2018 NC State Building Code Amendments

(adopted December 2017 through December 2024)

(Note: includes identified NC Errata)

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The following pages represent a summary of the Building Code Council adopted amendments that have been approved by the Rules Review Commission or by legislative review pursuant to N.C.G.S. 150B-21.3.

2018 NC Building Code (based on the 2015 International Building Code) effective 1/1/2019

These amendments revise, delete or add to the adopted NC Building Code.

2018 NC Building Code
101.2 Scope, 202 Definitions, Farm Building. (161213 Item B-7)

101.2 Scope. The provisions of this code shall apply to the construction, *alteration*, relocation, enlargement, replacement, *repair*, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.
Exceptions: If any of the following apply the building or structure is exempt from the provisions of this code:
1. Detached one- and two-family *dwellings* and multiple single-family *dwellings (townhouses)* not more than three *stories above grade plane* in height with a separate *means of egress*, and their accessory structures not more than three *stories above grade plane* in height, shall comply with the *International Residential Code*.

~~2. Farm *buildings* located outside of the buildings rules jurisdiction of any municipality.~~
~~**Exception:** All buildings used for sleeping purposes shall conform to the provisions of the technical codes.~~

2. *Farm buildings* not used for:
a. Sleeping purposes; or
b. Storage of hazardous materials in excess of those listed in Tables 307.1(1) and 307.1(2) within the building rules jurisdiction of any municipality.

3. The design construction, location, installation or operation of equipment for storing, handling and transporting liquefied petroleum gases for fuel purposes up to the outlet of the first stage pressure regulator, anhydrous ammonia or other liquid fertilizer.

4. The design construction, location, installation or operation of equipment or facilities of a public utility, as defined in N.C.G.S. 62-3, or electric or telephone membership corporation, including without limitation poles, towers and other structures supporting electric or communication lines from the distribution network up to the meter location.

Note: All *buildings* owned and operated by a public utility or an electric or telephone membership corporation shall meet the provisions of this code.

5. The storage and handling of substances governed by the Hazardous Chemicals Right to Know Act in N.C.G.S. Chapter 95, Article 18.

SECTION 202 DEFINITIONS
FARM BUILDING. Any *building* not used for sleeping purposes that is not accessed by the general public and is used primarily for a farm purpose. Farm purposes includes structures or *buildings* for equipment, storage and processing of agricultural products or commodities such as: crops, fruits, vegetables, ornamental or flowering plants, dairy, timber, livestock, poultry and all other such forms of agricultural products by the specific farm on which the structure or *building* is located. Farm purposes do not include structures or *buildings* for uses such as education facilities, research facilities, or aircraft hangers.

The delayed effective date of this Rule is January 1, 2019.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

(Note: The remainder is part of the 2018 Code adoption package.)

2018 NC Building Code
Chapter 2 Definitions. (200714 Item B-26)

CARBON MONOXIDE ALARM. A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

CARBON MONOXIDE DETECTOR. A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit.

The delayed effective date of this Rule is January 1, 2022.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
ERRATA – correct as shown

TEMPORARY OVERFLOW SHELTER. A shelter that provides Temporary Overflow accommodations from an approved homeless shelter in accordance with Section 427.

2018 NC Building Code
Section 116 Unsafe Structures and Equipment (210914 Item B-2)

SECTION 116 UNSAFE STRUCURES AND EQUIPMENT

~~Deleted. See the North Carolina Administrative Code and Policies~~

116.1 General. Owners of unsafe structures or equipment shall comply with a code enforcement official's authority as described in NC Administrative Code and Policies Section 204.2.8 and G.S. 160D-1119.
116.2 Public access. The structure owner or his representative shall secure the unsafe structure by a method *approved* by the local *building official* to prevent public access. The *approved* method shall be in place within the time limit specified in writing by the *building official* in the notice of unsafe building.

The delayed effective date of this Rule is January 1, 2023.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
Section 202 - Definitions (220913 Item B-1)

Travel distance, plumbing fixture access. Travel distance shall be measured from the most remote point of each room, area or space along the natural, unobstructed and accessible path of horizontal and vertical travel to the entrance to the nearest *toilet room* containing *plumbing fixtures* required to serve the room, area or space.

The delayed effective date of this Rule is January 1, 2024.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

North Carolina General Assembly Session Law 2023-91, Section 1 became law on 7/10/23:

SECTION 1. G.S. 143-138(b20) reads as rewritten:

"(b20) Exclusion for Temporary Motion Picture, Television, and Theater Stage Sets and Scenery. – Buildings used for temporary motion picture, television, and theater stage sets and scenery are exempt from use and occupancy classification under the North Carolina State Building Code. No permit shall be required under the North Carolina State Building Code or any local variant approved under subsection (e) of this section for any construction, installation, repair, replacement, or alteration of temporary motion picture, television, and theater stage sets and ~~scenery that are being used for less than one year in one location and are inspected by the assigned fire code inspector. The Building Code Council shall create a fire code inspection checklist that shall be used for inspections under this subsection.~~scenery."

2018 NC Building Code
312.1, H101.2, H109.2, Ground Signs. (180911 Item B-15)

312.1 General.
Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy. Group U shall include, but not be limited to, the following:

Agricultural buildings
Aircraft hangars, accessory to a one- or two-family residence (see Section 412.5)
Barns
Carports
Fences and ground signs more than 6 feet (1829 mm) in height
Grain silos, accessory to a residential occupancy
Greenhouses
Livestock shelters
Photovoltaic panel system (mounted at grade)
Private garages
Retaining walls
Sheds
Stables
Tanks
Towers

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
403.4.5 and 916. (201208 Item B-6)

403.4.5 Emergency Responder ~~Radio~~ Communication Coverage. Emergency responder ~~radio~~ communication coverage shall be provided in accordance with Section 510 of the *International Fire Code.*

The delayed effective date of this Rule is January 1, 2022.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
428.2 Residential care homes (200714 Item B-28)

428.2 Residential care homes. Homes keeping no more than six adults or six unrestrained children who are able to respond and evacuate the facility without assistance, determined by the state agency having jurisdiction to be licensable, shall be classified as single-family residential ~~(*North Carolina Residential*~~

~~*Code*)~~ and comply with the requirements of this section and the *North Carolina Residential Code* for detached one- and two-family dwellings and townhouses.

The delayed effective date of this Rule is January 1, 2022.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
ERRATA – correct as shown

428.2.4 Heating Appliances. Unvented fuel-fired heaters and portable electric heaters shall be prohibited.

2018 NC Building Code
428.3 Licensed small residential care facilities (200714 Item B-29)

428.3 Licensed Small Residential Care Facilities. The following facilities when determined by the state agency having jurisdiction to be licensable, shall be classified as Single-Family Residential and comply with the requirements of this section and the *North Carolina Residential Code* for detached one- and two-family dwellings and townhouses.

1. Residential Care Facilities keeping no more than six adults or six unrestrained children with no more than three who are unable to respond and evacuate without assistance.

2. Residential Care Facilities keeping no more than five adults or five children who are unable to respond and evacuate without assistance, when certifiable for Medicaid reimbursement, and when staffed 24-hours per day with at least two staff awake at all times.

3. Residential Care Facilities keeping no more than nine adults or nine children who are able to respond and evacuate without assistance.

The delayed effective date of this Rule is January 1, 2022.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
ERRATA – correct as shown

428.3.9 Heating Appliances. Unvented fuel-fired heaters, floor furnaces, and portable electric heaters shall not be installed.

2018 NC Building Code
Table 504.4 Allowable Number of Stories Above Grade Plane. (190910 Item B-12)

TABLE 504.4[a,b]
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION									
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B		A	B
A-1	NS	UL	5	3	2	3	2	3	2	1
	S	UL	6	4	3	4	3	4	3	2
A-2	NS	UL	11	3	2	3	2	3	2	1
	S	UL	12	4	3	4	3	4	3	2
A-3	NS	UL	11	3	2	3	2	3	2	1
	S	UL	12	4	3	4	3	4	3	2
A-4	NS	UL	11	3	2	3	2	3	2	1
	S	UL	12	4	3	4	3	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	UL	11	5	3	5	3	5	3	2
	S	UL	12	6	4	6	4	6	4	3
E	NS	UL	5	3	2	3	2	3	1	1
	S	UL	6	4	3	4	3	4	2	2
F-1	NS	UL	11	4	2	3	2	4	2	1
	S	UL	12	5	3	4	3	5	3	2
F-2	NS	UL	11	5	3	4	3	5	3	2
	S	UL	12	6	4	5	4	6	4	3
H-1	NS[c, d]	1	1	1	1	1	1	1	1	NP

	S									
H-2	NS[c, d]	UL	3	2	1	2	1	2	1	1
	S									
H-3	NS[c, d]	UL	6	4	2	4	2	4	2	1
	S									
H-4	NS[c, d]	UL	7	5	3	5	3	5	3	2
	S	UL	8	6	4	6	4	6	4	3
H-5	NS[c, d]	4	4	3	3	3	3	3	3	2
	S									
I-1 Condition 1	NS[d, e]	UL	9	4	3	4	3	4	3	2
	S	UL	10	5	4	5	4	5	4	3
I-1 Condition 2	NS[d, e]	UL	9	4	3	4	3	4	3	2
	S	UL	10	5						
I-2	NS[d, f]	UL	4	2	1	1	NP	1	1	NP
	S	UL	5	3						
I-3	NS[d, e]	UL	4	2	1	2	1	2	2	1
	S	UL	5	3	2	3	2	3	3	2
I-4	NS[d, g]	UL	5	3	2	3	2	3	1	1
	S	UL	6	4	3	4	3	4	2	2
M	NS	UL	11	4	2	4	2	4	3	1
	S	UL	12	5	3	5	3	5	4	2
R-1	NS[d,h]	UL	11	4	4	4	4	4	3	2
	S13R	4	4						4	3
	S	UL	12	5	5	5	5	5	4	3
R-2	NS[d,h]	UL	11	4	4	4	4	4	3	2
	S13R	4	4						4	3
	S	UL	12	5	5	5	5	5	4	3
R-3	NS[d,h]	UL	11	4	4	4	4	4	3	3
	S13R	4	4						4	4
	S	UL	12	5	5	5	5	5	4	4
R-4	NS[d,h]	UL	11	4	4	4	4	4	3	2
	S13R	4	4						4	3
	S	UL	12	5	5	5	5	5	4	3

S-1	NS	UL	11	4	2	3	2	4	3	1
	S	UL	12	5	~~3~~ 4	4	3	5	4	2
S-2	NS	UL	11	5	3	4	3	4	4	2
	S	UL	12	6	4	5	4	5	5	3
U[i]	NS	UL	5	4	2	3	2	4	2	1
	S	UL	6	5	3	4	3	5	3	2

Note: UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2.

a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
b. See Section 903.2 for the minimum thresholds for protection by an *automatic sprinkler system* for specific occupancies.
c. New Group H occupancies are required to be protected by an *automatic sprinkler system* in accordance with Section 903.2.5.
d. The NS value is only for use in evaluation of existing *building height* in accordance with the *International Existing Building Code.*
e. New Group I-1 and I-3 occupancies are required to be protected by an *automatic sprinkler system* in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
f. New and existing Group I-2 occupancies are required to be protected by an *automatic sprinkler system* in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code.*
g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
h. New Group R occupancies are required to be protected by an *automatic sprinkler system* in accordance with Section 903.2.8.
i. See Table C102.1 in Appendix C for Group U agricultural buildings.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)

