes adds 1 to 2% to the overall cost, but FEMA projects that for every dollar spent to meet the building codes standards, $11 in repair and recovery due to disaster damage, is saved.

Small business resiliency: The FEMA study found that communities meeting stricter building codes not only had reduced damages and financial losses, but fewer interruptions to business. In the wake of disasters, small businesses resumed operations quickly and avoided job losses. FEMA estimates 40 to 60% of small businesses do not survive after flood or hurricane damage.

FEMA & BCEGS

FEMA relied on ISO's Building Code Effectiveness Grading Schedule, detailed above. The BCEGS has assessments covering the nation to determine which codes are in effect, which are enforced, and which will reduce disaster losses.

However, statewide catastrophes are not necessary for the beneficial effects of adopting model codes to be realized. In fact, some of the costliest events can be microbursts which are limited to small areas or ice damage depending upon the weather in a particular season. Insurers have this data and take into effect the enhanced building codes even in states, such as Rhode Island, which are not subject to hurricanes as often as Gulf Coast states.

By the Numbers *

29,549 (national average: 31,618)	Average population served by building code enforcement departments in the state
$18.34 (national average: $22.62)	Average department expenditure per capita of population served
$1.23 (national average: $0.44)	Average department employee training expenditure per capita of population served
6.86% (national average: 2.48%)	Average training expenditure as a percentage of overall department expenditure

*Community data from BCEGS database

Updated building codes lead both to lower insurance costs and availability of insurance but also lower uninsured losses and the avoidance of unquantifiable items of damage such as significant displacement for the home or business venue, following a catastrophe. IBHS issues a report entitled ‘Rating the States’ assessing the progress of 18 hurricane-prone coastal states in strengthening their residential building codes. Rhode Island rates 6th of the 18 which is significantly better than many states but 7 points below Florida where the data on Hurricane Charley referenced above was obtained. The updating of the building codes should increase our ranking or at least not cause us to be ranked lower since our neighboring state has updated codes and could rank higher than us in the next report.

ICC Code Release	RI Commercial Date Adopted	RI Residential Date Adopted
2009	7/1/10	7/1/10
2012	7/1/13	7/1/13
2015	6/20/19	6/20/19
2018[1]	Adoption in process	Adoption in process

[1] Note that the State Electrical Code (SBC-5) is always 2 years ahead due to the different code cycles between ICC and NFPA

Regulatory Development Process

Each state's code development process varies—some states implement a mandatory statewide code, some leave code development to local governments, and some use a mixed approach.[2] In any case, a jurisdiction will not 'start from scratch' and create its own building code; rather, a jurisdiction will adopt a base code from a national or international organization to use for the vast majority of provisions, and will make revisions to specific provisions as it deems necessary, based on geographic location, climate/weather conditions, etc. Using a base code allows jurisdictions to leverage the expertise of national and international code development organizations and makes compliance easier for builders by keeping codes relatively standardized across jurisdictions.

The proposed revision to the Rhode Island State Building Codes update the incorporated versions of the relevant model codes from the International Code Council (ICC) 2015 editions to the 2018 editions. In the case of the RI State Electrical Code, the proposed revision updates the model code from the 2017 to the 2020 National Electrical Code (NEC), created by the National Fire Protection Association. Additionally, Rhode Island-specific amendments to this base code are developed by RIBCSC during the review process and adopted by the SBC regulations.

RI Building Codes: Current and Proposed Model Codes			
Reg.	**Title**	**Current Model Code**	**Proposed Model Code**
510-RICR-00-00-1	RI State Building Code	2015 IBC (ICC)	2018 IBC (ICC)
510-RICR-00-00-2	RI State One- and Two-Family Dwelling Code	2015 IRC (ICC)	2018 IRC (ICC)
510-RICR-00-00-3	RI State Plumbing Code	2015 IPC (ICC)	2018 IPC (ICC)
510-RICR-00-00-4	RI State Mechanical Code	2015 IMC (ICC)	2018 IMC (ICC)
510-RICR-00-00-5	RI State Electrical Code	2017 NEC (NFPA70)	2020 NEC (NFPA70)
510-RICR-00-00-6	RI State Property Maintenance Code	2015 IPMC (ICC)	2018 IPMC (ICC)
510-RICR-00-00-14	RI Swimming Pool and Spa Code	2015 ISPSC (ICC	2018 ISPSC (ICC)
510-RICR-00-00-19	RI State Fuel Gas Code	2015 IBC (ICC)	2018 IBC (ICC)

Model Code Development

For building codes, most jurisdictions—including Rhode Island—use some version of the International Building Code (IBC), which is a model code developed and revised by the International Code Council (ICC). The ICC maintains 15 codes which are coordinated and compatible with each other, of which Rhode Island uses seven. Rhode Island also uses the National Electrical Code (NEC), which is created by the National Fire Protection Association (NFPA). The ICC and NFPA processes attempt to balance health and safety goals with cost effectiveness and industry best practices and utilizes a mixture of design and performance standards.

The ICC and NFPA generally revise model codes on a three-year cycle. These code revision processes bring together a wide variety of interests, including consumers, regulators, builders, contractors, design professionals, trade associations, manufacturers, standard developing organizations, academia, research and testing labs. Code

[2] http://opim.wharton.upenn.edu/risk/library/WP201601_Simmons-Czajkowski-Done_Effectiveness-of-Florida-Building-Code.pdf

committees are composed of representatives from each of these groups. These committees discuss proposed code changes, consider alternatives, conduct hearings, gather public comment on the proposed changes, prepare further revisions, and publish the new edition of the model code.[3]

Jurisdictions considering updating their code to reflect a recently published model or national code must weigh the advantages and disadvantages of doing so. Rarely a jurisdiction will choose to keep using an older model code, citing the additional costs that are related to the incremental increases in the stringency of new model code provisions. Alternatively, the benefits of updating a code on a three-year cycle include:

- Keeping the code aligned with advancements in building science and material technology;
- Improving the building quality of construction in the state lifetime through long-term value additions related to construction resiliency and energy-savings improvements;
- Securing additional health, safety, and livability improvements for Rhode Islanders;
- Obtaining beneficial effect on insurance premiums and availability for citizens; and
- Easing compliance through procedural and administrative changes and remaining in alignment with other jurisdictions that use more recent model codes.
- Avoiding conflict with other State-adopted codes, i.e. State Fire Safety Code, which share many of the same referenced documents.

