Fiscal Note for
2020 State Electrical Code

Agency: NC Building Code Council

Statute: G.S. 143-136; 143-138

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Impact:		
	Federal Government:	No
	State Government:	No
	Local Government:	No (minimal)
	Small Businesses:	No (minimal)
	Substantial Impact:	No
	Dwelling $80.00 Increase	Yes

Purpose:
The 2020 edition of National Fire Protection Association (NFPA) 70, *National Electrical Code* (NEC) is a model code that regulates minimum electrical construction requirements for new buildings and installations. The *North Carolina State Electrical Code* is based on the NEC with North Carolina administrative and technical amendments. The State Electrical Code addresses minimum construction requirements for all aspects of electrical installations in both commercial and residential buildings.

The NC Building Code Council (BCC) plans to adopt the 2020 NEC as the new State Electrical Code with some changes in the form of State amendments. The proposed NC amendments to the 2020 NEC that the BCC plans to adopt are listed in Appendix A. The 2020 State Electrical Code major changes are identified in Appendix B. The 2020 NEC changes that may have an economic impact are presented in Appendix C. Appendix D includes a list of the members of the 2020 State Electrical Code Ad Hoc Committee who voted on the amendments to the 2020 NEC.

The purpose of the State Electrical Code is the practical safeguarding of persons and property from hazards arising from the use of electricity. The State Electrical Code is intended for use by code officials, contractors, and designers. The State Electrical Code is not intended as a design specification or an instruction manual for untrained persons. The State Electrical Code is organized by major content into nine chapters: General, Wiring and Protection, Wiring Methods and Materials, Equipment for General Use, Special Occupancies, Special Equipment, Special Conditions, Communications Systems, and Tables.

For example, before one constructs a building, the designer and contractor must determine the minimum electrical requirements for the building. Depending on whether the project includes

AC current or DC current; low-voltage or high-voltage equipment; residential use or commercial use; hazardous locations; the State Electrical Code sets forth minimum requirements for safe electrical power distribution.

Impact:

***Federal Government*:** The US General Services Administration has adopted the technical requirements of the latest edition of the nationally recognized codes, including the current accumulative supplements, in effect at the time of design contract award. The 2020 NEC is the latest edition for electrical installations. Therefore, the 2020 State Electrical Code adoption would have no additional impact on federal buildings.

State Government: The North Carolina Legislature has ruled that all facilities constructed or renovated for the State, 20,000 GSF in area or larger, shall be designed based on life-cycle cost. The goal of this legislation is to ensure that designers maximize the long-term benefits to the State, within the confines of a specific capital appropriation, since it is obvious that the cost imposed on the State over the life of a building far exceeds the initial construction investment. The 2020 State Electrical Code adoption will have negligible impact.

Local Government: The impact to local government is based on the purchase of the 2020 NEC for code enforcement and is considered minimal. The major proposed changes noted below under "Business" are not likely to affect local government.

Business:
The proposed changes would have an impact (some costs and some savings) on developers. Developers may pass the additional cost on to their customers or the end property user. The increased safety and efficiency will be of benefit to the end-user of the building.

Below are descriptions and benefits of the major proposed changes to the code that would result in an impact:

- Revision to expand Ground-Fault Circuit-Interrupter (GFCI) protection to more receptacles and outdoor equipment. Expected to affect an unknown amount of receptacles and outdoor equipment.
- Revision to require surge protection on service equipment. Surge protection has an upfront cost to protect from expenditures associated with lighting damage in the future. Expected to affect only services where the utility does not provide protection.

There are additional changes noted in Appendix C that indicate minimal change in cost, and whether it is a decrease, increase. The discussion below, by code article, addresses the major proposed changes to the code that would result in an impact.

Impact Analysis:

The Committee initially reviewed and identified the changes in Appendix B that were either an increase to or a relief from the 2017 State Electrical Code requirements. Upon further review, the sections below were determined to have quantifiable costs and savings. The remaining changes identified in Appendix C were deemed minimal without measurable cost or savings.

The Committee members listed in Appendix D were appointed as industry experts and tasked with reviewing for technical and cost changes. Certain changes in the Code will both increase and decrease the cost of installation in various circumstances. There were no changes that the Committee believes will cause a substantial economic impact. There was one section that the Committee believes may increase the cost of residential construction by more than $80.00 in certain scenarios. All Electrical Code changes are considered by the Committee to be economically minimal.