OCCUPANCY		A[d]	B[e]	E	F-1	F-2	H-1	H-2	H-3	H-4	H-5	I-1[a]	I-2	I-3	I-4	M	R[a]	S-1	S-2[b]	U
A[d]	S	2[d,f]	1	1	1	N	NP	3	2	2	2	1	2	1	1	1	1	1	N	N
	NS	2[d,f]	2	2	2	1	NP	4	3	3	3	2	NP	2	2	2	2	2	1	1
B[e]	S	1	2[d]	1	2	1	NP	2	1	1	1	1	2	1	1	1	1	1	1	1
	NS	2	2[d]	2	3	2	NP	3	2	2	2	2	NP	2	2	2	2	2	2	2
E	S	1	1	2[d]	1	N	NP	3	2	2	2	1	2	1	1	1	1	1	N	N
	NS	2	2	2[d]	2	1	NP	4	3	3	3	2	NP	2	2	2	2	2	1	1
F-1	S	1	2	1	3[d]	1	NP	2	1	1	1	1	2	1	1	2	1	2	1	1
	NS	2	3	2	3[d]	2	NP	3	2	2	2	2	NP	2	2	3	2	3	2	2
F-2	S	N	1	N	1	2[d]	NP	3	2	2	2	1	2	1	1	1	1[c]	1	1	1
	NS	1	2	1	2	2[d]	NP	4	3	3	3	2	NP	2	2	2	2[c]	2	2	2
H-1	S	NP	NP	NP	NP	NP	4[d]	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
	NS	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
H-2	S	3	2	3	2	3	NP	4[d]	1	1	1	3	3	3	3	2	3	2	3	3
	NS	4	3	4	3	4	NP	NP	NP	NP	NP	NP	NP	NP	NP	3	NP	3	4	4
H-3	S	2	1	2	1	2	NP	1	3[d]	1	1	2	2	2	2	1	2	1	2	2
	NS	3	2	3	2	3	NP	NP	NP	NP	NP	NP	NP	NP	NP	2	NP	2	3	3
H-4	S	2	1	2	1	2	NP	1	1	2[d]	1	2	2	2	2	1	2	1	2	2
	NS	3	2	3	2	3	NP	NP	NP	NP	NP	NP	NP	NP	NP	2	NP	2	3	3
H-5	S	2	1	2	1	2	NP	1	1	1	2[d]	2	2	2	2	1	2	1	2	2
	NS	3	2	3	2	3	NP	NP	NP	NP	NP	NP	NP	NP	NP	2	NP	2	3	3
I-1[a]	S	1	1	1	1	1	NP	3	2	2	2	2[d]	2	1	1	1	1	1	1	1
	NS	2	2	2	2	2	NP	NP	NP	NP	NP	2[d]	NP	2	2	2	NP	2	2	2
I-2	S	2	2	2	2	2	NP	3	2	2	2	2	2[d]	2	2	2	2	2	2	2
	NS	NP	NP	Np	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
I-3	S	1	1	1	1	1	NP	3	2	2	2	1	2	2[d]	1	1	1	1	1	1
	NS	2	2	2	2	2	NP	NP	NP	NP	NP	2	NP	NP	2	2	NP	2	2	2
I-4	S	1	1	1	1	1	NP	3	2	2	2	1	2	1	2[d]	1	1	1	1	1
	NS	2	2	2	2	2	NP	NP	NP	NP	NP	2	NP	2	NP	2	NP	2	2	2
M	S	1	1	1	2	1	NP	2	1	1	1	1	2	1	1	2[d]	1	1	1	1
	NS	2	2	2	3	2	NP	3	2	2	2	2	NP	2	2	2[d]	2	2	2	2
R[a]	S	1	1	1	1	1[c]	NP	3	2	2	2	1	2	1	1	1	2[d,g]	1	1[c]	1[c]
	NS	2	2	2	2	2[c]	NP	NP	NP	NP	NP	NP	NP	NP	NP	2	2[d,g]	2	2[c]	2[c]
S-1	S	1	1	1	2	1	NP	2	1	1	1	1	2	1	1	1	1	3[d]	1	1
	NS	2	2	2	3	2	NP	3	2	2	2	2	NP	2	2	2	2	3[d]	2	2
S-2[b]	S	N	1	N	1	1	NP	3	2	2	2	2	2	1	1	1	1[c]	1	2[d]	1
	NS	1	2	1	2	2	NP	4	3	3	3	3	NP	2	2	2	2[c]	2	2[d]	2
U	S	N	1	N	1	1	NP	3	2	2	2	1	2	1	1	1	1[c]	1	1	1[d]
	NS	1	2	1	2	2	NP	4	3	3	3	2	NP	2	2	2	2[c]	2	2	1[d]

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
N = No separation requirement.
NP = Not permitted.
a See Section 420.
b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
c. See Section 406.3.4.
d. Separation is not required between occupancies of the same classification unless fire area separation is required.
e. See Section 422.2 for ambulatory care facilities.
f. A-1, A-2, A-3, A-4 & A-5 must be separated by the designated fire-resistance rating unless they are to be nonseparated mixed use.
g. R-1, R-2, R-3 & R-4 must be separated by the designated fire-resistance rating unless they are to be nonseparated mixed use.

2018 NC Building Code
ERRATA – correct as shown

510.2 Horizontal building separation allowance. A building shall be considered as separate and distinct buildings for the purpose of determining area limitation, continuity of *fire walls*, limitations of number of *stories* and the type of construction where all of the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 3 hours.
2. The building below the *horizontal assembl*y is Type IA construction.
3. *Shaft, stairway, ramp* and escalator enclosures through the *horizontal assembly* shall have not less than 2-hour *fire-resistance rating* with opening protectives in accordance with Section 716.5.
   Exception: Where the enclosure walls below the *horizontal assembly* have not less than a 3-hour *fire-resistance rating* with opening protectives in accordance with Section 716.5, the enclosure walls extending above the *horizontal assembly* shall be permitted to have 1-hour *fire-resistance rating*, provided:
   1. The building above the *horizontal assembly* is not required to be Type I construction;
   2. The enclosure connects fewer than four *stories*; and
   3. The enclosure opening protectives above the *horizontal assembly* have a *fire-resistance rating* of not less 1 hour.
4. The building or buildings above the *horizontal assembly* shall be permitted to have multiple Group A occupancy uses, each with an *occupant load* of less than 300, or Group B, M, R or S occupancies.
5. The building below the *horizontal assembly* shall be protected throughout by an *approved automatic sprinkler* system in accordance with Section 903.3.1.1, and shall be permitted to be any occupancy allowed by this code except Group H.
6. The maximum *building height* in feet (mm) shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the *grade plane*.

2018 NC Building Code
Table 602 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance. (180911 Item B-13)

TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE[a,d,g]

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H[e]	OCCUPANCY GROUP F-1, M, S-1[f]	OCCUPANCY GROUP A, B, E, F-2, I, R[i,j], S-2, U[h]
X < 5[b]	All	3	2	1
5 ≤ X < 10	IA Others	3 2	2 1	1 1
10 ≤ X < 30	IA, IB IIB, VB Others	2 1 1	1 0 1	1[c] 0 1[c]
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.
a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
b. See Section 706.1.1 for party walls.
c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
e. For special requirements for Group H occupancies, see Section 415.6.
f. For special requirements for Group S aircraft hangars, see Section 412.4.1.
g. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
i. For Group R-3 detached one- and two-family *dwellings* of any construction type and not more than three *stories above grade plane* in height with a separate *means of egress*, a fire separation distance of 5 feet or less shall be 1-hour fire-resistant rated and shall be 0-hour fire-resistant rated for distances greater than 5 feet.
j. For Group R-3 attached one- and two-family dwellings of any construction type separated with fire walls complying with Section 706, containing no other occupancy classification, and not more than three *stories above grade plane* in height with a separate *means of egress*, a fire separation distance of 5 feet or less shall be 1-hour fire-resistant rated and shall be 0-hour fire-resistant rated for distances greater than 5 feet.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
Table 602 FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE (220315 Item B-4)

TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE[a,d,g]

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H[e]	OCCUPANCY GROUP F-1, M, S-1[f]	OCCUPANCY GROUP A, B, E, F-2, I, R[i,j], S-2, U[h]
X < 5[b]	All	3	2	1
5 ≤ X < 10	IA Others	3 2	2 1	1 1
10 □ X < 30	IA, IB IIB, VB Others	2 1 1	1 0 1	1[c] 0 1[c]
X □ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.
a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
b. See Section 706.1.1 for party walls.
c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
e. For special requirements for Group H occupancies, see Section 415.6.
f. For special requirements for Group S aircraft hangars, see Section 412.4.1.
g. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
~~i. For Group R-3 detached one- and two-family *dwellings* of any construction type and not more than three *stories above grade plane* in height with a separate *means of egress,* a fire separation distance of 5 feet or less shall be 1-hour fire-resistant rated and shall be 0-hour fire-resistant rated for distances greater than 5 feet.~~
~~j. For Group R-3 attached one- and two-family dwellings of any construction type separated with fire walls complying with Section 706, containing no other occupancy classification, and not more than three *stories above grade plane* in height with a separate *means of egress,* a fire separation distance of 5 feet or less shall be 1-hour fire-resistant rated and shall be 0-hour fire-resistant rated for distances greater than 5 feet.~~

The delayed effective date of this Rule is January 1, 2025.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
705.12 Soffit in Group R. (200310 Item B-8)

705.12 Soffit in Group R.
In Group R buildings of combustible construction, the soffit material shall be securely attached to framing members and shall be constructed using one of the following methods:

1. Non-combustible soffit material;
2. Fire retardant treated soffit material;
3. Vinyl soffit installed over 3/4-inch wood sheathing;
4. Vinyl soffit installed over 5/8-inch gypsum board;
5. Aluminum soffit installed over 3/4-inch wood sheathing; or
6. Aluminum soffit installed over 5/8-inch gypsum board.

Venting requirements shall apply to both soffit and underlayment and shall be per Section 1203.2. ~~Vent openings shall not be located within 5 feet horizontally of any unprotected wall opening located within 3 feet vertically below the soffit.~~

Exceptions:
1. Vinyl and aluminum soffit material may be installed without wood sheathing or gypsum backing board if the exterior wall finish is noncombustible for a minimum distance of 10 feet above finished grade or the *building* is equipped throughout with an *automatic sprinkler system* in accordance with 903.3.1.1.
2. ~~Location of vent openings in soffits shall not be limited in buildings equipped throughout with an automatic sprinkler system complying with Section 903.3.1.1.~~ Detached one- and two- family dwellings and townhouses.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
714.4.2 Membrane penetration. (190312 Item B-2)

714.4.2 Membrane penetrations.
Penetrations of membranes that are part of a *horizontal assembly* shall comply with Section 714.4.1.1 or 714.4.1.2. Where floor/ceiling assemblies are required to have a *fire-resistance rating*, recessed fixtures shall be installed such that the required *fire resistance* will not be reduced.

Exceptions:
7. The ceiling membrane of 1- and 2-hour *fire-resistance-rated horizontal assemblies* is permitted to be interrupted with the double wood top plate of a wall assembly ~~that is sheathed with Type X gypsum wallboard~~, provided that all penetrating items through the double top plate are protected in accordance with Section 714.4.1.1 or 714.4.1.2 and the ceiling membrane is tight to the top plate. For 2-hour fire-resistance-rated horizontal assemblies the wall assembly must be sheathed with Type X gypsum wallboard.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
901.1 Scope. (161213 Item B-6)

901.1 Scope. ~~The provisions of this chapter shall specify where fire protection systems are required and shall apply to the design, installation, inspection, operation, testing and maintenance of all *fire protection systems*.~~

901.1 Scope. The provisions of the *International Building Code* shall specify where *fire protection systems* are required. The provisions of the *International Fire Code* shall determine the design, installation, inspection, operation, testing and maintenance of all *fire protection systems*.

The delayed effective date of this Rule for the 2018 NC Building Code is January 1, 2019.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

(Note: Also printed in 2018 Fire Prevention Code, Section 901.1.)

2018 NC Building Code
903.2.8 Group R. (180911 Item B-13)

903.2.8 Group R. An *automatic sprinkler system* installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R *fire area*, except as provided for in Section 903.2.8.5.

Exceptions:

1. An *automatic sprinkler system* is not required in new adult and child day care facilities located in existing Group R-3 and R-4 occupancies.

2. An *automatic sprinkler system* is not required in *temporary overflow shelters*.

3. An *automatic sprinkler system* is not required in camping units located within a campground where all of the following conditions exist.

3.1. The camping unit is limited to one story in height.

3.2. The camping unit is less than 400 square feet (37 m2) in area.

3.3. The camping unit does not have a kitchen.

4. An automatic sprinkler system is not required in an *open air camp cabin* that complies with the following:

4.1. The *open air camp cabin* shall have at least two remote unimpeded exits. Lighted exit signs shall not be required.

4.2. The *open air camp cabin* shall not be required to have plumbing or electrical systems, but if the cabin has these systems, then the provisions of the code otherwise applicable to those systems shall apply.

4.3. Smoke alarms and portable fire extinguishers may be required as otherwise provided in the code.

5. An *automatic sprinkler system* is not required in the following Group R-3 buildings not more than three *stories above grade plane* in height with a separate *means of egress*:

5.1. Detached one- and two-family *dwellings.*

5.2. Attached one- and two-family *dwellings* separated with fire walls complying with Section 706 and containing no other occupancy classification.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
903.2.8 Group R. (220315 Item B-4)

903.2.8 Group R. An *automatic sprinkler system* installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R *fire area*, except as provided for in Section 903.2.8.5.

Exceptions:

1. An *automatic sprinkler system* is not required in new adult and child day care facilities located in existing Group R-3 and R-4 occupancies.

2. An *automatic sprinkler system* is not required in *temporary overflow shelters*.

3. An *automatic sprinkler system* is not required in camping units located within a campground where all of the following conditions exist.

3.1. The camping unit is limited to one story in height.

3.2. The camping unit is less than 400 square feet (37 m2) in area.

3.3. The camping unit does not have a kitchen.

4. An automatic sprinkler system is not required in an *open air camp cabin* that complies with the following:

4.1. The *open air camp cabin* shall have at least two remote unimpeded exits. Lighted exit signs shall not be required.

4.2. The *open air camp cabin* shall not be required to have plumbing or electrical systems, but if the cabin has these systems, then the provisions of the code otherwise applicable to those systems shall apply.