Rhode Island Amendments

The Rhode Island Building Code Standards Committee uses the following process to review and recommend the adoption of national model codes and standards for the construction of buildings under its jurisdiction, with the overarching goal of promoting public safety.

When the national model codes (such as those prepared by the International Code Council, or National Fire Protection Association) update or modify industry recognized standards, the Building Code Standards Committee receives and reviews those documents to evaluate the appropriateness of incorporation into the Rhode Island family of codes. Publications are distributed to the members of the Building Code Standards Committee, which then divides, by expertise and interest, into various subcommittees. Chair and staff members are assigned within the subcommittees of the building codes standards commission to assist each group.

The individual subcommittees review every modification to the national publications, evaluating life safety, and construction practicality, and their effect on local industry and topics such as environmental or flood related conditions, insurance ratings, and economic considerations. The committees also consider alternative courses of action, and if necessary, prepare RI-specific amendments to the building codes. The Chair of the subcommittees then report those evaluations or modifications back to the full Building Code Standards Committee.

Upon concurrence, The Building Code Standards Committee, in accordance with RI regulatory adoption procedures, schedules the necessary internal reviews, public notices and hearings, and adoption of regulations.

[3] https://www.iccsafe.org/cs/codes/Documents/misc/CodeDevelopmentProcess.pdf

Summary of Building Code Changes

Explanation of Significant Changes and Themes to Building Codes

The proposed changes to the State Building Code, from 2015 to 2018, are minimal in cost. Changes this cycle are mainly focused on clarification of definitions, giving more options to build/design professionals, addition of maps, and addition of text so that the code is more harmonized with RI general laws. Although there are mainly no-cost changes proposed, the changes make it easier to understand the code.

The Building Code Standards Committee would like to bring to the readers' attention that the status quo is maintained, such that the past Rhode Island amendments will be maintained, in most sections of the code.

Significant cost reduction re: Building Design Loads: Hurricanes, Winds & Debris

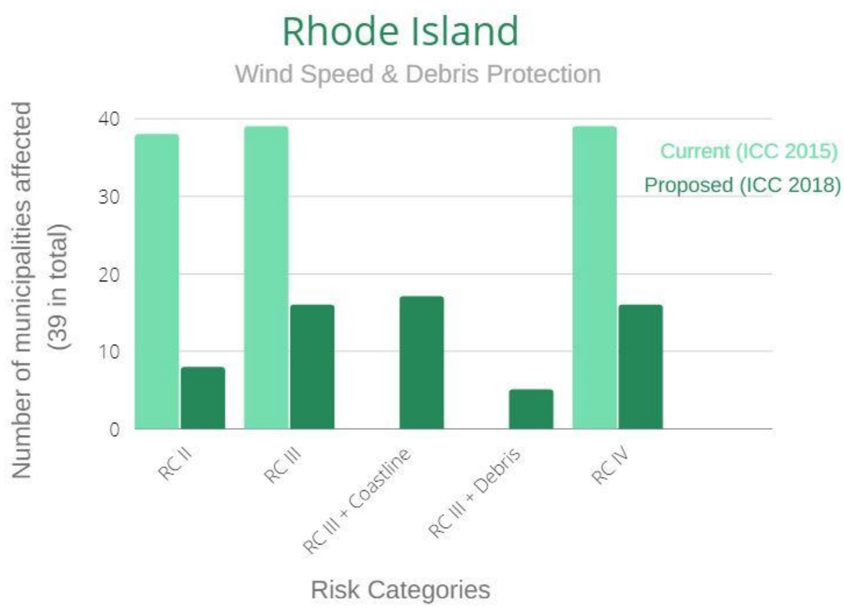
The current Rhode Island State Building Code (SBC-1) incorporates the Major Reference Standard of the ASCE/SEI (American Society of Civil Engineers / Structural Engineering Institute) 7-2016, which is the standard for 'Minimum Design Loads for Buildings and Other Structures'. The most recent update of this standard meant a qualified reduction in ultimate design wind speeds affecting the northeast hurricane prone regions.

An ASCE/SEI presentation[4] notes the wind maps had been updated to reflect decreased wind speeds along the northeast coast, as well as the rest of the country and the west coast. The major changes to the wind maps in ASCE 7-16 reflect the revised hurricane modeling for the northeast. The wind speed reductions mean the impact standards are affected in terms of location and requirements for debris protection for structure openings (windows, doors, louvers, and intake vents). The current code requirements for Impact Resistant Glazing and Storm Shutter Systems are indicated by table 1608.1 in RI SBC-1 2019 (ICC 2015), which accounts for wind borne debris regions affected by speeds greater than either 130 Vult[5] mph within a mile of the 'mean high coastal water line' or speeds at 140 mph and greater.

The proposed code adoption of the ICC 2018 series incorporates the revised ASCE 7-16 standard, with the clarification of the wind-borne debris standard, and identifies those areas that remain in risk categories, and those no longer affected. The Wind Speed application was further modified to separate Category III and Category IV, rather than as a single-hazard application. This separate analysis further reduces the application and requirement for wind borne structure opening protection. The table below gives an overview of the number of municipalities affected with the current code versus the proposed adoption.

[4] https://static1.squarespace.com/static/5c3faa364eddecdc367bedc5/t/5d695aa258a8480001741e94/1567185613786/02+ASCE+7-16+Wind+Provisions+Changes+Affecting+the+Design+Provisions.pdf

[5] Vult = Ultimate design wind speeds (3-second gust), miles per hour (mph) (km/hr.) determined from Figures 1609A, 1609B, or 1609C or ASCE 7. W = Load due to wind pressure.