The following code change may increase cost to certain residential dwellings by more than $80.00 in some applications:

210.8(A)(7) Sinks (GFCI Protection for Personnel)

- 2020 NEC Change: The new Code section requires that in dwellings where a 125/250v range receptacle is installed within 6 ft of a sink, the receptacle must be provided with GFCI protection. The current 2017 State Electrical Code does not require a range receptacle is installed within 6 ft of a sink, to be provided with GFCI protection. Expected to affect an unknown amount of receptacles residential kitchens.
- 2017 NEC Requirement: Current typical installation practices suggest that to achieve Code compliance under the proposed 2020 State Electrical Code where section 210.8(A)(7) is applicable to range receptacles is for a GFCI-type breaker to be installed in lieu of a standard-type breaker that protects the branch-circuit and receptacle of the range.
- Analysis: Because the typical range breaker is a 2-pole 50-amp, the following analysis was performed:
  50-amp Standard 2-Pole Breaker – Average Cost – $10.37
  50-amp GFCI 2-Pole Breaker – Average Cost – $94.55
  Increase of $84.18
- Justification of Analysis: Performed using Home Depot - North Durham https://www.homedepot.com/ and an average cost from Eaton, GE, Siemens, and Square D Homeline manufacturer's online prices. The Committee stresses that this increase will not apply to all dwelling units, only those where the design requires the range receptacle (not range itself) be located within 6 ft of any sink.
- Proposed State Electrical Code Change: Adopt the 2020 NEC language.
- Necessity: This requirement is to address all receptacles that are in a dwelling's kitchen area that are near a water source and may create a shock hazard to personnel.
- Estimated Impact: This will affect an unknown number of dwelling kitchen installations per year. Only designs that require the range receptacle be located within 6 ft of the kitchen sink will anticipated an average cost increase of $84.18 per installation.

Alternatives:

The options available are to:
(1) remain at the current level of protection provided by the 2017 State Electrical Code,
(2) adopt the 2020 NEC without State amendments, or
(3) adopt the 2020 NEC with State amendments.

The NEC is amended and published every 3-years through a consensus process. The 2017 NEC, with State amendments, is the current State Electrical Code. The risk in retaining the 2017 State Electrical Code is that industry changes, such as more efficient lighting, will not be recognized. Further life-safety changes, such as GFCI expansions will not be implemented.

The 2020 NEC is the latest edition published by NFPA. This risk of adopting the 2020 NEC as the State Electrical Code is that the 2020 NEC without amendments restricts the State of North Carolina to a national standard without regard to the State's additional codes and laws associated with construction. An example is the state amendment that removes GFCI protection from sewage lift pumps in order to comply with the North Carolina Department of Health's septic regulations. There are also savings, such as an amendment to provide relief to expanding GFCI protection into finished basements as required by the 2020 NEC.

The preferred option is to adopt the 2020 NEC with the Appendix A amendments. This option captures the national industry and life-safety updates, while allowing input from interested groups represented by Ad Hoc Committee members listed in Appendix D.

Risks and Uncertainties:
There are several uncertainties related to this analysis, and most of them deal with assumptions made or lack of available data. First, the estimates of the total costs in the table above use the housing completions forecast. However, the changes to the Code would apply to any new installation, regardless of whether it is in an existing or new building. As a result, these numbers may be underestimating the potential cost.

Second, the BCC expects that several of the proposed changes to the Code would results in negligible costs or savings, and therefore did not quantify them. However, given that those changes could impact a significant number of installations, in aggregate they may have a significant positive or negative impact.

Third, given the lack of data, benefits are hard to estimate, therefore this analysis does not present the full impact of the changes. While some of the proposed changes would prevent fire and shock hazards, there is no reliable source for recent fires or shocks in North Carolina, or nationally, that could be attributed to an issue that the proposed changes would address. As a result, estimation of avoided fires, damages and shocks are difficult to estimate.