4.3. Smoke alarms and portable fire extinguishers may be required as otherwise provided in the code.

~~5. An *automatic sprinkler system* is not required in the following Group R-3 buildings not more than three *stories above grade plane* in height with a separate *means of egress*:~~

~~5.1. Detached one- and two-family *dwellings.*~~

~~5.2. Attached one- and two-family *dwellings* separated with fire walls complying with Section 706 and containing no other occupancy classification.~~

The delayed effective date of this Rule is January 1, 2025.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
905.3.1 Height. (190910 Item B-3)

905.3.1 Height. Class III standpipe systems shall be installed throughout buildings where ~~the floor level of the highest story is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access, or where the floor level of the lowest story is located more than 30 feet (9144 mm) below the heights level of fire department vehicle access.~~ any of the following exist:

1. Four or more *stories* are above or below *grade plane*.
2. The floor level of the highest *story* is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access.
3. The floor level of the lowest *story* is located more than 30 feet (9144 mm) below the highest level of fire department vehicle access.

Exceptions:

1. Class I standpipes are allowed in *buildings* equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Class I standpipes are allowed in Group B and E occupancies.
~~2~~ 3. Class I manual standpipes are allowed in *open parking garages* where the highest floor is located not more than 150 feet (45720 mm) above the lowest level of fire department vehicle access.
~~3~~ 4. Class I manual dry standpipes are allowed in *open parking garages* that are subject to freezing temperatures, provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5.
~~4~~ 5. Class I standpipes are allowed in *basements* equipped throughout with an *automatic sprinkler system*.
6. Class I standpipes are allowed in buildings where occupant-use hose lines will not be utilized by trained personnel or the fire department.
~~5~~ 7. In determining the lowest level of fire department vehicle access, it shall not be required to consider either of the following:
~~5~~ 7.1 Recessed loading docks for four vehicles or less.
~~5~~ 7.2 Conditions where topography makes access from the fire department vehicle to the building impractical or impossible.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
915 Carbon Monoxide Alarm and Detection Systems. (180612 Item B-5)

915.1.1 Where required. Carbon monoxide detection shall be provided in Group A-2, I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies in the locations specified in Section 915.2 where any of the conditions in Sections 915.1.2 through 915.1.6 exist.

915.1.2 Fuel-burning appliances and fuel-burning fireplaces. Carbon monoxide detection shall be provided in Group A-2 occupancies, dwelling units, sleeping units and classrooms that contain a fuel-burning appliance or a fuel-burning fireplace.

915.1.3 Forced air furnaces. Carbon monoxide detection shall be provided in Group A-2 occupancies, dwelling units, sleeping units and classrooms served by a fuel-burning, forced air furnace.

915.4.1 Power source. Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.
Exceptions:
1. Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.
2. In A-2 occupancies the carbon monoxide detector shall be permitted to be battery-powered.

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

[Note: This Rule will also be printed in the 2018 NC Fire Code, 915 Carbon Monoxide Alarm and Detection Systems.]

2018 NC Building Code
403.4.5 and 916. (201208 Item B-6)

916 Emergency Responder ~~Radio~~ Communication Coverage

916.1 General. Emergency responder ~~radio~~ communication coverage shall be provided in all new buildings in accordance with Section 510 of the *International Fire Code.*

The delayed effective date of this Rule is January 1, 2022.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
Table 1004.1.2 (220913 Item B-2)

TABLE 1004.1.2
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT[c]

Skating rinks, swimming pools, recreational courts	
Rink, pool, and recreational court	50 gross
Decks	15 gross[d]

For SI: 1 square foot = 0.0929 m^2, 1 foot = 304.8 mm.

a. Floor area in square feet per occupant.
b. An assembly occupancy conference room that is accessory to a Group B office occupancy and meeting the requirements of Section 303.1, exception 2, shall be calculated at 100 square feet per occupant for determining the overall occupant load of the associated floor. The assembly occupancy shall be calculated at 15 square feet per occupant for the purpose of determining egress from the room containing the assembly occupancy.
c. For mixed uses sum all loads before rounding up to the next whole number.
d. Occupant circulation area required by 15A NCAC 18A .2522 around the edge of a swimming pool shall not be included in the deck gross floor area.

(The remainder of Table 1004.1.2 remains unchanged by this proposed amendment.)

The delayed effective date of this Rule is January 1, 2024.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code and NC Fire Code
1004.2 Increased Occupant Load. (210309 Item B-5)

1004.2 Increased Occupant Load. Where approved by the *building official*, the *occupant load* permitted in any building, or portion thereof, is permitted to be increased from the number established for the occupancies in Table 1004.1.2, provided that all other requirements of the code are met based on such modified number and the occupant load does not exceed one occupant per 7 square feet (0.65 m^2) of occupiable floor space. Where required by the *building official*, an *approved aisle*, seating or fixed equipment diagram substantiating any increase in *occupant load* shall be submitted. Where required by the *building official*, such diagram shall be posted.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
1009.7.2 Separation. (180911 Item B-2)

1009.7.2 Separation.

(no change to subsection)

Exceptions:

1. Areas for assisted rescue that are located 10 feet (3048 mm) or more from the exterior face of a building are not required to be separated from the building by fire-resistance rated walls or protected openings.

2. The fire-resistance rating and opening protectives are not required in the exterior wall where the building is equipped throughout with an automatic sprinkler system installed in accordance with section 903.3.1.1 or 903.3.1.2.

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
1010.1.9.7 Delayed Egress. (200901 Item B-1)

[BE] 1010.1.9.7 Delayed egress. Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies ~~any occupancy except Group A, E and H~~ in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved* automatic smoke or heat detection system installed in accordance with Section 907**:** ~~The locking system shall be installed and operated in accordance with all of the following:~~

1. Group B, F, I, M, R, S and U occupancies.

2. Group E classrooms with an occupant load of less than 50.
Exception: Delayed egress locking systems shall be permitted to be installed on exit or exit access doors, other than the main exit or exit access door, serving a courtroom in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

~~1. The delay electronics of the delayed egress locking system shall deactivate upon actuation of the *automatic sprinkler system* or automatic fire detection system, allowing immediate, free egress.~~

~~2. The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.~~

~~3. The delayed egress locking system shall have the capability of being deactivated at the fire command center and other approved locations. If a fire command center is not required by the *International Building Code*, the door locks shall have the capability of being unlocked by a signal from a location approved by the local fire code official.~~

~~4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.~~

~~**Exception:** Where *approved*, a delay of not more than 30 seconds is permitted on a delayed egress door.~~

~~5. The egress path from any point shall not pass through more than one delayed egress locking system.~~

~~**Exception:** In Group I-2 or I-3 occupancies, the egress path from any point in the building shall not pass through more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds.~~

~~6. A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware:~~

~~6.1. For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.~~

~~6.2. For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.~~

~~6.3. The sign shall comply with the visual character requirements in ICC A117.1.~~
~~**Exception:** Where *approved*, in Group I occupancies, the installation of a sign is not required where care recipients who, because of clinical needs, require restraint or containment as part of the function of the treatment area.~~

~~7. Emergency lighting shall be provided on the egress side of the door.~~

~~8. The delayed egress locking system units shall be *listed* in accordance with UL 294.~~

[BE] 1010.1.9.7.1 Delayed egress locking system. The delayed egress locking system shall be installed and operated in accordance with all of the following:

1. The delay electronics of the delayed egress locking system shall deactivate upon actuation of the *automatic sprinkler system* or automatic fire detection system, allowing immediate free egress.

2. The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.

3. The delayed egress locking system shall have the capability of being deactivated at the fire command center and other *approved* locations.

4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.
Exception: Where *approved*, a delay of not more than 30 seconds is permitted on a delayed egress door.

5. The egress path from any point shall not pass through more than one delayed egress locking system.
Exceptions:
1. In Group I-2 or I-3 occupancies, the egress path from any point in the building shall not pass through not more than two delayed egress locking systems provided that the combined delay does not exceed 30 seconds.
2. In Group I-1 or I-4 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided that the combined delay does not exceed 30 seconds and the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

6.A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware:

6.1 For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.

6.2 For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.

6.3 The sign shall comply with the visual character requirements in ICC A117.1.
Exception: Where *approved*, in Group I occupancies, the installation of a sign is not required where care recipients who, because of clinical needs, require restraint or containment as part of the function of the treatment area.

7. Emergency lighting shall be provided on the egress side of the door.

8. The delayed egress locking system units shall be *listed* in accordance with UL294

The delayed effective date of this Rule is January 1, 2022.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
1010.1.9.11 Stairway doors. (180313 Item B-10)

[BE] 1010.1.9.11 Stairway doors.
Interior stairway means of egress doors shall be openable from both sides without the use of a key or special knowledge or effort.

Exceptions:
1. Stairway discharge doors shall be openable from the egress side and shall only be locked from the opposite side.

2. This section shall not apply to doors arranged in accordance with Section 403.5.3 of the International Building Code.

3. ~~In stairways serving not more than four stories, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building.~~

3. Stairway exit doors are permitted to be locked from the side opposite the egress side, provided that they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building and upon activation of the fire alarm if present.

4. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single exit stairway where permitted in Section 1006.3.2.

5. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the dwelling unit is from a single exit stairway where permitted in Section 1006. 3.2.

~~6. In other than high-rise, stairways serving floors above a 3-hour horizontal building separation, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon activation of the building fire alarm system.~~

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

[Note: This Rule will also be printed in the 2018 NC Fire Prevention Code, 1010.1.9.11 Stairway doors.]

2018 NC Building Code
ERRATA – correct as shown

TABLE 1020.1
CORRIDOR FIRE-RESISTANCE RATING[k]

(The table remains unchanged; only footnote f is affected)

f. Exit access corridors are not required to be rated on any single tenant floor or in any single tenant space, if 1-hour fire-resistance-rated floor/ceiling assemblies are provided in multistory buildings and fire partitions are provided between other tenant spaces on the same floor. The structure supporting such floor/ceiling assemblies and fire partitions is not required to be rated in Types IIB, IIIB and VB construction.

2018 NC Building Code
1107.6.2.2.1 Type A units. (161213 Item B-11)
(See also 190910 Item B-2 below for further amendment to this section)

1107.6.2.2.1 Type A units.
In Group R-2 occupancies containing ~~11 or~~ more than 15 *dwelling units* or *sleeping unit*s, at least 5 percent but not less than one of the units shall be a *Type A unit*. ~~For a site with more than 100 units, at least 2 percent of the number of units exceeding 100 shall be Type A units.~~ All Group R-2 units on a *site* shall be considered to determine the total number of units and the required number of *Type A units*. *Type A units* shall be dispersed among the various classes of units. Bedrooms in monasteries and convents shall be counted as *sleeping units* for the purpose of determining the number of units. Where the *sleeping units* are grouped into suites, only one *sleeping unit* in each suite shall count towards the number of required *Type A unit*

Exceptions:
1. The number of *Type A units* is permitted to be reduced in accordance with Section 1107.7.
2. *Existing structures* on a *site* shall not contribute to the total number of units on a *site*.

The delayed effective date of this Rule is January 1, 2019.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

(Note: The remainder is part of the 2018 Code adoption package.)
(Note: Also "more than 15" correlation with 2018 Existing Building Code adoption package, 806.1.8.)

2018 NC Building Code
1107.6.2.2.1 Type A Units. (190910 Item B-2)

1107.6.2.2.1. Type A Units. In Group R-2 occupancies containing more than ~~15~~ 20 *dwelling units* or *sleeping units*, at least 5 percent but not less than one of the units shall be a *Type A unit*. All Group R-2 units on a *site* shall be considered to determine the total number of units and the required number of *Type A units*. *Type A units* shall be dispersed among the various classes of units. Bedrooms in monasteries and convents shall be counted as *sleeping units* for the purpose of determining the number of units. Where the *sleeping units* are grouped into suites, only one *sleeping unit* in each suite shall count towards the number of required *Type A units*.

Exceptions:
1. The number of *Type A units* is permitted to be reduced in accordance with Section 1107.7.
2. *Existing structures* on a *site* shall not contribute to the total number of units on a *site*.
3. For a *site* with more than 100 units, at least 2 percent of the number of units exceeding 100 shall be *Type A units*.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
1301.1.1 Criteria. (170613 Item B-6)

1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the *International Energy Conservation Code.*
Exception: Per G.S. 143-138 (b18), no energy conservation code provisions shall apply to any structure for which the primary occupancy classification is Group F, S, or U. This exclusion shall apply to the entire building area.

The delayed effective date of this Rule is January 1, 2019.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
1705.4 Masonry construction. (180612 Item B-2)

1705.4 Masonry construction.
Exception: Special inspections and tests shall not be required for:
4. Non-load bearing masonry partition walls and screens as determined and designated as such by the registered design professional in or added to the construction documents.