To address the financial aspect of this, a sample typical window in standard production is roughly half the cost of the impact resistant unit. Therefore, a typical home with 20 units would realize substantial savings from this change.

For commercial units outside the debris zone, such as a hotel sized at 7 floors with 170 rooms, savings would range from 40 to 60 percent based on material selection. Another 10 to 15 percent would be saved on labor costs due to the product weight and added anchoring requirements for the heavier product that is rated for debris protection.

Plumbing

Multiple code revisions apply specifically to plumbing work. This includes the following items:

Code	Citation	Description	Cost Impact
SBC-3	303.5	Sway Bracing: Additional information clarifies where sway bracing is needed for drainage piping. This clarification specifies the location of the required supports on the turn fitting, to prevent the up-stream piping from axial movement.	Clarification; no additional cost
SBC-3	308.10	Thermal expansion tanks: The tanks cannot be supported by the piping. Tank shall be supported in accordance with manufacture instructions. A hanger/support is needed for the tank.	Slight increase in cost for Hanger/support
SBC-3	403.1	Assembly areas used for gaming (gambling) now have specific ratios for plumbing fixtures, which mean a decrease in required plumbing fixtures for Gaming Areas.	Decrease

Code	Citation	Description	Cost Impact
SBC-3	403.1.2	Single User Toilet Facility Identification: Single-user toilet facilities with required plumbing fixtures must now be labeled for use by either sex.	Potential slight increase for identification labels
SBC-3	405.5	Pumped Waste Plumbing Fixture: Fixtures with a pumped waste arrangement must comply with a standard that covers the internal waste. Manufacture would comply in design.	No additional cost
SBC-3	411.3	Emergency Shower Temperature Control: Emergency shower or eyewash station requires an ASSE 1071 mixing valve for temperature control, to meet water temperature requirement of emergency wash to deal with the chemical hazard present.	Cost increase would depend on hazard present.
SBC-3	412.7	Flow Limiting Device for Hot Water Discharge: Where it is desired to limit the discharge water temperature at a faucet or fitting, installation of an ASSE 1062 device is an approved method of control. This section is beyond code requirements, so it is a user preference and not mandatory.	No additional cost
SBC-3	607.3	Thermal Expansion Control Devices: An alternative method to control hot water system pressures (instead of thermal expansion tanks). This gives contractors more options.	No additional cost; potential cost reduction depends on installation
SBC-3	608.12	NSF 61-compliant Tanks for Drinking Water: Where in contact with potable water intended for drinking, water tanks, coatings for the inside of tanks and liners for water tanks shall conform to NSF 61 to prevent contamination of drinking water. NSF 61 now addresses specifically where the standard applies.	No additional cost
SBC-3	802.4.3.1	Laundry Tub Connection to Clothes Washer Standpipe: Provides alternative method to connect a laundry tub drain to a clothes washer standpipe without a fixture. Will save labor and material.	Decrease in cost

Mechanical

Design and installation improvements to mechanical work include the following items:

Code	Citation	Description	Cost Impact
SBC-4	403.3.2.4	Outdoor Air Ventilation for Dwelling Units: In whole a house (dwelling) where ventilation system is provided, it is newly required to label the controls to inform occupants of the system. This applies where the ventilation system is not expected as required.	Slight cost increase to label switch
SBC-4	403.3.2	Dwelling Unit Ventilating Equipment: Exhaust fans for dwelling units have an added test for minimum airflow. This standard is verified at manufacturing phase.	No additional cost

Code	Citation	Description	Cost Impact
SBC-4	504.4.1	Clothes Dryer Exhaust Termination: The required size is now 12.5 square inches of open area through the exhaust duct to eliminate flow resistance. The code prevents installer from using a smaller duct or terminal.	No additional cost
SBC-4	506.5.2	Pollution Control Units: Any unit installed has to meet the standard installation requirements of coverage. The units are installed in the grease exhaust system to extract smoke, grease particles, and odors from the exhaust flow.	No additional cost
SBC-4	507.2.6	Clearances for Type I Hoods: A new exception was added to recognize Type I Hoods that are listed for clearances of less than 18 inches. This change would give options to designers/owners and ease the burden of maintaining clearances to combustible walls, ceilings, trim, etc.	Potential cost decrease
SBC-4	603.5.2	Phenolic Ducts: The code added coverage for a newer type of non-metallic phenolic duct. This code addition gives more options to the installer.	Additional cost only if more costly option is chosen
SBC-4	929	High Volume Large Diameter Fans: Where provided, high volume fans shall be tested and labeled in accordance with AMCA 230, listed and labeled in accordance with UL 507, and installed in accordance with the manufacturer's instructions.	No additional cost

Electrical

The significant code changes in the RISBC-5 NEC 2020 are generally those that are for the enhancement of life safety. The BCSC identified 260 code changes in the NEC 2020, but just 25 with an associated increase or decrease in cost. The significant residential changes that increase the cost are new requirements for surge protection, the requirements of GFI protection, new countertop receptacle requirements and solar enhancements.

The code changes that will affect the commercial install costs are the new requirements for GFI protection, GFI protection of twist lock receptacles along with the new arc fault requirements, solar system enhancements and the requirement of a bypass isolation switch for an ATS for critical loads. See Appendix 1 for details.

Fuel Gas

Some options, clarifications and safety concerns to fuel gas work include the following items:

Code	Citation	Description	Cost Impact
SBC-19	303.3	Gas-fired Clothes Dryer in Bathrooms: A new option was added to allow a gas-fired clothes dryer to be installed in either a toilet room or bathroom.	No additional cost
SBC-19	310.2 / 310.3	Bonding of CSST and Arc-resistant CSST: Section 310.2 previously applied to all CSST products but is now	No additional cost

Code	Citation	Description	Cost Impact
		restricted to only the traditional yellow-jacketed CSST product. New section 310.3 was added to address the arc resistant CSST products.	
SBC-19	403.4.2 / 403.10.1	Schedule 10 Steel Gas Pipe: Can now be used for fuel gas service. This added section gives contractors another option for materials.	Potential cost decrease depending on material chosen
SBC-19	409.7	Shutoff Valve Support for Tubing Systems: Safety concern addressed with rigid and secure support installed independent of tubing for the shutoff valves.	Slight increase of cost

Significant Revisions to Building Codes

The table in Appendix 1 provides an overview of the identified significant revisions as a result of updating the building codes.