Appendix A:
2020 NEC Proposed NC Amendments

Appendix B:
2020 State Electrical Code Major Changes

Appendix C:
2020 State Electrical Code Summary of Fiscal Impact

Appendix D:
2020 NEC Ad Hoc Committee Members

Appendix A

2020 NEC Proposed State Amendments

Line No.	NEC Section	Synopsis of Amendment
1	Article 10	Administrative Article that regulates enforcement
2	110.26(E)(2)	Relief for dedicated space outdoors above and below electrical equipment
3	210.8	Relief for requiring GFCI where cords pass through a door
4	210.8(A)(2)	Relief for GFCI requirement for a garage door opener receptacle on the ceiling
5	210.8(A)(3)	Relief for GFCI requirement for Sewage lift pumps in residential
6	210.8(A)(5)	Relief for GFCI requirements in finished basements
7	210.8(B)(4)	Relief for GFCI requirement for Sewage lift pumps in commercial
8	210.12(D)	Extends circuit modification to 50 feet before AFCI requirement is mandated
9	210.52(B)(2)	Allows receptacle to be on small-appliance circuit when 6 ft form kitchen sink
10	210.52(C)(2)	Returns requirements of 2017 NEC for kitchen islands and peninsular
11	230.71(B)	Exempts T-Poles from single throw disconnect
12	250.50	Restricts destroying concrete for bonding
13	250.53(A)(2)	Requires only one grounding electrode for T-Poles
14	250.140	Addresses 3-wire ranges and dryers where main is relocated
15	250.142(B)	Address 3-wire feeders where main is relocated
16	300.3(B)	Allows external grounding conductor for 3-wire feeders where main is relocated
17	Table 300.5	Allows lesser coverage where GFCI is provided
18	300.9	Allows 6 ft of length for raceway before deemed a wet location
19	320.23(A)	Defines locations in attics where wiring is to be protected
20	334.15(C)	Allows strapping of wiring to bottom of floor joist in a crawlspace
21	406.4(D)(4)	Removes requirement for AFCI for receptacle replacement
22	410.2	Redefines closet storage space
23	410.16(C)	Allows LED and florescent light above closet door
24	555.10(3)	Requires No Swimming be on signage at docks with electrical power
25	555.35(A)(3)	Requires branch circuits have 30mA GFCI protection
26	680.4	Removes allowing inspections of existing pools
27	680.21(D)	Requires GFCI protection to pool motor circuits that are modified
28	680.26(2)(b)	Allows single wire equipotential bonding for above pools only
29	695.2	Defines reliable power for fire pumps
30	695.3	Removes informational note for defining reliable power

Appendix B

2020 NEC Ad Hoc Committee Identification of Major Changes from the 2017 State Electrical Code to the Proposed 2020 State Electrical Code

Line No.	NEC Section	Synopsis of Change	Committee Comments
1	110.16	Amendment removes part (B)service labeling	Adopt as written in the 2020 NEC
2	110.24(A)	Amendment for not providing documentation	Adopt as written in the 2020 NEC
3	110.41	Amendment for not requiring testing of equipment	Adopt as written in the 2020 NEC
4	210.8	address if a receptacle 6ft from a bathroom sink, and outside the bathroom, could be allowed on the bathroom receptacle circuit. This would require the receptacle to be GFCI protection, including AFCI protected where the location demands such protection	Amend by accepting language in 2020 NEC with excluding cabinet doors from the cord passing through doors and doorway provision
5	210.8(A)(2)	GFCI receptacle requirements in a garage	Amend by adopting as written in the 2020 NEC with exempting garage door openers that are not readily accessible.
6	210.8(A)(5)	GFCI for all basements, finished and unfinished	Amend and return to the 2017 NCE language to remove finished basements from the GFCI requirement
7	210.8(A)(7)	GFCI for 250v indoor receptacles located with 6 ft of kitchen sink	Adopt as written in the 2020 NEC
8	210.8(A)(10)	GFCI for 250v indoor receptacles located with laundry area	Adopt as written in the 2020 NEC
9	210.8(B)(1-10)	New locations added to GFCI receptacle requirements for non-residential applications	Adopt as written in the 2020 NEC
10	210.8(D)	Amendment deletes GFCI requirement for dishwashers	Adopt as written in the 2020 NEC
11	210.8(F)	GFCI for 250v outdoor outlets	Adopt as written in the 2020 NEC
12	210.12	Amendment deletes AFCI readily accessible requirement	Adopt as written in the 2020 NEC
13	210.12(B)	Amendment deletes AFCI requirement in dorm bathrooms	Adopt as written in the 2020 NEC
14	210.12(C)	Amendment deletes AFCI in hotel rooms	Adopt as written in the 2020 NEC