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
ERRATA – correct as shown

[P] TABLE 2902.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 419.2 OF THE *INTERNATIONAL PLUMBING CODE*)		LAVATORIES		BATHTUBS / SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE*)	OTHER
				MALE	FEMALE	MALE	FEMALE			
3	Educational	E[b,i]	K-8 9-12 Teacher/staff	1 per 25 1 per 30 1 per 30	1 per 25 1 per 25 1 per 25	1 per 60 1 per 100 1 per 100		—	1 per 100	—
8	Storage	S-1 S-2	Structure for the storage of goods, warehouses, storehouses and freight depots. Low and Moderate Hazard m, n	1 per 100		1 per 100		See Section 411 of the *International Plumbing Code*	—	—

a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code.
b. Toilet facilities for employees shall be separate from facilities for inmates, students or care recipients.
c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient *sleeping units* shall be permitted, provided that each patient *sleeping unit* has direct access to the toilet room and provisions for privacy for the toilet room user are provided.
d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
e. The number of fixtures provided shall be based on either the capacity of the church sanctuary or the church educational building (including fellowship halls and multiple purpose rooms), whichever is larger and within 300 feet (91.44 m).
f. For attached one- and two-family dwellings, one automatic clothes washer connection shall be required per 20 dwelling units.
g. A mop receptacle with a water supply, or a hose bib and floor drain, may be used in lieu of a service sink.
h. A can wash may be used in lieu of a service sink.
i. See Section 2902.9 for additional information on plumbing fixtures for schools.
j. When the rearrangement of an area or space increases the occupant content, the plumbing facilities shall be increased in accordance with this code.
k. For baseball stadiums, the number of fixtures shall be reduced by 50 percent.
l. Service sink may be omitted when located within a single-family dwelling.
m. Self-service mini-storage facilities without an office area are exempt.
n. Unheated storage buildings which are used periodically are not required to have toilet rooms.
o. For business and mercantile occupancies with an occupant load of ~~25~~ 30 or fewer, service sinks shall not be required.
p. See section 2902.7 for adjustments in occupant count.

2018 NC Building Code
Table 2902.1 Minimum Number of Required Plumbing Fixtures. (191210 Item B-17 and B-19)
(Only affected portions of the table are displayed here. Other portions of the table are unchanged by this amendment.)

[P] TABLE 2902.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 419.2 OF THE *INTERNATIONAL PLUMBING CODE*)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE*)	OTHER
				MALE	FEMALE	MALE	FEMALE			
2	Business (see sections 403.2,403.3 and 403.3.3.1)	B	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial and similar uses	1 per ~~25~~ 30 for the first ~~50~~ 30 and 1 per 50 for the remainder exceeding ~~50~~ 30		1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80		—	1 per 100	1 service sink[o]
6	Mercantile (see sections 2902.2,2902.3 and 2902.3.3.2)	M	Retail stores, service stations, shops, salesrooms, markets and shopping centers	1 per 500		1 per 750		—	100 - 1,000 1 greater than 1,000 require 1 more for each additional 1,000	1 service sink[e,o]

a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code.
b. Toilet facilities for employees shall be separate from facilities for inmates or care recipients.
c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient *sleeping units* shall be permitted, provided that each patient *sleeping unit* has direct access to the toilet room and provisions for privacy for the toilet room user are provided.
d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
e. The number of fixtures provided shall be based on either the capacity of the church sanctuary or the church educational building (including fellowship halls and multiple purpose rooms), whichever is larger and within 300 feet (91.44 m).
f. For attached one- and two-family dwellings, one automatic clothes washer connection shall be required per 20 dwelling units.
g. A mop receptacle with a water supply, or a hose bib and floor drain, may be used in lieu of a service sink.
h. A can wash may be used in lieu of a service sink.
i. See Section 2902.9 for additional information on plumbing fixtures for schools.
j. When the rearrangement of an area or space increases the occupant content, the plumbing facilities shall be increased in accordance with this code.
k. For baseball stadiums, the number of fixtures shall be reduced by 50 percent.
l. Service sink may be omitted when located within a single-family dwelling.
m. Self-service mini-storage facilities without an office area are exempt.
n. Unheated storage buildings which are used periodically are not required to have toilet rooms.

o. For business and mercantile occupancies with an occupant load of ~~25~~ 30 or fewer, service sinks shall not be required.
p. See section 2902.7 for adjustments in occupant count.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
Table 2902.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES. (180911 Item B-19)
(Only affected portions of the table are displayed here. Other portions of the table are unchanged by this amendment.)

Table 2902.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES

NO.	CLASSIFI-CATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 419.2 OF THE *INTERNATIONAL PLUM BING CODE*)	LAVATORIES	BATHTUBS/ SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410)	OTHER
2	Business (See Sections 2902.2, 2902.3, and 2902.3.2.2)	B	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial and similar uses	1 per 25 for the first 50 and 1 per 50 for the remainder exceeding 50	1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80	—	1 per 100[q]	1 service sink[o]

q. For business occupant loads of 25 or fewer, drinking fountains shall not be required.

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

[Note: This Rule will also be printed in the 2018 NC Plumbing Code, Table 403.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES.]

2018 NC Building Code
Table 2902.1 (220913 Item B-1)

[P] TABLE 2902.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 419.2 OF THE *INTERNATIONAL PLUMBING CODE*)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE*)	OTHER
				MALE	FEMALE	MALE	FEMALE			
1	Assembly (See Sections 403.2, 403.3 and 403.3.3.2)	A-3	Places of worship and other religious services. Including churches ~~Churches~~ without assembly halls[e]	1 per 150	1 per 75	1 per 200		-	1 per 1,000	1 service sink

e. The number of fixtures provided shall be based on either the capacity of the church sanctuary or the church educational building (including fellowship halls and multiple purpose rooms), whichever is larger ~~and within 300 feet (91.44 m)~~. Remote buildings applying this footnote shall be a maximum of 300 feet (91.44 m) exterior travel distance to the nearest entrance of the building containing required *plumbing fixtures* and the total *plumbing fixture access travel distance* shall comply with Section 2902.3.2. The path of travel between buildings is not required to be enclosed or covered when applying this footnote.

(The remainder of Table 2902.1 remains unchanged by this proposed amendment.)

The delayed effective date of this Rule is January 1, 2024.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
2902.1.1 Fixture calculations. (170912 Item B-2)

2902.1.1 Fixture calculations.
To determine the occupant load of each sex, the total occupant load shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of each sex in accordance with Table 403.1. Fractional numbers resulting from applying the fixture ratios of Table 403.1 shall be rounded up to the next whole number. For calculations involving multiple *occupancies*, such fractional numbers for each *occupancy* shall first be summed and then rounded up to the next whole number.
Exceptions:
1. The total occupant load shall not be required to be divided in half where *approved* statistical data indicates a distribution of the sexes of other than 50 percent of each sex.
2. In buildings that contain dwellings or sleeping units that have a pool dedicated to the residents, a percentage reduction of the total required fixtures provided for a pool and pool deck without bleachers and grandstands may be taken equal to the percentage of ~~total~~ residential units whose entries fall within a 500 ~~feet~~ foot horizontal travel distance of the pool deck. In multi-story structures, the residential units located not more than one story above or below the pool and pool deck may be included in the percentage. Travel from the pool to the required toilet facilities shall be on an accessible route.

The delayed effective date of this Rule is January 1, 2019.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.
(Note: Also printed in 2018 Plumbing Code, Section 403.1.1, Exception 2.)

2018 NC Building Code
2902.2 Separate Facilities. (191210 Item B-15)

[P] 2902.2 Separate facilities.
Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for *dwelling units* and *sleeping units*.

2. Separate facilities shall not be required in business occupancies with a total occupant load, including both employees and customers, of 30 or fewer. Separate facilities shall not be required in all other structures or tenant spaces with a total occupant load, including employees and customers, of 25 or fewer.

3. Separate facilities shall not be required in mercantile occupancies in which the maximum occupant load is 100 or less.

4. Except as provided in Section 405.3.2 of the North Carolina Plumbing Code.

5. Where the code requires only one toilet facility for each sex, two unisex facilities may be substituted for separate sex facilities.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
2902.6 Small Occupancies. (191210 Item B-13)

[P] 2902.6 Small occupancies. Drinking fountains shall not be required for an occupant load of ~~15~~ 30 or fewer.

The delayed effective date of this Rule is January 1, 2021.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
3006.2 Hoistway opening protection required (210914 Item B-3)

3006.2 Hoistway opening protection required. Elevator hoistway door openings for occupied and unoccupied stories shall be protected in accordance with Section 3006.3 where an elevator hoistway connects more than three *stories*, is required to be enclosed within a *shaft enclosure* in accordance with Section 712.1.1 and any of the following conditions apply:
1. The building is not protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. The building contains a Group I-1, Condition 2 occupancy.
3. The building contains a Group I-2 occupancy.
4. The building contains a Group I-3 occupancy.
5. The building is a high rise and the elevator hoistway is more than 75 feet (22 860 mm) in height. The height of the hoistway shall be measured from the *lowest floor* to the highest floor of the floors served by the hoistway.

Exceptions:
1. Protection of elevator hoistway door openings is not required where the elevator serves only *open parking garages* in accordance with Section 406.5.
2. Protection of elevator hoistway door openings is not required at the level(s) of *exit discharge*, provided that the level(s) of *exit discharge* is equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
3. Enclosed elevator lobbies and protection of elevator hoistway door openings are not required on levels where the elevator hoistway opens to the exterior.

The delayed effective date of this Rule is January 1, 2023.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
3006.3 Hoistway opening protection (210914 Item B-4)

3006.3 Hoistway opening protection. Where Section 3006.2 requires protection of the elevator hoistway door opening, the protection shall be provided by one of the following:

1. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway *shaft enclosure* doors from each floor by fire partitions in accordance with Section 708. In addition, doors protecting openings in the elevator lobby enclosure walls shall comply with Section 716.5.3 as required for *corridor* walls. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.

2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway *shaft enclosure* doors from each floor by smoke partitions in accordance with Section 710 where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the *smoke partitions* shall comply with Sections 710.5.2.2, 710.5.2.3 and 716.5.9. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.

3. Additional doors shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such door shall comply with the smoke and draft control door assembly requirements in Section 716.5.3.1 when tested in accordance with UL 1784 without an artificial bottom seal and contain a vision panel as allowed by Table 716.5. The door shall not be installed in a way that affects the fire-resistance-rating or operation of the normal elevator shaft doors.

4. The elevator hoistway shall be pressurized in accordance with Section 909.21.

The delayed effective date of this Rule is January 1, 2023.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

2018 NC Building Code
312.1, H101.2, H109.2, Ground Signs. (180911 Item B-15)

SECTION H101 GENERAL

H101.2 Signs exempt from permits. The following signs are exempt from the requirements to obtain a *permit* before erection:
1. Nonilluminated wall signs.
2. Temporary signs.
3. Signs erected by transportation authorities.
4. Projecting signs not exceeding 6 square feet (0.56 m^2).
5. The changing of moveable parts of an approved sign that is designed for such changes, or the repainting or repositioning of display matter shall not be deemed an alteration.
6. Ground signs less than 6 feet (1829 mm) in height above finished grade.

SECTION H109 GROUND SIGNS

H109.2 Required Clearance. The bottom coping of every ground sign shall be not less than 3 feet (914 mm) above the ground or street level, which space can be filled with platform decorative trim or light wooden construction.
Exception: Signs that have a solid base of masonry, steel or similar material, commonly known as monument signs.

The delayed effective date of this Rule is January 1, 2020.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.

January 7, 2026

CHAPTER 36
DOCKS, PIERS, BULKHEADS AND WATERWAY STRUCTURES

This chapter is a North Carolina addition to the 2015 International Building Code. ~~There will be no underlined text.~~
Sections 3601 through 3607 applies to docks, piers, bulkheads and waterway structures not included in North Carolina General Assembly Session Law 2023-137, Section 35 and not in estuarine waters as defined within the definition of "Coastal Fishing Waters" within North Carolina General Statute 113-129(4).

Section 3608 applies to docks, piers, bulkheads and waterway structures included in North Carolina General Assembly Session Law 2023-137, Section 35 and in estuarine waters as defined within the definition of "Coastal Fishing Waters" within North Carolina General Statute 113-129(4).

Section 3608 represents a reprint of Chapter 36 of the 2009 North Carolina Building Code.

SECTION 3601
GENERAL AND SCOPE

3601.1 General. The intent of ~~this chapter~~Sections 3601 through 3607 is to provide minimum standards for the design, construction and maintenance of docks, piers, bulkheads and waterway ~~structures.~~structures in non-estuarine waters. The guidelines in ~~this chapter~~Sections 3601 through 3607 address minimum standards for foundations, design forces, structural integrity, material selection and utilization and construction techniques.

3601.2 Scope. The following structures shall be designed in accordance with the requirements of ~~this chapter:~~ Sections 3601 through 3607:

1. Docks, piers, gangways and catwalks, other than residential and farm docks and piers exempted from ~~this chapter~~Sections 3601 through 3607 in the exceptions below, shall be designed by a *registered design professional*.

2. All bulkheads having an exposed height greater than 5 feet (1525 mm) or with a superimposed load shall be designed by a *registered design professional* and require special inspection. Special inspection shall be waived for bulkheads of any height constructed from property line to property line of one- and two-family dwellings and including attachment to neighboring bulkheads.