Regulatory Impact Analysis

The Rhode Island state building codes are some of the largest and most significant regulations in the state, and have a far-reaching impact that affects the quality, safety, and cost of construction in Rhode Island. These impacts include:

- Safety, health, livability, and environmental impacts related to increased protective requirements;
- Building quality and resiliency impacts related to higher-quality construction and energy savings requirements;
- Construction cost impacts related to the cost of construction and compliance with the state building code requirements;
- Procedural and administrative impacts related to the management and application of the code requirements
- Effect on the cost and availability of insurance to the citizens of Rhode Island
- Effect on catastrophic damage to buildings and dwellings

Impacted Stakeholders

State & Local Government

The proposed changes to the building codes will alter the standards that state and local government building code and inspection offices enforce through building inspections and permitting activities. This will require these offices to become familiar with the changes to the model codes as well as the changes to the Rhode Island amendments. Some of the proposed changes also alter the way in which the building codes are administered by state and local entities that have jurisdiction.

Builders and Construction Industry

The proposed changes will have an impact on developers—in some cases adding costs, and in some cases creating savings. Depending on the market, developers may pass any additional costs on to their customers, the property owners.

Homeowners, Property Owners, and Business Owners

Additional costs or savings created by the revised building code provisions may change the prices charged to property owners. The benefits associated with the proposed code revisions—such as safety, building resiliency, and efficiency savings—are benefits to the end-users of the buildings. There are also benefits to the cost and availably of insurance and the survivability of buildings subject to catastrophic events.

Neighboring States

Rhode Island's neighbors use the following model codes, when they use a specific code:

Code	Connecticut	Massachusetts	RI (current)	RI (proposed)
Building Code	2015 IBC	2015 IBC	2015 IBC	2018 IBC
Residential Code	2015 IRC	2015 IRC	2015 IRC	2018 IRC
Plumbing Code	2015 IPC	based on 2015 National Uniform Plumbing Code	2015 IPC	2018 IPC
Mechanical Code	2015 IMC	2015 IMC	2015 IMC	2018 IMC
Electrical Code	2017 NEC	2017 NEC	2017 NEC	2020 NEC
Swimming Pool & Spa	2015 IRC	2015 ISPSC	2015 ISPSC	2018 ISPSC
Fuel Gas Code	IFGC not adopted[6]	IFGC not adopted[7]	2015 IFGC	2018 IFGC

In Massachusetts, the current edition of the building code became effective on October 20th, 2017.[8] Connecticut is currently in the process of revising its building codes and adopting an updated model code and it anticipates adopting the ICC 2018 code and the 2020 NFPA 70: National Electrical Code in the final quarter of 2021.[9] ICC maintains a list of International Code Adoptions by state.[10]

Methodology

The Building Code Commission, in consultation with the Office of Regulatory Reform and external consultants and advisers, developed a methodology to identify, explain, and estimate the impact of proposed revisions to the building and fire codes.

Identification and Explanation of Code Changes

Each change in the building and fires codes that was identified as a significant revision was included in an explanatory table, provided as Appendix 1 of this report. This table includes the following information, where appropriate, for each change that was identified:

Descriptive Information

- Code citation
- description
- current code language

[6] The International Fuel Gas Code (IFGC) is not adopted by the State of Connecticut. Any references to the IFGC are references to requirements NFPA 2, NFPA 54, and NFPA 58, as adopted in the Connecticut State Fire Safety and the Connecticut Fire Prevention Codes.

[7] Relevant MA code references MA General Laws, NFPA 54 (2012) & 58, 85 and 86 (2011 editions).

[8] https://www.mass.gov/handbook/ninth-edition-of-the-ma-state-building-code-780

[9] https://portal.ct.gov/DAS/Office-of-State-Building-Inspector/Building-and-Fire-Code-Adoption-Process

[10] https://www.iccsafe.org/wp-content/uploads/Master-I-Code-Adoption-Chart-May-Update.pdf

- proposed code language
- a brief description of the difference between the current and proposed code
- background information, reasoning, and/or justification for the proposed code revision

Cost

- whether the code change is likely to lead to an increase or decrease in construction costs (if applicable)
- The prototype, cost per prototype, and cost per square-foot of development
- The frequency (high, medium, low, or rare) of this provision applying to a project in each of following categories:
    - Residential- Basic
    - Residential- Specialty
    - Commercial- Basic
    - Commercial- Specialty
- An estimated statewide construction cost impact

Categorization

- Identification of up to five benefits/categorizations associated with the code change from the following list:
    - Safety
    - Building Resiliency
    - Cost Savings
    - Health/Livability
    - Energy/Environmental Savings
    - Flexibility
    - Increase Permissiveness
    - New Materials/Technology
    - Administrative/Procedural
    - Technical
- Whether the code revision is a significant change
- Whether the change falls within one of the following revision themes that was identified across the codes:
    - Snow/ Cold Weather Resiliency
    - Flood Related
    - Energy
    - Pool
    - Restaurant-related
    - Detectors and warning systems

Cost Estimation

Cost estimates were generated for provision changes, when deemed possible and appropriate. The cost estimation process includes three primary calculations: the percentage increase in construction costs, the frequency/prevalence of the code change, and the impact on overall Rhode Island construction output. An example of the calculation of a code revision is provided below.

Percentage Increase in Construction Costs

Most of the code provisions analyzed in this report make incremental changes to specific provisions in the code. For any given provision or requirement that has been altered in some form, this analysis estimates costs by looking at the marginal difference between the current cost of the provision and the estimated cost were the change to be adopted. The cost estimates should not be taken to represent the cost of the provision in totality, because, for the purpose of this analysis, the costs associated with the current code language are fixed.