15	210.52(C)(2)	Island and Peninsular Receptacle Spacing	Amend and replace with 210.52(C)(2)(3)&(4) of the 2017 NEC while incorporating the intent of (b) from the 20202 NEC
16	210.52(I)	Amendment requires only one receptacle in foyer	Adopt as written in the 2020 NEC
17	230.62(C)	Service lug barriers	Adopt as written in the 2020 NEC
18	230.67(D)	Surge protection on replacement services	Adopt as written in the 2020 NEC
19	230.71(B)	Six throws of the hand rule	Amend to exclude T-Poles
20	230.85	Outside disconnect requirement	Adopt as written in the 2020 NEC
21	230.95(C)	Amendment removes qualified person	Adopt as written in the 2020 NEC
22	240.67(C)	Performance testing of arc energy	Adopt as written in the 2020 NEC
23	240.87(C)	Performance testing of arc energy	Adopt as written in the 2020 NEC
24	404.2(C)(8)	Amendment exempts neutral in switch box	Adopt as written in the 2020 NEC
25	406.4(D)	Amendment deletes readily accessible from receptacle replacements of AFCI and GFCI type	Adopt as written in the 2020 NEC
26	406.9(C)	Bathtub space defined	Adopt as written in the 2020 NEC
27	406.12	Amendment deletes tamper receptacle in several occupancies	Adopt as written in the 2020 NEC
28	408.4(B)	Amendment deletes prohibiting handwriting labels	Adopt as written in the 2020 NEC
29	409.22(B)	Amendment deletes documentation requirement	Adopt as written in the 2020 NEC
30	422.5(B)	Amendment deletes appliance GFCI from being readily accessible	Adopt as written in the 2020 NEC
31	430.99	Amendment Deletes providing fault current	Adopt as written in the 2020 NEC
32	430.130(A)(4)	Amendment deletes listing of assembly as a whole	Adopt as written in the 2020 NEC
33	440.1	Amendment Deletes providing fault current	Adopt as written in the 2020 NEC
34	Article 445	Amendment retained 2014 NEC for generators	Adopt as written in the 2020 NEC
35	555.1	Application of residential docks	Adopt as written in the 2020 NEC
36	555.35(A)	Feeders and Branch circuits have 100mA GFCI protection	Amend and require Branch Circuits to have 30mA GFCI Protection
37	680.4	Inspection of existing swimming pools	Admen by deletion of section
38	680.26(B)(2)(b)	Single wire alternative equipotential bonding	Amend to remove the single wire #8 AWG copper option from in-ground pools.

Appendix C

2020 NEC Ad Hoc Committee Identification of Fiscal Change Significance from the 2017 State Electrical Code to the Proposed 2020 State Electrical Code

Line No.	NEC Section	Synopsis of Change with Committee Amendments	Fiscal Change	Significance	Evaluation
1	110.16	Must provide service labeling	Increase	Minimal	No
2	110.24(A)	Documentation Required	Increase	Minimal	No
3	110.41	Testing of Equipment Required	Increase	Minimal	No
4	210.8	Amend by accepting language in 2020 NEC with excluding cabinet doors from the cord passing through doors and doorway provision	Decrease	Minimal	No
5	210.8(A)(2)	Amend by adopting as written in the 2020 NEC with exempting garage door openers that are not readily accessible.	Increase	Minimal	No
6	210.8(A)(5)	Amend and return to the 2017 NCE language to remove finished basements from the GFCI requirement	Decrease	Minimal	No
7	210.8(A)(7)	GFCI for 250v indoor receptacles located with 6 ft of kitchen sink	Increase	> $80 in Residential	Yes
8	210.8(A)(10)	GFCI for 250v indoor receptacles located with laundry area	Increase	Minimal	Yes
9	210.8(B)(1-10)	New locations added to GFCI receptacle requirements for non-residential applications	Increase	Minimal	Yes
10	210.8(D)	GFCI requirement for appliances	Increase	Minimal	Yes
11	210.8(F)	GFCI for 250v outdoor outlets	Increase	Minimal	Yes
12	210.12	AFCI readily accessible requirement	Increase	Minimal	No
13	210.12(B)	AFCI requirement in dorm bathrooms	Increase	Minimal	No
14	210.12(C)	AFCI in hotel rooms	Increase	Minimal	No
15	210.52(C)(2)	Amend and replace with 210.52(C)(2)(3)&(4) of the 2017 NEC while incorporating the intent of (b) from the 20202 NEC	Decrease	Minimal	No
16	210.52(I)	Foyer receptacles required every 3 ft	Increase	Minimal	No
17	230.62(C)	Service lug barriers	Increase	Minimal	No
18	230.67(D)	Surge protection on replacement services	Increase	Minimal	Yes
19	230.71(B)	Six throws of the hand rule excluding T-Poles	Decrease	Minimal	No
20	230.85	Outside disconnect requirement	Increase	Minimal	No
21	230.95(C)	Qualified person defined in Article 100	Decrease	Minimal	No
22	240.67(C)	Performance testing of arc energy	Increase	Minimal	No