3. ~~Oceanfront retaining~~Retaining walls, bulkheads and other types of retaining walls used by the public ~~on the coastline of the ocean or adjacent inlets~~ shall be designed by a *registered design professional*.

4. ~~Marine terminal~~Terminal or port facilities in non-estuarine waters for berthing, mooring, docking and servicing ships, barges or tug boats that handle cargo of all types, including bulks, containers, liquids,

fuels and people, which shall be designed by a *registered design professional* in accordance with accepted industry standards.

5. Groins not exempted below, jetties, breakwaters, ~~oceanfront seawalls,~~ and ~~oceanfront~~ revetments which shall be designed by a *registered design professional* in accordance with accepted industry standards.

Exceptions*:* The following structures are exempt from the requirements of ~~this chapter:~~Sections 3601 through 3607:

1. Sill structures combined with marsh plantings and certain groins in accordance with the Department of Environmental and Natural Resources general permit requirements.

2. ~~Oceanfront and inlet sandbag~~Sandbag revetments in accordance with the Department of Environmental and Natural Resources general permit requirements.

3. Revetments constructed on single-family residential property having a height no greater than 10 feet and slope greater than 1.5 horizontal: 1.0 vertical and in accordance with the Department of Environmental and Natural Resources general permit requirements.

4. Farm structures ~~not on public waters.~~exempted from building rules by North Carolina General Statute 143-138(b4).

5. Piers and docks associated with one- and two-family dwellings meeting the exceptions of the *North Carolina Residential Code*.

6. Docks, piers, bulkheads and waterway structures included in North Carolina General Assembly Session Law 2023-137, Section 35 and in estuarine waters as defined within the definition of "Coastal Fishing Waters" within North Carolina General Statute 113-129(4).

SECTION 3602
DEFINITIONS

ADDITIVES. Substances added to a polymer resin or vinyl chloride material to aid in processing the material.

BOAT SLIP. A berthing place for one or two watercraft where the watercraft can be securely moored to cleats, piling, or other devices while the boats are in the water. Boat slips are commonly configured as "side-ties" or as single- or double loaded "U" shaped berths.

BULKHEAD. A vertical wall structure designed to retain shoreline material and prevent erosion due to wave activity.

CATWALK. A narrow footway platform extending alongside a structure.

DESIGN WAVE. A wave that is potentially most damaging to an economically feasible structure, or wave for which a structure is designed.

DOCK. A structure extending alongshore or out from the shore into a body of water, usually accommodating multiple boat slips, to which boats may be moored in order to load or unload people or cargo, or to provide access to the water.

ESTUARINE WATERS. "The Atlantic Ocean; the various coastal sounds; and estuarine waters up to the dividing line between coastal fishing waters and inland fishing waters agreed upon by the Marine Fisheries Commission and the Wildlife Resources Commission", as defined within the definition of "Coastal Fishing Waters" within North Carolina General Statute 113-129(4).

EXTRUSION. Manufacturing process whereby a material is pushed through a die to form a shape of constant cross section. Vinyl chloride sheet piling is generally manufactured using an extrusion process.

FETCH. Open water exposure over which waves are generated.

FIBER. One or more glass, carbon, or aramid filaments in the form of a continuous strand or roving in a fiber reinforce polymer (FRP) material.

FIBER ARCHITECTURE. Construction of a composite material from layers with different types and orientations of fibrous material.

FIBER ORIENTATION. Fiber orientation is the alignment of the longitudinal axis of a fiber in an FRP material with respect to the stated reference axis.

FIBER REINFORCED POLYMER (FRP). A polymeric composite material consisting of reinforcement fibers, impregnated with a fiber-binding polymer, such as glass, carbon, aramid or hybrid combinations of these fiber types; which are then molded and hardened. Fiber-reinforced polymers are permitted to contain cores laminated between fiber-reinforced polymer facings.

FIBER VOLUME FRACTION. The volume of reinforcement fiber in a cured composite divided by the volume of the composite section.

FILLER. Substance added to the matrix of an FRP material intended to alter its engineering properties, performance, and/or cost.

GANGWAY. A footway bridge extending from the *dock*, *pier*, *bulkhead* or shore, usually to a floating structure.

GLASS TRANSITION TEMPERATURE (T_g). Temperature at which the polymer matrix of an FRP material changes from a glassy state to a rubbery state.

KING PILE. The primary structural member that supports horizontal panels to form a vertical wall sometimes used in bulkhead or groin construction.

LAMINA. A layer of fibers and resin in an FRP material.

MATERIAL LONGITUDINAL DIRECTION. Direction in an FRP material parallel to the direction of pultrusion (pulling) during the manufacture of a plate or structural shape.

MATERIAL TRANSVERSE DIRECTION. Direction in an FRP material orthogonal to the longitudinal direction.

MATRIX. Continuous constituent of an FRP material surrounding the reinforcing fibers and consisting of a polymer resin with any fillers and additives.

PIER. An elevated deck structure, usually pile supported, extending out into the water from the shore.

PILE. A timber, concrete, metal, or composite member embedded into the ground to support or brace a structure. “Piles” or “piling” are plural forms of “pile.”

PRIVATE WATERFRONT STRUCTURES. A *dock, pier, bulkhead,* or associated structure not open to the general public and with no more than ten total boat slips and no more than ten owners.

PUBLIC WATERFRONT STRUCTURES. A *dock, pier, bulkhead,* or associated structure located on *multi-family* residential property (greater than ten *dwelling units*), public property or commercial property.

PULTRUSION. Manufacturing process whereby a material is pulled through a die to form a shape of constant cross section. FRP plates and structural shapes are generally manufactured using a pultrusion process.

RESIN. An organic polymer possessing indefinite and often high molecular weight and a softening or melting range that exhibits a tendency to flow when subjected to stress.

REVETMENT. A sloping structure usually constructed of stone or concrete and placed on a shoreline to protect it against erosion by wave and current action.

ROVING. In an FRP material, a roving is a large number of continuous parallel filaments or a group of untwisted parallel strands.

SHEET PILE. A pile with a generally slender flat cross section to be embedded into the ground or seabed and meshed or interlocked with like members to form a diaphragm, wall or bulkhead.

SYMMETRIC COMPOSITE. A symmetric composite is a composite material in which the sequence of lamina below the laminate mid-plane is a mirror image to those above the laminate mid-plane.

SECTION 3603
PERMITS AND APPROVALS

3603.1 General. In addition to a building permit, permits may be required from federal, state or county agencies such as, but not limited to, the United States Army Corps of Engineers or the North Carolina Department of Environmental Quality. In cases of structures to be built on lakes operated by an electric utility for the generation of power, a permit from the operating utility may also be required.

SECTION 3604
MINIMUM DESIGN LOADS

3604.1 General. Every structure shall be of sufficient strength to support the imposed dead, live, snow, wind, impact and seismic loads without exceeding the prescribed stresses for the various materials described elsewhere in this code. Adequate consideration shall be made for forces imposed by earth, water, docking and mooring.

3604.2 Dead loads. The weight of the component parts of a structure shall be used in the design when it will influence the strength of the structural elements. All utilities, permanent furniture, dock boxes and mooring hardware should be considered as dead load.

3604.3 Live loads. Design live loads shall be the greatest load that will likely be imposed on the structure, including superimposed loads on retained material that exert horizontal loads on the structure. Where vehicles are allowed, actual weight of vehicles and wheel loads as specified in the latest edition of *Standard Specifications for Highway Bridges of the American Association of State Highway and Transportation Officials* or obtained from the vehicle manufacturer shall be used. The design load shall be posted at the dock or pier approach where vehicles are allowed. Minimum live loads are:

1. Fixed piers, docks, catwalks - Private waterfront piers: 40 psf or 300 pounds concentrated load on any 2 foot by 2 foot (610 mm by 610 mm) area. Public waterfront piers: Design loads shall be the greatest combinations of loads exerted on the structure but not less than 60 psf or 300 pounds concentrated load on any 2 foot by 2 foot (610 mm by 610 mm) area.

2. Floating docks - Private waterfront docks: 20 psf, public waterfront docks: 30 psf, or 300 pounds concentrated load on any 2 foot by 2 foot (610 mm by 610 mm) area. Under dead and live load, all floating docks shall have a minimum of 3 inches (76 mm) freeboard from the top of the flotation device, other than low freeboard watercraft (e.g. kayak) launching facilities. Floating docks with roofs shall have a minimum of 3 inches (76 mm) freeboard from the top of the flotation device under a combination of dead, snow and 75% of live load. All floating docks subject to this chapter shall have not more than 5 degrees tilt from the horizontal under uniform live loading on one-half of the dock width or under concentrated load of 400 pounds applied within 12 inches (305 mm) of any side.

3. Gangways - Gangways shall be designed for a live load of for 100 psf. Flotation for gangway landing shall be designed for 50 psf, live load.

4. Bulkheads, revetments - Design loads shall be the greatest combinations of loads exerted on the structure. Consideration shall be given to horizontal loads exerted by superimposed loads on the retained earth and by inclined surface slopes. Superimposed loads shall be considered when exceeding 50 psf and located within a horizontal distance of three times the height of the bulkhead from the face of the bulkhead.

3604.4 Snow loads. Design snow loads shall be as prescribed in Chapter 16.

3604.5 Wind loads. Design wind loads shall be as prescribed in Chapter 16 without moored vessels. In wind regions with a design wind speed greater than 90 mph, the design wind speed with moored vessels shall be no less than 90 mph (3 second gust). This gust wind speed shall be adjusted for duration and height (not restricted to 15 feet minimum) for wind pressures applied to vessels moored at the facility in accordance with Chapter 16.

3604.6 Impact loads. Design impact loads shall be as prescribed in Chapter 16 but not less than 1.25 times the kinetic energy exerted by a striking vessel or vehicle.

3604.7 Seismic loads. Design seismic loads shall be as prescribed in Chapter 16. Seismic loads are not applicable for any structure exempted from design by a *registered design professional*.

3604.8 Water loads. Hydrostatic and hydrodynamic loadings shall be considered as follows:

3604.8.1 Hydrostatic pressures. Hydrostatic pressures shall be considered in conjunction with the equivalent fluid pressure of soil and any surcharge acting on the structure. For bulkheads hydrostatic pressures shall be estimated based on maximum difference between retained and offshore water surface elevations.

3604.8.2 Current loads. Current loads for structures and vessels shall be determined from records on current velocity using accepted engineering practice.

3604.8.3 Anchorage for uplift. Sufficient anchorage against uplift between all components, except elements specifically designed to break away, shall be provided. Resisting forces shall be not less than 1.5 times the applied uplift force.

3604.8.4 Wave forces. Wave forces shall be determined from wave records where available. Where no wave records are available, the design wave shall be determined from probable wind speed, direction, fetch and water depth that will yield a critical wave. Forces shall then be calculated using accepted engineering practice.

3604.8.5 Forces due to passing vessels. All *piers*, floating *docks*, *bulkheads* and revetments shall be designed for water loading generated by wind and passing vessels. Adjacent to federal designated channels, water loading shall be based on commercial and recreational vessels with minimum passing speeds of 10 and 20 knots, respectively.

3604.9 Earth loads. Lateral earth pressures shall be determined by considering the specific soil properties and applying earth pressure theories generally accepted for soil mechanics in engineering practice. A geotechnical investigation or other adequate consideration shall be given by the *registered design professional* for the effect of probable varying levels of retained water, tide and flood water. Pressures exerted by the earth shall be checked for dry, moist, and saturated conditions as applicable.

3604.10 Erosion. The effects of reasonably predictable erosion, propeller wash-induced scour, and wave-induced scour shall be given ample consideration.

3604.11 Water levels. The ability to accommodate dead, live, wind, current and wave loadings for the range of water levels (from low water to base flood level) anticipated at the site shall be given ample consideration. For public and private floating docks, guide piling systems shall be capable of accommodating water levels extending a minimum of 2 feet (610 mm) above base flood elevation plus the freeboard of the dock structure.

SECTION 3605
MATERIALS

3605.1 General. The quality of materials and fasteners used for load-supporting purposes shall conform to good engineering practice.

3605.2 Piling and foundations. Materials used for piling and repairing piling shall comply with applicable provisions of Chapter 18 and the material requirements of Sections 3605.3 through 3605.7.

> **3605.2.1 Helical anchors.** Helical anchors shall be hot dipped galvanized or stainless steel. A representative number of helical anchors subjected to tensile loading shall be load tested in accordance with ASTM D3689 to two times their design load capacity. Load testing of anchors in tension shall include creep testing of a representative number of the anchors. Helical anchors shall be designed and installed as determined by a *registered design professional*.

3605.3 Wood. Wood shall be pressure treated with a preservative recommended by the American Wood Preservers' Association for the specific application. Wood species, preservative treatment, minimum lumber size, and lumber grade shall be in accordance with Table 3605.3. Handrails, guardrails, wallcaps, and decking may be constructed of naturally durable species where located above the normal high water mark.