To generate these incremental percentage changes, the BCC based their estimates on material provided by external consultants and other subject matter experts to understand the change in construction costs associated with the proposed revisions to the code. Prototype projects were used to provide structure to the estimation of code impacts around a typical example of a project where the code revision would lead to construction cost differences.

For example, suppose a (hypothetical) revision to the code now requires GFCI outlets to be installed in two common home locations that typically do not have GFCI outlets. Cost estimators would use an example prototype project of a 2,000 square foot home to determine the cost impact per home of these two new GFCI outlets. Since the wiring, outlets, and labor would be installed regardless of the code change, the incremental cost difference would be the difference between two GFCI outlets vs. two regular outlets. Using an example cost difference of $4, the cost of two additional GFCI outlets is $8 per 2,000 square foot home, or $0.004 per square foot.

To determine the percentage increase in the cost of development per square foot, the cost estimates per square foot were divided by the average cost of development per square foot. These estimates were based on values from valuation tables published by the ICC. This analysis used four different total cost of development per square foot assumptions:

- Residential- Basic
- Residential- Specialty
- Commercial- Basic
- Commercial- Specialty

Using the Feb. 2020 ICC Valuation Tables cost of construction per square foot for basic one and two-family residential—VB (@ $122.46 sq./ft), the percentage increase in the cost of construction related to the GFCI outlet example provided above is 0.0033%.

Frequency/Prevalence Factor

Each provisional change was assigned a ranking that estimated how likely it is that the change would impact a construction project. Identifying prevalence or commonality is critical to understanding the magnitude of effect each provision could have in the state. This factor ensures that the impact of code changes that only apply to rare project types or circumstances are not attributed to all construction, and therefore over-estimate the impact. Conversely, it also ensures the estimates reflect a larger impact for the code changes that affect everyday construction projects.

Since more accurate data from permitting data or other RI data sources could not be provided to estimate the commonality of a code change, the following scale was used to rank the prevalence of a code change applying to a category of construction:

- High
- Medium
- Low
- Rare

These ranks corresponded to percentages that were used to generate the overall cost estimate. A frequency could be applied to up to four of the categories of construction noted in the list above, depending on the relevance of the code change to that type of construction.

Impact on Overall Construction Output

The percentage increases in construction costs and frequency factors were applied to an estimate of overall Rhode Island construction output. This figure represents the assumed statewide cost estimate. Since more accurate data from permitting data or other RI data sources was not available, the construction output estimates were based on national-level data, which were then proportionally applied to the state level in RI. Total RI Construction Industry Output estimates and forecasts were based on national level BEA/Census/BLS data on gross output by industry and other economic indicators and were then distributed to the state level. The overall state-level estimate was then distributed to the four types of construction outlined above using Census Bureau estimates of the Value of Construction Put in Place by type of construction.[11]

Calculation

$$\frac{Cost\ of\ Provision\ per\ Square\ Foot}{Cost\ of\ Construction\ per\ Square\ Foot} \times Frequency\ Factor\ \times RI\ Construction\ Industry\ Output = Estimated\ Statewide\ Impact\ of\ Provision$$

Calculation Example

Example: Cost of a Residential Provision (2 new GFCI outlets)			
Category	**Item**	**Estimate**	**Source**
Percentage Increase in Construction Costs	Cost of Provision in Prototype Project	$8	Estimate
	Square footage of Prototype Project	2,000	Estimate
	Cost of Provision Per Square Foot	**$0.004**	*Calculation*
	Total Cost of Development Per Square Foot: Basic Residential	$122.46	Based on Feb 2020 ICC Valuation Tables for VB-one and two family residential
	Percentage Increase of Cost of Development	**0.0033%**	*Calculation*
Prevalence	Frequency: Likelihood of provision applying to a residential project	25%	Analytic Assumption
RI Construction Output: Residential	Total RI Construction Industry Output	$4,530,337,315	Based on BEA/Census Data
	Percentage of Construction Output: Basic Residential	32.8 %	Based on category percentages from BEA Value of Construction Put-in-Place data
	RI Construction Industry Output: Basic Residential	$1,486,065,775	*Calculation*
Statewide Impact		**$12,135**	

[11] https://www.census.gov/construction/c30/c30index.html

Benefit Categorization and Comparisons

The proposed building code changes that were identified and described in this analysis have benefits that are related to the changes. In some cases, the proposed changes were associated with multiple categories of benefit.

Changes by Subject Area/Benefit Category

The proposed changes were categorized by the type of benefits that are related to that provision's change:

Categorization of Code Changes	
Category	**Description**
Safety	Positive impact on personal safety from immediate risks, likely lowering the chances of danger or injury.
Health/Livability	Positive impact on long-term health and enjoyment of living space.
Building Resiliency	Positive impact on the long-term durability and value of a structure.
Energy/Environ. Savings	Positive Impact on energy usage, conservation, or environmental effect.
New Materials/Technology	Positive Impact by incorporating the use of new types of building materials or technology.
Cost Savings	Positive impact through the lowering of construction or materials costs.
Flexibility	Positive Impact by increasing flexibility in building materials, methods, or designs.
Increase Permissiveness	Positive Impact through new allowances that lower requirements and other barriers.
Procedural/Administrative	Alters the method by which code provisions are administered or enforced.
Technical	Alters the provision to update technical language.