23	240.87(C)	Performance testing of arc energy	Increase	Minimal	No
24	404.2(C)(8)	Neutral required in switch boxes	Increase	Minimal	No
25	406.4(D)	Receptacle replacements of AFCI and GFCI type required to be readily accessible	Increase	Minimal	No
26	406.9(C)	Bathtub space defined	Increase	Minimal	No
27	406.12	Tamper resistant increased locations	Increase	Minimal	No
28	408.4(B)	Prohibiting handwriting labels	Increase	Minimal	No
29	409.22(B)	Documentation requirement	Increase	Minimal	No
30	422.5(B)	Appliance GFCI readily accessible requirement	Increase	Minimal	No
31	430.99	Providing fault current	Increase	Minimal	No
32	430.130(A)(4)	Listing of assembly as a whole	Increase	Minimal	No
33	440.1	Providing fault current	Increase	Minimal	No
34	Article 445	Generators will use the 2020 NEC	Increase	Minimal	No
35	555.1	Application of residential docks	Increase	Minimal	No
36	555.35(A)	Amend and require Branch Circuits to have 30mA GFCI Protection	Increase	Minimal	No
37	680.4	Delete Inspection of existing swimming pools	Decrease	Minimal	No
38	680.26(B)(2)(b)	Single wire alternative equipotential bonding option only for above ground pools	Increase	Minimal	No

Evaluation

Home Depot - North Durham https://www.homedepot.com/							
			Eaton	GE	Siemens	Square D	Average Cost
20 Amp	Standard	1-Pole Breaker	$ 4.68	$ 4.34	$ 4.35	$ 4.14	$ 4.38
20 Amp	AFCI/GFCI	1-Pole Breaker	$ 48.48	$ 47.44	$ 47.03	$ 46.97	$ 47.48
Leviton 20 Amp	GFCI/Tamper	Receptacle	NA	NA	NA	NA	$ 19.97
30 Amp	Standard	2-Pole Breaker	$ 10.65	$ 9.76	$ 9.90	$ 9.71	$ 10.01
30 Amp	GFCI	2-Pole Breaker	$ 93.72	$ 74.25	$ 78.84	$ 95.98	$ 85.70
50 Amp	Standard	2-Pole Breaker	$ 12.09	$ 9.76	$ 9.90	$ 9.71	$ 10.37
50 Amp	GFCI	2-Pole Breaker	$ 72.29	$ 108.89	$ 99.00	$ 98.00	$ 94.55
Surge Protection	Standard	Whole Home	$ 69.14	$ 66.92	$ 64.09	$ 29.34	$ 57.37

Average Home Appliances & Installation Methods			Average Cost	Cost Increase
Laundry	2017 NEC	20 Amp GFCI Receptacle on Standard 20 Amp 1-Pole Breaker	$24.35	$23.13
	2020 NEC	20 Amp AFCI/GFCI 2-Pole Breaker	$47.48	
Small Appliance	2017 NEC	20 Amp GFCI Receptacle on Standard 20 Amp 1-Pole Breaker	$24.35	$23.13
	2020 NEC	20 Amp AFCI/GFCI 2-Pole Breaker	$47.48	
Small Appliance	2017 NEC	20 Amp GFCI Receptacle on Standard 20 Amp 1-Pole Breaker	$24.35	$23.13
	2020 NEC	20 Amp AFCI/GFCI 2-Pole Breaker	$47.48	
Refrigerator	2017 NEC	20 Amp GFCI Receptacle on Standard 20 Amp 1-Pole Breaker	$24.35	$23.13
	2020 NEC	20 Amp AFCI/GFCI 2-Pole Breaker	$47.48	
Dishwasher	2017 NEC	Standard 20 Amp Breaker Allowed	$4.38	$43.10
	2020 NEC	20 Amp AFCI/GFCI 2-Pole Breaker	$47.48	
Microwave	2017 NEC	Standard 20 Amp 1-Pole Breaker	$4.38	$43.10
	2020 NEC	20 Amp AFCI/GFCI 2-Pole Breaker	$47.48	
Dryer	2017 NEC	Standard 30 Amp 2-Pole Breaker	$10.01	$75.69
	2020 NEC	GFCI 30 Amp 2-Pole Breaker	$85.70	
Range	2017 NEC	Standard 50 Amp 2-Pole Breaker	$10.37	$84.18
	2020 NEC	GFCI 50 Amp 2-Pole Breaker	$94.55	
Outdoor Air Conditioner	2017 NEC	Standard 30 Amp 2-Pole Breaker	$10.01	$75.69
	2020 NEC	GFCI 30 Amp 2-Pole Breaker	$85.70	
Surge Protection	2017 NEC	Not Required	$-	$57.37
	2020 NEC	Required	$57.37	

Appendix D

2020 NEC Ad Hoc Committee to Adopt the 2020 State Electrical Code (2020 NEC with Amendments)

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