> **3605.3.1 Wood connections.** All steel bolts, rods and other hardware shall be hot-dipped galvanized or protected with an equivalent system. All bolts, rods and other metal materials shall be no smaller than 5/8 inch in diameter. Beams, girders or pile caps shall be attached to the piling with a minimum of two 5/8-inch hot-dip galvanized steel bolts per beam member through bolted at each piling connection. Piling shall not be notched so that the cross-section is reduced below 50 percent. Threaded fasteners shall not be tightened directly against wood surfaces but used only in conjunction with standard ogee or flat washers. Cold formed metal connectors shall not be used in wet applications or applications subject to wetting and drying cycles. Mooring hardware, including cleats, and pile guides shall be through bolted using sizes recommended by the manufacturer.

Table 3605.3: SPECIFICATIONS FOR SOUTHERN PINE[b] LUMBER IN FRESH ~~AND SALT~~ WATER SERVICE							
LOCATION	**COMPONENT**	**AWPA USE CATEGORY[a,d]**		**DIMENSIONS (inches)**	**LUMBER GRADE**		**MOISTURE CONTENT AT TREATMENT**
		~~**Saltwater**~~	**Freshwater**		~~**Saltwater**~~	**Freshwater**	
Above Normal High Water	**Decking[c]**	~~3B~~	3B	$^5/_4$" 2 Nominal Min.	~~Premium~~ ~~No. 2~~	Premium No. 2	Surfaced Dry 19%
	Guardrails	~~3B~~	3B	2 Nominal Min.	~~No. 2~~	No. 2	Surfaced Dry 19%
	Wallcaps	~~3B~~	3B	2 Nominal Min.	~~No. 2~~	No. 2	Surfaced Dry 19%
	Walers	~~3B~~	3B	4 x 6 Nominal	~~No. 2~~	No. 2	Surfaced Dry 19%
	Cross Bracing	~~3B~~	3B	2 to 4 Nominal	~~No. 2~~	No. 2	Surfaced Dry 19%
Splash Zone	**Split Pile Caps**	~~4B~~	4B	2 to 4 Nominal	~~No. 2~~	No. 2	Surfaced Dry 19%
	Stringers	~~4B~~	4B	2 Nominal	~~No. 2~~	No. 2	Surfaced Dry 19%
Below Normal High Water	**Sheet Piles**	~~5B~~	4C	2 to 4 Nominal	~~Marine No. 1[g]~~	No. 2	Surfaced Dry 19%
	Walers	~~5B~~	4C	4 x 6 Nominal	~~Marine No. 1[g]~~	No. 2	KD 20% or less or Dry 23%
	Cross Bracing	~~5B~~	4C	2 to 4 Nominal	~~Marine No. 1[g]~~	No. 2	Surfaced Dry 19%
	Rectangular Timber Piles	~~Not Allowed[f]~~	4C	6 x 6 Nominal	~~Not Allowed[f]~~	No. 2	KD 20% or less or Dry 23%
	Round Timber Piles	~~5B[f]~~	4C	ASTM D25	~~ASTM D25~~	ASTM D25	KD 25% or Less
Engineered Lumber	**Glulam Timber**	~~5B~~	4B	4 Nominal Min.	~~Note e~~	Note e	12% Average
	Parallel Strand Lumber	~~5B~~	4B	3½ Minimum	~~1.8E or Better~~	1.8E or Better	per manufacturer's specifications

a. Lumber shall be pressure treated with preservative treatment in accordance with AWPA U1.

b. At the discretion of the building official, lumber species other than Southern Pine may be approved when span tables for wet use conditions are submitted, and the lumber is treated for comparable service life to the treatment specifications required by Table 3605.3.

c. Wood composite decking, treated or untreated, shall provide equivalent service life to the treated decking specified in Table 3605.3.

d. All notches, holes, and field cuts shall be field treated in accordance with AWPA M4.

e. Glulam grade shall be specified as a layup combination or stress class in accordance with the National Design Specification or the manufacturer's published data. Layup combinations shall consist of species and grades capable of the treatment retentions equivalent to the AWPA use categories specified in Table 3605.3.

~~f. Commercial pile wraps may be used to extend the life expectancy of timber piles exposed to marine borers.~~

~~g. AWPA requirements for Marine No. 1 specify that no heartwood be exposed on any face prior to preservative treatment.~~

3605.4 Concrete. Concrete components shall comply with applicable provisions of Chapter 19 and ACI 318. Minimum concrete strength, air entrainment, maximum chloride content, and maximum water cement ratio shall be determined from ACI 318 on the basis of required structural strength, required resistance to freeze-thaw exposure, required abrasion resistance, and required resistance to water ~~penetration and saltwater intrusion.~~penetration. Minimum concrete cover shall be increased and reinforcing steel spacing shall be decreased in accordance with ACI 350, to reduce crack size. All steel embedments, other than reinforcing steel, shall be stainless, hot-dip galvanized or coated for corrosion protection. Field welds and abrasions of coatings on embeds shall be touch coated in the field.

3605.5 Structural steel. Steel components shall comply with applicable provisions of Chapter 22 and AISC 360. All structural steel members, fasteners, and fittings shall be protected from corrosion by coating or cathodic protection for the specific exposure. Steel bulkhead components and dock components shall be hot-dip galvanized or coated to achieve the corrosion protection required for the degree of exposure of corrosive elements. Field welds and abrasions to coatings shall be touched up after erection or installation is completed. Cold-formed metal joists, girders, columns and studs shall not be used in applications where the members are constantly wet or subject to wetting and drying cycles.

3605.6 Aluminum. Aluminum bulkhead sheets or aluminum bulkhead or dock components shall be of proper alloy to resist corrosive elements in the adjacent water and soil. Bulkhead components and hardware shall be aluminum or stainless steel. Aluminum shall be galvanically and physically isolated from concrete and galvanically isolated from steel. Connection hardware and fasteners for aluminum components may be stainless steel or galvanized steel if isolated from aluminum structural elements.

3605.7 Plastics and composites. Bulkheads, structural shapes, plates, and guardrail systems manufactured from vinyl chloride based materials or fiber reinforced polymer (FRP) materials shall be designed to comply with manufacturer's published load tables or manufacturer's published mechanical properties subject to the requirements for specific materials in Sections 3605.7.1, 3605.7.2, and 3605.7.3. Plastic and composite members shall contain additives to inhibit ultra violet radiation degradation or shall be protected from ultra violet radiation by an appropriate coating.

> **3605.7.1 Sheet piling manufactured from vinyl chloride based materials**. Vinyl chloride materials for sheet piling shall be specified and tested for conformance in accordance with ASTM D4216, including weathering tests in accordance with ASTM D1435. Mechanical properties shall be established in accordance with the tests specified in Table 3605.7.1. Design values of the tabulated properties shall conform to the limiting values specified in the table. The manufacturer of the sheet piling shall produce a certificate of analysis from a third party testing agency certifying the vinyl chloride material from which the sheet piling is manufactured conforms to the physical properties specified. The third party testing agency shall be accredited in accordance with ISO 17025 to conduct the specified tests. Testing programs shall address changes in material sources and composition over time, and test data shall accurately represent the properties of the product produced at any given time.
>
> > **3605.7.1.1 Deflection of vinyl chloride based sheet piling.** Deflection of vinyl sheet pile bulkheads shall not exceed the lesser of 1/60 times the height from the mud line to the top

of the wall or 2 inches. Effects of in-service temperatures exceeding 80ºF (27ºC) on modulus of elasticity shall be considered in deflection calculations and selection of materials.

3605.7.1.2 Service stresses for vinyl chloride based sheet piling. Service load stresses in the vinyl sheet piling shall not exceed 3200 psi.

3605.7.1.3 Ultra violet light stabilization. Vinyl chloride based materials shall be compounded with stabilizing agents. Addition of stabilizers during the extrusion process is prohibited.

3605.7.1.4 Impact resistance of vinyl materials. Vinyl sheet pile bulkheads shall have sufficient impact resistance, determined in accordance with ASTM D256 and ASTM D4226, to resist impact from vessels traveling at mooring speeds, resist wave impact ~~when installed in high velocity flood zones (V-Zones on Flood Insurance Rate Maps),~~ and to resist impact from debris likely to collide with the bulkhead at flood ~~stage or in areas subject to storm surge.~~stage.

3605.7.1.5 Fire, smoke, and toxicity. Vinyl materials shall be tested for the in-service thickness in accordance with ASTM D635 with a resulting burning rate of 2½ inches per minute or less.

Table 3605.7.1: LIMITATIONS ON MECHANICAL PROPERTIES FOR VINYL CHLORIDE BASED SHEET PILING

MECHANICAL PROPERTY	TEST PROTOCOL	LIMITATIONS ON PROPERTY
Notch Impact Resistance	ASTM D256	2.0 ft-lb./in minimum
Drop Dart Impact Resistance, Procedure A	ASTM D4226	1.0 in-lb./mil minimum
Drop Dart Impact Resistance, Procedure B	ASTM D4226	2.0 in-lb./mil minimum
Tensile Strength	ASTM D638	6500 psi minimum
Modulus of Elasticity in Tension	ASTM D638	377,000 psi minimum
Deflection Temperature under 264 psi	ASTM D648	158 psi minimum
Linear Coefficient of Expansion	ASTM D696	4.4×10^{-5} in/in/^{0}F maximum

3605.7.2 Pultruded fiber reinforced polymer (FRP) sheet piling, shapes and plates. Mechanical properties for FRP structural components shall be established in accordance with the tests specified in Table 3605.7.2. Each manufacturer shall publish the characteristic values for the

product in accordance with ASTM D7290. The manufacturer of the FRP shall produce a certificate of analysis certifying the FRP material and constituent materials from which the FRP components are manufactured conform to the physical properties specified. Testing programs shall address changes in material sources and composition over time, and test data shall accurately represent the properties of the product produced at any given time. Manufactured components shall be inspected in the plant in accordance with ASTM D3917 for dimensional tolerances and according to ASTM D4385 for visual defects. Inspection reports shall be provided.

Table 3605.7.2: LIMITATIONS ON PHYSICAL AND MECHANICAL PROPERTIES FOR FIBER REINFORCED POLYMER COMPONENTS

PROPERTY[a]	ASTM TEST METHOD	MINIMUM NUMBER OF TESTS
Barcol Hardness	D2583	5
Glass Transition Temperature T_g	D4065	5
Coefficient of Thermal Expansion	D696	5
Moisture Equilibrium Content	D570	5
Longitudinal Tensile Strength	D638	10
Transverse Tensile Strength	D638	10
Longitudinal Tensile Modulus	D638	10
Transverse Tensile Modulus	D638	10
Longitudinal Compressive Strength	D6641	10
Transverse Compressive Strength	D6641	10
Longitudinal Compressive Modulus	D6641	10
Transverse Compressive Modulus	D6641	10

Longitudinal Flexural Strength	D790	10
Transverse Flexural Strength	D790	10
Longitudinal Flexural Modulus	D790	10
Transverse Flexural Modulus	D790	10
In-Plane Shear Strength	D5379	10
In-Plane Shear Modulus	D5379	10
Inter-laminar Shear Strength	D2344	10
Longitudinal Pin Bearing Strength	D953[b]	10
Transverse Pin Bearing Strength	D953[b]	10
Pull Through Strength per Fastener t = 3/8” t = ½” t = ¾”	D7332, Proc. B	10

a. Property requirements for shapes apply to sheet piles.

b. Tests shall be conducted for material thicknesses, t, tabulated and bolt sizes from 3/8 inch to 1 inch in diameter. No more than one-third of the bolt shank within the thickness of the connection material may be threaded. Bolts shall be installed snug tight.

3605.7.2.1 Maximum service temperature. Service temperature of FRP structural components shall not exceed T_g-40^{0}F, where T_g is the glass transition temperature determined in accordance with ASTM D4065.

3605.7.2.2 FRP constituent materials. Fibers and matrix constituents shall comply with the following requirements:

3605.7.2.2.1 Fiber type. Fibers shall be glass, carbon, aramid, or hybrid combinations of these fiber types. Glass fibers shall conform to ASTM D578.

3605.7.2.2.2 Fiber architecture and content. The fiber architecture of any pultruded element comprising the cross section of a pultruded FRP structural member shall be symmetrical and balanced. Each pultruded FRP structural element shall contain a minimum total fiber volume fraction of 30 percent.

3605.7.2.2.3 Fiber orientations. Each element of a pultruded FRP structural member shall have fibers oriented in a minimum of two directions separated by a minimum of 30 degrees. In the direction of the longitudinal axis of the member, the percentage of continuous fiber in each pultruded element shall be a minimum of 30 percent of the total fiber reinforcement by volume for shapes and a minimum of 25 percent of the total fiber reinforcement by volume for plates. When multiple elements share a common edge in the direction of pultrusion, at least 50 percent of the nonroving reinforcement in the element having the largest percentage of nonroving reinforcement shall extend through the junction connecting the elements.

3605.7.2.2.4 Minimum fiber tensile strength. Determined in accordance with ASTM D7290, the characteristic value of the tensile strength of the fiber strands, yarns, and rovings shall be at least 290,000 psi. Tensile tests shall be conducted in accordance with ASTM D2343.