Appendix 1 provides additional information regarding the reasoning and benefits associated with each of the proposed code changes. The following table outlines the number of reviewed proposed changes that are associated with the following benefits:

Number of Changes to RI Building Codes by Benefit Type							
Code	**SBC-1**	**SBC-2**	**SBC-3**	**SBC-4**	**SBC-5**	**SBC-6**	**SBC-19**
Safety	1	6	4	1	19	0	1
Health/Livability	0	1	0	1	2	0	0
Building Resiliency	0	0	0	0	1	0	1
Energy/Environ. Savings	1	0	0	0	0	0	0
New Materials/Technology	1	0	0	0	0	0	0
Cost Savings	2	3	0	0	1	0	0
Flexibility	1	2	0	2	3	0	1
Increase Permissiveness	1	3	0	0	0	0	0
Procedural/Administrative	38	10	2	1	0	0	0
Technical	16	0	0	0	0	0	0

Benefits Related to Significant Provisions

Proposed revisions to the building code that have an estimated cost impact also have the following benefits related to the change:

Benefits Related to Select Provisions		
Code	**Provision**	**Explanation of Benefit**
SBC-1	428 / 430 Modular Construction	Refers modular and prefabricated construction to RIGL 23-27.4 IIBC Compact, which provides uniform labeling of off-site modular construction and reduces administrative costs.
SBC-1	2303.1.1 EX, Native Lumber RI Addition	Provides a procedure for the use of native cut lumber and adds a further option in material use.
SBC-2	R-602.3 (6), Alternate stud height	Allows a flexibility and design cost decrease; one- and two-story building can have 11' and 12' walls without engineering.
SBC-3	P-412.7, Actuates temperature	The water temperature at fixture fittings is limited for safety.
SBC-3	P-608.17.10, Humidifiers	Prevents backflow into the potable water system and keeps the system safe from potential contamination.
SBC-5	230.67, Surge protection	This new Surge Protection Device requirement aligns with the recognized need to protect sensitive electronics systems found in most appliances and equipment used in modern dwelling units.
SBC-5	230.85, emergency disconnect	Provides an outdoor accessible emergency or service disconnect for first responders during a fire, gas leak, flooding, or structural damage etc.

Results

Construction Cost Results/Estimate

The methodology outlined above estimates the statewide annual construction cost impacts across the identified/quantified building code revisions to be approximately $745 thousand, for a 5-year net present value cost of $3.3 million between 2021-2026.

Comparison to Benefits

There are numerous benefits to the code changes that are being proposed that are not easily quantifiable. The Building Code Commission focuses on public safety and welfare, and many of the proposed code revisions are likely to decrease risks associated with building construction and increase the safety and well-being of Rhode Islanders.

These benefits are not easily quantifiable because they represent incremental changes to the risk and long-term building values. The qualitative analysis in this report notes the type of benefit and the justification for the proposed changes. For a means of comparison, the estimated construction costs noted above would be equal to the benefits if just 0.0745 statistical lives were saved per year as a result of these changes. However, in reality, a combination of benefits—related to all of the categories noted above—will accrue to Rhode Islanders due to the proposed changes.

Conclusion & Determination

Pursuant to R.I. Gen. Laws § 42-35-2.9(b)(3)(ii), the Building Code Standards Committee must (BCSC) "make a determination" as to whether the proposed rule will achieve the objectives of the authorizing statute in a more cost-effective manner, or with greater net benefits, than other regulatory alternatives." Looking to statute, the BCSC is charged by the legislature with establishing "adequate and uniform regulations governing the construction and alteration of buildings and structures within the state" that "insures public health, safety, and welfare."[12] The BCSC has the authority to "adopt, promulgate, and administer a state building code," which shall be "reasonably consistent with recognized and accepted standards adopted by national model code organizations and recognized authorities."[13]

After considering each of the proposed changes and the alternative means of achieving the goals of each provision, the BCSC has determined:

- that the benefits of the proposed changes to the state building codes justify the costs of the proposed rule; and
- that the proposed rule will achieve the objectives of the authorizing statute in a more cost-effective manner, or with greater net benefits, than other regulatory alternatives.

[12] See R.I. Gen. Laws Chapter 23-27.3, including R.I. Gen. Laws § 23-27.3-100.1.2 and R.I. Gen. Laws § 23-27.3-100.3

[13] See R.I. Gen. Laws § 23-27.3-100.1.5

Appendix 1: List of Changes and Information with Affected Cost

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-1: RI Amendments to State Building Code						
SBC-1	428 / 430	Modular Construction	Keep RI Amendment	Refers Modular and Prefabricated construction to RIGL 23-27.4 IIBC Compact	Decrease in Admin Costs/ Non-construction related	Provides uniformity of construction and labeling of Off-Site Modular Construction
SBC-1	2902.2 add Exception # 4	Separate Facilities	Increases number of occupants allowed in existing facilities before separate facilities are required	Keep RI Amendment	Decrease	2902.2 add Exception # 4
SBC-2: RI Amendments to State One- and Two-Family Dwelling Code						
SBC-2	R-602.3 (6)	Alternate stud height.	No difference between the codes. New section added to ICC.	Prescriptive requirement is added for studs greater than 10' in height.	Decrease in design costs	Allows one- and two-story building to have 11' and 12' walls without engineering.

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-3: RI Amendments to State Plumbing Code						
SBC-3	P-308.10 (New)	Thermal expansion tank.	Addition to the code.	Adds support to tanks.	Minimal increase	Safety
SBC-3	P-412.7	Temperature actuated, flow reductive devises.	Addition to the code.	Limits water temperature at fixture fittings.	Increase	Safety
SBC-3	P - 608.17.10	Humidifiers.	Addition to the code.	Prevents backflow into the Potable water system.	Increase	Prevents backflow into the Potable water system.

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5: RI Amendments to State Electrical Code						
SBC-5	230.67	New Article/ New Requirement: SURGE PROTECTION - All dwelling unit services are now required to be provided with surge-protection. The surge protection device (SPD) must be an integral part of the service equipment or located immediately adjacent to the service equipment unless it is supplied at each next level distribution equipment downstream toward the load. This SPD is required to be either a Type 1 or Type 2 SPD. This requirement applies to residential service equipment being replaced as well.	No Prior Requirement	This new SPD requirement aligns with the recognized need for surge protection to protect sensitive electronics systems found in most appliances and equipment used in today's modern dwelling units.	Increase	This Surge Protection device will protect all Electronic Equipment