3605.7.2.2.5 Resin. A commercial grade thermoset resin shall be used for fabricating pultruded FRP structural members.

3605.7.2.2.6 Other constituent materials. Additives to the resin system that influence processing or curing, such as fillers, promoter, accelerators, inhibitors, UV resistant agent, and pigments shall be compatible with the fiber and resin system.

3605.7.2.3 Durability and environmental effects. Materials for FRP structural components shall be selected, designed, and manufactured to tolerate long term environmental effects anticipated during the service life of the structure.

3605.7.2.3.1 Factors considered in material selection. The following factors shall be considered in selecting FRP materials for ~~marine~~ structures:

1. Performance criteria for the structure;
2. Intended service life of the structure;
3. Expected environmental conditions, including likelihood of exposure to alkalis or organic solvents;
4. Protective measures;
5. Feasibility of maintenance and repair during service.

3605.7.2.3.2 Adjustment of material properties to account for environmental effects. Unless the glass transition temperature determined in accordance with ASTM D4065 and the tensile strength of the composite in the longitudinal and transverse directions determined in accordance with ASTM D638, can be shown to retain at least 85 percent of their characteristic values after conditioning in the environments listed below, the nominal strength and stiffness shall be reduced for design purposes in accordance with test data produced from testing simulating the anticipated environment. Materials that cannot retain at least 15 percent of their characteristic values after conditioning the listed environments are prohibited in structural applications. Design tensile strength shall be reduced in accordance with material specific tests when in-service temperatures exceed of 90^0F. Condition test samples as follows:

a. Water: Samples shall be immersed in distilled water having a temperature of 100 + 3^0F and tested after 1,000 hours of exposure.

b. Alternating ultraviolet light and condensing humidity: Samples shall be exposed according to Cycle No. 1 (0.89 W/m^2/mm, 8 hours UV at 60^0C, 4 hours condensation at 50^0C) using UVA-340 lamps in an apparatus meeting the requirements of ASTM G154. Samples shall be tested within two hours after removal from the apparatus.

3605.7.2.4 Impact resistance of FRP materials. (Deleted).

3605.7.2.5 Deflection of FRP sheet piling. Deflection of vinyl sheet pile bulkheads shall not exceed the lesser of 1/60 times the height from the mud line to the top of the wall or 2 inches. Effects of in-service temperatures in excess of 90^0F on modulus of elasticity shall be considered in deflection calculations.

3605.7.2.6 Fire, smoke, and toxicity. FRP materials shall be tested for the in-service thickness in accordance with ASTM D635 with a resulting burning rate of 2½ inches per minute or less.

3605.7.3 Carbon fiber reinforced polymer repair products. Carbon fiber reinforced plate and wrap used for flexural and shear reinforcement of existing concrete structures shall be designed in accordance with the design procedures specified in ACI 440.2R.

Mechanical properties of carbon fiber reinforced plate and wrap shall be established in accordance with the tests specified in ACI 440.3R.

3605.8 Masonry. Masonry used in bulkheads and dock work shall comply with Chapter 21.

SECTION 3606
CONSTRUCTION OF PIERS, DOCKS, CATWALKS, GANGWAYS, AND FLOATING DOCKS

3606.1 Fixed piers. Fixed piers shall be constructed in accordance with Sections 3606.1.1 through 3606.1.7.

3606.1.1 Required depth of piles. Fixed piers shall be supported by pilings with tip penetrations dependent on the soil conditions and the total applied load. Pier support by shallow piling, legs or columns with point bearing on rock shall have provisions to resist horizontal forces and overturning, as well as flotation uplift. Piles shall be installed in accordance with the requirements of Chapter 18 and inspected in accordance with the requirements of Chapter 17.

3606.1.2 Structural steel and concrete members. Structural steel members shall be designed in accordance with AISC 360, Chapter 22 of this code, and the material requirements of this chapter. Concrete members shall be designed in accordance with ACI 318, Chapter 19 of this code, and the materials requirements of this chapter.

3606.1.3 Size of wood piles. Piles shall be sized in accordance with the American Wood Council National Design Specification. In no case shall round timber piles be less than 7 inches (178 mm) in diameter at the butt and have a minimum tip diameter of less than 5½ inches (138 mm). Rectangular timber piles shall not be less than nominal 6 inches by 6 inches (152 mm x 152 mm).

3606.1.4 Bracing of wood piles. Where required by design, bracing shall be sized to limit stresses in the piles from lateral loads in accordance with the American Wood Council National Design Specification to prevent buckling.

3606.1.5 Wood girder and joist spans. Maximum spans for pier pile caps or girders and joists or stringers shall be determined in accordance with the American Wood Council National Design Specification considering the member to be subject to wet use.

3606.1.6 Connections. Connections between piling or legs to pile caps, stringers, beams, bracing and deck shall have sufficient capacity to safely support all applied loads and provide transfer of load to adjoining members.

3606.1.7 Gangways. ~~On coastal waterways, the maximum slope permitted shall be 3:1 at 0.0 mean low water or above and 2½:1 below 0.0 mean low water.~~ On lakes and other

inland waters, the maximum slope shall be 3:1 not less than 90 percent of the time and 2½:1 not more than 10 percent of the time.

3606.2 Flotation units. Flotation units shall be foam-filled encapsulated floats or polystyrene billets securely wrapped with Class I woven geotextile fabric in accordance with AASHTO M288. The use of metal barrels not specifically designed for use as flotation devices and unwrapped polystyrene billets are prohibited.

3606.3 Electrical service. All electrical service to ~~marine~~ structures shall be in accordance with the *North Carolina Electrical Code*.

3606.4 Fire protection. All fire protection for ~~marine~~ structures shall be in accordance with applicable provisions of the *North Carolina Fire Code.*

3606.5 Fuel docks. Fuel docks and other ~~marine~~ facilities handling flammable liquids shall comply with the *Flammable and Combustible Liquids Code*, NFPA 30 and the *North Carolina Fire Code*. All fuel installations shall be designed to prevent fuel spillage from entering the water. The fuel docks or floats shall be isolated to the extent that fire or explosion would have minimal opportunity to spread to or from the fuel dock to the berths. Storage tanks for public facilities shall be located a minimum distance of 50 (15.24 m) feet from the dispenser with a shutoff valve at the tank.

3606.6 Guardrails. For walkways, access piers, steps or ramps, guardrails or other safety provisions shall be provided along the edges where the vertical drop to the lesser of the mean low water level, ~~normal low water level (sounds),~~ normal pool (lakes and rivers) or mud line exceeds 6 feet (1828.8 mm). Edges having a primary function other than walks or access ways, such as docking frontage and swimming access shall not require guardrails. Guardrails shall be designed in accordance with Chapter 16 for balconies. Guardrails shall be a minimum of 42 inches (1047 mm) high and shall prevent the passage of a 21-inch (533 mm) sphere except where required otherwise by Chapter 11. Edge protection shall be provided as required by other rules.

> **Exception:** For private waterfront piers and docks, guardrails or other safety provisions shall be provided along the edges where the vertical drop to the lesser of the mean low water level, ~~normal low water level (sounds),~~ normal pool (lakes and rivers) or mud line exceeds 8 feet (2438 mm). Guardrails shall be a minimum of 36 inches (914 mm) high and shall prevent the passage of a 21-inch (533 mm) sphere. Edge protection shall be provided as required by other rules.

3606.7 Accessibility. Piers, docks, catwalks, gangways, and floating docks shall comply with Chapter 11 and ANSI/ICC A117.1 for accessibility.

3606.8 Egress. Piers and docks shall be provided with means of egress in accordance with Sections 3606.8.1 through 3606.8.4.

> **3606.8.1 Occupant Load.** Occupant load for piers and docks shall be calculated as follows:

3606.8.1.1 Piers and boardwalks. Occupant load for piers and boardwalks intended for recreational fishing shall be calculated based on 3 linear feet (914 linear mm) of rail per person on the perimeter plus 50 square feet (4.65 m^2) per person on a net area with a perimeter 3 feet (914 linear mm) inside the rail. Occupant load for piers and boardwalks intended for other uses shall be in accordance with Chapter 10.

3606.8.1.2 Public waterfront docks. Occupant load for docks constructed at public marinas intended for mooring of private pleasure craft shall be calculated based on 30 square feet (2.79 m^2) of net dock area per person.

3606.8.1.3 Private Waterfront Docks. Occupant load for private waterfront docks shall be calculated based on 20 square feet (1.86 m^2) per person.

3606.8.2 Piers. Piers intended for recreational fishing, assembly, or educational purposes with travel distance to exit discharge exceeding 600 feet (183 m) and greater than 15 feet (4572 mm) above mean low water shall have emergency access ladders at 300 feet (91.4 m) intervals and at the end of the pier. The pier shall be constructed of noncombustible material with the exception that the floor decking may be heavy timber.

3606.8.3 Public waterfront docks. Public waterfront docks intended for mooring of private pleasure craft with travel distance to exit discharge in excess of 600 feet (183 m) shall have a second means of egress or a means of rescue from the water. Construction for these docks shall be noncombustible with the exception that wood walers may be embedded in the dock edges for attachment of mooring hardware.

3606.8.4 Buildings constructed on piers and docks. Buildings constructed on public waterfront piers and docks shall comply with the requirements of all applicable provisions of the *North Carolina State Building Code*.

SECTION 3607
CONSTRUCTION: BULKHEADS AND REVETMENTS

3607.1 Bulkheads. Bulkheads shall be constructed in accordance with Sections 3607.1.1 through 3607.1.5.

3607.1.1 General. Bulkheads shall be constructed in a manner to be effective against erosion and provide for bank stabilization. The bulkhead system may consist of any of the following or combinations thereof: braced sheet pile walls with tie backs, king piles and horizontal panels, gravity walls, cantilever and counterfort retaining walls. Bulkhead walls shall be constructed to prevent passage of fine material (See ASTM D2487) through joints or cracks from the fill side to the stream side.

3607.1.2 Systems. Local site conditions and performance of bulkheads in service shall govern in selection of a system. The potential for erosion and scour at the mud line shall also be investigated, and compensating features shall be reflected in the construction. Bulkheads shall be terminated by either tying into adjoining structures or by extending the bulkhead line a minimum of 10 feet (3050 mm) in a landward direction at an angle of

not less than 45 degrees to the shoreline in order to protect against end erosion or flanking by wave action. No structure shall be terminated without regard for end anchorage and stabilization.

3607.1.3 Guardrails. Where designated public walkways, steps or ramps run adjacent to bulkheads within 6 feet (1829 mm), guardrails or other safety provisions shall be provided along the top of the wall where the vertical drop to the lesser of the mean low water level, ~~normal low water level (sounds),~~ normal pool (lakes and rivers) or mud line exceeds 6 feet (1829 mm). Guardrails shall be designed in accordance with Chapter 16 for balcony guardrails. Guardrails shall be 42 inches (1067 mm) high and shall prevent the passage of a 21-inch (533 mm) sphere except where required otherwise by Chapter 11. Edge protection shall be provided as required by other regulations.

> **Exception:** For private waterfront bulkheads with designated walkways within 6 feet (1829 mm), guardrails or other safety provisions shall be provided along the edges where the vertical drop to the lesser of the mean low water level, ~~normal low water level (sounds),~~ normal pool (lakes and rivers) or mud line exceeds 8 feet (2438 mm). Guardrails shall be a minimum of 36 inches (914 mm) high and shall prevent the passage of a 21-inch (533 mm) sphere. A wall cap 30 inches (762 mm) or less in width shall not be considered a designated walkway unless it is connected to a walkway. Edge protection shall be provided as required by other rules.

3607.1.4 Wood construction. For wood grades, member sizes, preservative treatment, and protection of metal fasteners and fittings see Section 3605.3.

3607.1.5 Bulkheads of materials other than wood. Vinyl, fiber reinforced polymer, aluminum, concrete and steel bulkheads shall be constructed in a manner to ensure performance. Connections shall be designed to resist the full applied load. For materials and corrosion protection reference Sections 3605.4 through 3605.7.

3607.2 Revetments. Revetments shall be constructed in accordance with Sections 3607.2.1 through 3607.2.2

3607.2.1 Rigid revetments. Rigid revetments shall be founded on a firm foundation to prevent undermining and progressive instability. Provisions shall be made to provide for adequate toe protection to compensate for known or anticipated scour. Additional protection may be needed in active areas and may consist of sheet piling along the toe or stone rip rap. An adequate pattern of weep holes shall be provided in the face to relieve hydrostatic pressure behind the wall. Joints shall be sealed or provided with a properly designed filter to prevent loss of fines from the protected slope.

3607.2.2 Flexible revetments. Adequate provisions shall be made to prevent migration of fine materials through the structure. The face shall not be steeper than one unit horizontal to one unit vertical. Flatter slopes may be needed for stability depending on the

construction materials and site conditions. The face may consist of armor stone, rip rap, or individual interlocking concrete units or poured concrete. Toe protection provisions shall be provided as discussed for the rigid type and the top of slope shall be detailed to prevent erosions under the revetment from surface water runoff. Flexible revetments shall be provided with a filter layer designed to prevent loss of fines from the protected slope and to relieve hydrostatic pressure behind the face.