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	230.85	New requirement: added to require an emergency disconnect at a readily accessible outdoor location for dwelling units.	No prior requirement for Emergency Disconnect	An emergency disconnecting means (which could include the service disconnecting means) for a one- or two-family dwelling is now required to be installed and located on the outside of the structure.	Increase	Provides an outdoor accessible emergency or service disconnect for first responders during a fire, gas leak, flooding, or structural damage etc.
SBC-5	210.8 (A)(5)	Revision: GFCI protection now required for ALL dwelling unit basements (not just unfinished portions of basements).	2017: Unfinished Basement (Not intended as a habitable room) and all 125volt 15 amp and 20-amp receptacles. 2020: In any and all dwelling unit basements and all 125 thru 250 volts receptacles now require GFI protection.	An unfinished basement of a dwelling unit can be an area that has been shown to be subject to shock hazards from the use of electricity in these areas. Often accompanied by damp conditions, the use of power tools and other electrical equipment.	Increase	Life Safety

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	210.8 (A)	Dwelling unit GFCI protection has been expanded to all 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground installed in the specified areas of 210.8(A).	2017 Requirement: All 125-volt, single-phase, 15- and 20-ampere receptacles installed in (10) specific locations (bathrooms, kitchens, laundry areas, etc.) of a dwelling unit 2020 Requirement: All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground installed in (11) specific locations of a dwelling unit require ground-fault circuit-interrupter (GFCI) protection for personnel.	GFCI protection to most receptacles commonly used in the specified areas of 210.8(A). The necessity for GFCI protection for areas such and kitchens and laundry areas has been proven for these receptacles over several Code cycles. 250-volt rated receptacles present similar shock hazards and substantiation submitted for this change demonstrated the need for GFCI protection for greater the 125-volt rated receptacles. Including these higher rated receptacles for GFCI protection	Increase	Life Safety

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	210.8 (A)(11)	GFCI protection for all 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground installed in indoor damp or wet locations regardless of its location.	Added that all Damp and Wet Locations and up to 250 Volt receptacles not just 125 volts.	The areas that come to mind that this will affect are areas like a mud room with no sink or a mud room with a sink but receptacles in that area are located greater than 1.8 m (6 ft) from said sink. Another area that this new provision will cover would be an indoor area where animals like dogs are washed down before being permitted to re-enter the main dwelling unit.	Increase	Life Safety
SBC-5	210.8(B)	New GFCI requirements at non-dwelling unit locations were added for damp locations, accessory buildings, laundry areas, and areas around bathtubs and shower stalls. for all 125-volt through 250-volt receptacles supplied by a single-phase branch circuit rated 150 volts or less to ground	GFCI protection was expanded to non-dwelling unit areas with a sink and permanent provisions for either food preparation or cooking, indoor damp locations, accessory building, laundry areas, and receptacles that are installed within 1.8 m (6 ft) of the outside edge of a bathtub or shower stall.	Damp Locations were added; not just for wet locations.	Increase	Life Safety

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	210.8(E)	GFCI protection is now required for the receptacles required by 210.63 for HVAC equipment, indoor service equipment, and indoor equipment requiring dedicated equipment space.	GFCI protection is now required for all receptacle outlets required; prior to this did not spell out that GFI was required no matter where the receptacle was located	Maintenance and service personnel can often be found in commercial garages and aircraft hangers working with electrical diagnostic equipment, electrical hand tools, or portable lighting equipment increasing the need for GFCI protection. The same can be said of the indoor electrical service equipment areas and indoor equipment areas requiring dedicated equipment space.	Increase	Life Safety
SBC-5	210.8(F)	GFCI protection is now required on dwelling unit outdoor outlets supplied by single-phase branch circuit rated 150 volts or less to ground, and 50 amperes or less (including 240-volt AC units).	The largest impact of the change is on GFCI protection for dwelling unit outdoor-installed heat pumps and air-conditioning units. With this requirement applying to 'all outdoor outlets', this would include outdoor hard-wired AC units.	Outdoor dwelling unit outlets typically serve loads that are comprised of 240-volt motor driven pumps or compressors that are in operation for many years without maintenance. CMP-2 concluded that it was time to encompass these outdoor dwelling unit outlets under the safety umbrella of GFCI protection.	Increase	SBC-5

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	210.12(C)	All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets and devices installed in guest rooms and guest suites of hotels and motels and patient sleeping rooms in nursing homes and limited-care facilities are required to be arc-fault circuit interrupter (AFCI) protected.	AFCI protection has been expanded to patient sleeping rooms in nursing homes and limited-care facilities.	Similar rooms with comparable uses exist at patient sleeping rooms in nursing homes and limited-care facilities. For the 2020 NEC, AFCI protection has been expanded to include these patient sleeping rooms as well	Increase	Life Safety
SBC-5	210.12(D)	Arc-fault is required at dwelling units, dormitory units, and guest rooms and guest suites of hotels and motels where branch-circuit wiring is modified or extended	Extension work was added, along with Guest Rooms and Guest Suites	To encompass new areas such as Guest Rooms and Suites of Hotels and Motels	Increase	Life Safety

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	210.52 C1	At least one receptacle is required for the first 0.84 m2 (9 ft2), or fraction thereof, of the countertop or work surface. Another receptacle outlet is required for every additional area of 1.7 m2 (18 ft2), or fraction thereof.	Removal of prior measurements for the 2020 NEC & provided square footage to determine the number and placement of receptacle outlets at island or peninsular countertops or work surfaces.	Depending on the square footage of the island or peninsular countertop will determine the required number of receptacle outlets for that island or peninsular countertop.	Increase	To supply enough receptacles to counter tops or islands
SBC-5	342.10 (E)	New sub-section (E) clarifies that intermediate metal conduit (Type IMC) is permitted to be installed where subject to severe physical damage.	IMC could not be used where subject to severe physical damage; in the 2020 it will be allowed to be used when subject to severe physical damage	This was a needed change for Article 342 to help clear up the confusion over whether IMC can be used in areas subject to severe physical damage.	Decrease	Will save on labor and material cost

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	406.12	Requirements for tamper-resistant (TR) receptacles were expanded to attached and detached garages and accessory buildings of dwelling units. Common areas of multi-family dwelling units and hotels and motels are included as well. New List Item (8) was added for assisted living facilities.	Receptacles were expanded to attached and detached garages and accessory buildings of dwelling units. Common areas of multifamily dwelling units and hotels and motels and assisted living facilities	This requirement is also protecting persons of all ages not just the young population.	Increase	Life Safety
SBC-5	445.18 (D)	An emergency shutdown device is now required to be located at a readily accessible outdoor location at dwelling units when an optional standby generator is installed. Not for cord and plug connected generators.	Prior requirements did not require to be located outdoors; now required to be located at a readily accessible outdoor location at dwelling units	This new requirement will further enhance the safety of emergency responders. By providing an external emergency generator shutdown device, this will allow for the safe interruption of electrical power outside	Increase	First Responders

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	517.10 (B)	New areas not covered by the wiring and protection methods of Part II of Article 517 have been added	A more itemized listing of areas not required to comply with a stricter wiring method	With varied interpretation of what is covered and what is not covered by Part II, there was a need to provide additional clarification as to when the more restrictive wiring methods in Part II are applicable and when they are not.	Decrease	Less restrictive wiring methods
SBC-5	555.35 (A)	Ground-Fault Protection of Equipment (GFPE) and Ground Fault Circuit-Interrupter (GFCI) Protection: GFP protection divided into three parts:	Expansion of GFI protection to Floating Buildings: all 125v 15-20-amp receptacles for other than shore power and requirements for shore power to receptacles; addition of Current Leakage Measurement Device	For the 2020 NEC, the ground-fault protection (GFP) requirements of marinas, boatyards, and docking facilities was extensively revised. These GFP requirements (previously located at 555.3) were divided into three parts to provide clarity for these important ground-fault requirements.	Increase	Life Safety
SBC-5	590.4 (G) Ex.No.2	On construction sites, a new exception to 590.4(G) permits branch-circuits that are permanently installed in framed walls and ceilings to be used for temporary power or lighting (with GFCI protection).	No provisions allowed permanent wiring to be used to supply temporary power or lighting	Allowing permanent wiring in framed walls and ceilings to be used to supply temporary power or lighting under specific conditions and with the permanent wiring method employing GFCI protection.	Decrease	Temporary Power using wiring that has been installed for permanent wiring.

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	620.6	Revision clarifies that any receptacle in a pit must be GFCI protected. GFCI protection not required for a hard-wired sump pump.	Revised to state that a permanently installed sump pump is required to be either permanently wired or must be supplied by a single receptacle that is GFCI protected.	Adding sump pumps to the list of appliances requiring GFCI protection makes sense in recognition of the potential for personnel handling sump pumps when wet.	Increase	Life Safety
SBC-5	625.54	Revision clarifies that all receptacle outlets used for EV charging be provided with GFCI protection for personnel for all cord and plug connected electric vehicle power transfer equipment.	All receptacle outlets installed for the connection of EV charging will be required to be provide with GFCI protection for personnel (regardless of the receptacle outlet's location). Prior code depended on location.	Electrical safety was the main concern with the new GFCI provision for receptacle outlets used for EV charging. Concerns were raised with personnel plugging and unplugging something like a 250-volt cord cap into a receptacle outlet in a wet or damp environment	Increase	Life Safety

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	680.21 (C)	GFCI protection is applicable to all motors used in pool applications. Exception added for listed low-voltage motors not requiring grounding.	Outlets supplying all pool motors on branch circuits rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase, shall be provided with Class A ground-fault circuit-interrupter protection. Only Single Phase was required in the 2017 Code	A subtle but significant change to this GFCI provision was to open this requirement up to all permanently installed pool motors, not just pool pump motors	Increase	Life Safety
SBC-5	680.59	New section added to specifically address GFCI protection for non-submersible fountain pumps.	No prior Provision	Even though they are not submerged in the water, non-submersible pumps still move every drop of water contained in a fountain and deserve GFCI protection as much as their submergible counterparts.	Increase	Life Safety
SBC-5	690.13 (A)	PV operates at above 30 volts. The enclosure door or hinged cover for disconnecting means exposes live parts when open; will now be required to be locked or require a tool to open	Did not require a locking device	Are accessible by other than qualified personnel (children in some instances). The disconnect enclosures can often be easily opened exposing potentially life threating voltages and current	Increase	Life Safety

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-5	690.41 (B)	PV system dc circuits (not just the arrays) that exceed 30 volts, or 8 amperes are now required to be provided with dc ground-fault protection.	Previously, only the PV Arrays were required to have GF Protection	PV system circuits operating at these low voltage and power levels do not pose an arcing or other fire risk; therefore, they are permitted to be installed without ground-fault protection.	Increase	Safety
SBC-5	708.24 (D)	A new 708.24(D) was added for a bypass isolation switch to facilitate maintenance as required	No prior requirement for a bypass isolation switch in the ATS	Electrically safe work condition so that maintenance can be performed safely on the automatic transfer switch without losing power to the critical loads associated with a COPS designated building.	Increase	Safety/Security
SBC-19: RI Amendments to State Fuel Gas Code						
SBC-19	403.4.2 / 403.10.1	Schedule 10 Steel Gas Pipe	Addition	Schedule 10 steel gas pipe can now be used for fuel gas service.	Potential cost decrease depending on material	This added section gives contractors another option for materials.

Code	Citation	Description	Difference between codes	Background/Reasoning	Increase/ Decrease Likely?	Benefits
SBC-19	409.7	Shutoff Valve Support for Tubing Systems	Addition	Adds support to gas piping in tubing installation systems.	increase	Safety concern addressed with rigid and secure support installed independent of tubing for the shutoff valves.

Resources

1. NOAA National Centers for Environmental Information (NCEI), U.S. Billion-Dollar Weather and Climate Disasters (2020), <https://www.ncdc.noaa.gov/billions/events/US/2020>, accessed on December 4, 2020.
2. Building Codes Save: A Nationwide Study of Loss Prevention, Federal Emergency Management Agency (FEMA), November 2020, <https://www.fema.gov/emergency-managers/risk-management/building-science/building-codes-save-study>, accessed on December 9, 2020.