SECTION 3608
DOCKS, PIERS, BULKHEADS AND WATERWAY STRUCTURES IN ESTUARINE WATERS

Section 3608 applies to docks, piers, bulkheads and waterway structures included in North Carolina General Assembly Session Law 2023-137, Section 35 and in estuarine waters as defined within the definition of "Coastal Fishing Waters" within North Carolina General Statute 113-129(4).

Section 3608 represents a reprint of Chapter 36 of the 2009 North Carolina Building Code.

SECTION 3601
GENERAL

The intent of this chapter is to provide minimum standards for the design, construction and maintenance of piers, bulkheads and waterway structures that are not covered by other existing codes or design standards. This chapter exempts farm structures not on public waters, marine terminal or port facilities for berthing, mooring, docking and servicing ships, barges or tug boats which handle cargo of all types including bulks, liquids, fuels and passengers.

The design of piers, bulkheads and waterway structures is essential for the protection of life and property without causing adverse effects to the shoreline. These structures by their very nature result in some modification of physical environment and therefore require minimum design standards. The guidelines in this chapter address minimum standards for foundations, design forces, structural integrity, material selection and utilization, and construction techniques.

SECTION 3602
PERMITS AND APPROVALS

The construction of any pier, bulkhead or waterway structure in public waters or the placement of dredged materials in waters or wetlands, generally requires the owner to obtain permits prior to construction. A permit from the United States Army Corps of Engineers is generally required for all marine construction. In addition to the permit issued by the Corps of Engineers, additional permits may be required from municipal, county or state governments and/or local marine commissions. In cases of structures to be built on lakes operated by an electric utility for the generation of power, a permit from the operating utility may also be required.

SECTION 3603
MINIMUM DESIGN LOADS

3603.1 General. Every structure shall be of sufficient strength to support the imposed dead, live, wind and impact loads without exceeding the allowable stresses prescribed for the various materials elsewhere in this code. Adequate consideration shall be made for forces imposed by earth, water, docking and mooring.

3603.2 Dead loads. The weight of the component parts of a structure shall be used in the design when it will influence the strength of the structural elements.

3603.3 Live loads. Design live loads shall be the greatest load that will probably be imposed on the structure including superimposed loads on retained material which exert horizontal loads on the structure. Where vehicles are allowed, use actual weight of vehicles and wheel loads as specified in the latest

edition of *Standard Specifications for Highway Bridges* of the American Association of State Highway Bridges: of the American Association of State Highway and Transportation Officials. The design load shall be posed at the dock or pier approach where vehicles are allowed. Minimum live loads are:

1. FIXED PIERS, DOCKS, CATWALKS—40 pounds per square foot (psf) (1915 Pa) or 300 pounds (1335 N) concentrated load on any area 2 foot (610 mm) square.
2. FLOATING PIERS, DOCKS, FINGERS—20 psf or 300 pounds (1335 N) concentrated load on any area 2 feet (610 mm) square. Under dead load, floating piers shall have a minimum of 15 inches (381 mm) freeboard. The pier shall have not more than 6 degrees (0.11 rad) tilt from the horizontal under uniform live loading on one-half of the pier width or under concentrated load of 600 pounds (2669 N) applied on any side.
3. BULKHEADS, SEAWALLS, REVETMENTS—Design loads shall be the greatest combinations of loads exerted on the structure. Consideration shall be given to horizontal loads exerted by superimposed loads on the retained earth and by inclined surface slopes.
4. PUBLIC FISHING PIERS
   - 4.1. Mean low water line to land–100 psf (4788 Pa).
   - 4.2. Mean low water line to end of pier–50 psf (2304 Pa).

3603.4 Wind loads. As prescribed in Chapter 16.

3603.5 Impact loads. As prescribed in Chapter 16 but not less than 1.25 times the kinetic energy exerted by a striking vessel or vehicle.

3603.6 Water loads. Hydrostatic horizontal pressures along with the equivalent fluid pressure of soil and any surcharge thereon shall be considered. Provide sufficient anchorage against uplift between all components and between the structure and its support of not less than 1.5 times the uplift force. Wave forces shall be determined from wave records where available. Where no wave records are available, the design wave shall be determined from probable wind speed, direction, fetch and water depth which will yield a critical wave. Forces shall then be calculated using current coastal engineering practice.

3603.7 Earth loads. Lateral earth pressures shall be determined by considering the specific soil properties and applying earth pressure theories generally accepted for soil mechanics in engineering practice. Except for simple and inexpensive structures this normally requires the services of specialists in soil mechanics and/or foundations design. Adequate consideration shall be given for the effect of probable varying levels of ground water, tide and flood water. Pressures exerted by the earth shall be checked for dry, saturated and submerged conditions as applicable.

3603.8 Erosion. The effects of reasonably predictable erosion and wave-induced scour shall be given ample consideration.

SECTION 3604
ENGINEERED DESIGNS

3604.1 Docks, piers and catwalks. Docks, piers and catwalks used by the public or are intended for use by vehicles shall be designed by a professional engineer or architect.

3604.2 Bulkheads and other type retaining walls. Bulkheads and other types of retaining walls used by the public having an exposed face above the ground or above mean low water of 5 feet (1524 mm) or greater shall be designed by a professional engineer or architect.

3604.3 Ocean-front retaining walls, bulkheads and retaining walls. Ocean-front retaining walls, bulkheads and other types of retaining walls used by the public on the coastline of the ocean or adjacent inlets shall be designed by a professional engineer or architect.

SECTION 3605
MATERIALS

3605.1 General. The quality of materials and fastenings used for load-supporting purposes shall conform to good engineering practices. In areas subject to attack from wood borers such as termites, teredoes or limnoria, the wood used shall be approved wood having natural resistance or shall be pressure treated with a preservative recommended by the American Wood Preservers Association for the specific application. Piling shall comply with applicable provisions of Chapter 18.

Wood components shall comply with applicable provisions of Chapter 23. Concrete components shall comply with applicable provisions of Chapter 19. Steel components shall comply with applicable provisions of Chapter 22. In areas of severe corrosion such as salty or brackish waters, all metal components shall be protected by coating, cathodic protection or be oversized accordingly to allow for the specific exposure. Aluminum bulkhead sheets or aluminum bulkhead or dock components shall be of proper alloy to resist corrosive elements in the adjacent water and soil. Galvanized bulkhead components and dock components shall be coated by the "hot dip" process to sufficient cover to provide corrosion protection equal to the degree of exposure of corrosive elements. Masonry used in bulkheads and dock work shall comply with Chapter 21.

SECTION 3606
CONSTRUCTION OF PIERS, DOCKS, CATWALKS AND FLOATING DOCKS

3606.1 Fixed piers. Fixed piers for coastal areas shall be supported by pilings with tip penetrations of not less than 8 feet (2438 mm) dependent on the total applied load. Less penetration is approved only if other means of resisting flotation uplift is provided. Pier support by shallow piling, legs or columns with point bearing on rock shall have provisions for horizontal forces and overturn as well as flotation uplift. Connection between piling or legs to cap beams, stringers, beams and deck shall have sufficient capacity to safely support all applied loads

and provide transfer of load to adjoining members. Maximum spans for pier joists shall be in accordance with the *Span Table for Joists and Rafters*, as published by the National Forest Products Association or may be designed in accordance with accepted engineering practice.

3606.2 Metal barrel flotation units. The use of metal barrels not specifically designed for use as flotation devices is prohibited.

3606.3 Decomposable flotation units. Floating docks or piers using exposed polystyrene billets (or other foam material) shall be designed for 125 percent of tabulated loads to allow for deterioration from environmental effects.

3606.4 Electrical service. All electrical service to marine structures shall be in accordance with the *North Carolina State Electrical Code*.

3606.5 Fuel docks. Fuel docks and other marine facilities handling flammable liquids shall comply with the *Flammable and Combustible Liquids Code*, NFPA 30 and the *North Carolina Fire Code*. All fuel installations shall be designed to prevent fuel spillage from entering the water. The fuel docks or floats shall be a separate structure form berths and shall be isolated to the extent that fire or explosion would have minimal opportunity to spread to or from the fuel dock to the berths. Storage tanks for public facilities shall be located a minimum distance of 50 feet (15 240 mm) from the dispenser with a shutoff valve at the tank.

3606.6 Handrails. For walkways, access piers, steps or ranges, personnel handrails or other safety provisions shall be provided along the edges where the vertical drop to the mean low water level or mud line exceeds 6 feet (1829 mm). Edges which have a primary function other than walks or access ways, such as docking frontage and swimming access shall not require railings. Railings shall be designed in accordance with Chapter 16 for balcony railings.

3606.7 Maintenance of public structures. The building official shall have the authority to condemn and close to the public any structure which is considered unsafe, and it shall not be used by the public until the deficiencies are corrected. Before the structure is reopened to the public, a certification by a professional engineer or architect shall be required. Each owner shall be responsible for the proper and satisfactory maintenance of any public structure covered by this section. All such structures shall be subject to inspection at any time by the building official.

SECTION 3607
CONSTRUCTION: BULKHEADS, SEAWALLS AND REVETMENTS

3607.1 Bulkheads.

3607.1.1 Bulkheads shall be constructed in a manner to be effective against erosion and provide for adequate bank stabilization. The bulkhead system may consist of either of the following combinations thereof: braced sheet pile walls with tie backs, king piles and horizontal panels, gravity walls, cantilever and counterfort retaining walls. Bulkhead walls shall be constructed to prevent passage of fine material through joints or cracks from the fill side to the stream side.

3607.1.2 Local site conditions and performance of bulkheads in service should govern in selection of a system. The potential for erosion and scour at the mud line shall also be investigated, and appropriate compensating features shall be reflected in the construction. Bulkheads shall be terminated by either tying into adjoining structures or by extending the bulkhead line a minimum of 10 feet (3048 mm) in a landward direction at an angle of not less than 45 degrees (0.79 rad) to the shoreline in order to protect against end erosion or flanking by wave action. No structure shall be terminated without regard for end anchorage and stabilization. Sheet pile bulkheads with an exposed vertical height of 4 feet (1219 mm) or greater shall be stabilized at the top by providing adequate anchorage, such as the use of batter piles or tie backs. Anchor blocks for tie backs shall be located landward of the soil wedge formed by the wall and a line projected on an angle of the material being retained.

The tie back anchor shall be located no closer than twice the height of the exposed vertical surface of the wall. Sheet pile embedment shall be determined by analysis and design, but shall not be less than the length of the pile exposed above ground. Cantilever and gravity wall bulkheads shall be founded on a firm foundation with special construction given to undermining and progressive instability.

3607.1.3 Where public walkways, steps or ramps run adjacent to bulkheads, personnel handrails or other safety provisions shall be provided along the top of the wall where the vertical drop to the mean low water line or mud line exceeds 6 feet (1829 mm). Handrails shall be designed in accordance with Chapter 16 for balcony railings.

3607.1.4 Wood members used for permanent features shall be not less than 2 inches (51 mm) in nominal thickness. All steel bolts, rods and other hardware shall be hot dipped galvanized or protected with an equivalent system. Bolts, rods and other metal materials shall be no smaller than $^1/_2$ inch (12.7 mm) in diameter or thickness. Threaded fasteners shall not be tightened directly against wood surfaces but used only in conjunction with standard ogee or flat washers.

3607.1.5 Concrete, steel and cement asbestos bulkheads shall be constructed in a manner to assure adequate performance. Connections shall be designed to resist the full applied load. Adequate attention shall be given to material protection against corrosion and concrete cover for reinforcing steel. Concrete shall have a 28-day minimum compressive strength of 3,000 pounds per square inch (20 685 kPa) and shall be "air-entrained" type concrete.

3607.2 Seawalls. Seawalls may be constructed of concrete or stone rubble mound or other suitable materials. They shall be founded on a firm foundation and may require the use of piling or other suitable support. The face shall be shaped and supported to withstand the full force of the design wave. A provision shall be provided to prevent undermining and progressive instability by installing a sheet pile wall along the toe and/or by placing adequate stone rip rap protection.

3607.3 Revetments.

3607.3.1 Rigid revetments shall be founded on a firm foundation to prevent undermining and progressive instability. Provisions should be made to provide for adequate toe protection by extending the face a minimum of 2 feet (610 mm) below the mud line plus a depth to compensate for known or anticipated scour. Additional protection may be needed in active areas and may consist of sheet piling along the toe and/or stone rip rap. An adequate pattern of weep holes shall be provided in the face to relieve hydrostatic pressure behind the wall. Joints shall be sealed to prevent loss of fines from the protected slope.

3607.3.2 Flexible revetments may be utilized where foundations will produce minor consolidation and settlement. Adequate provisions shall be made to prevent migration of fine materials through the wall. The face shall not be steeper than one unit horizontal to one unit vertical. Flatter slopes may be needed for stability depending on the construction materials and site conditions. The face may consist of stone rip rap or individual interlocking concrete units or poured concrete. Toe protection provisions shall be provided as discussed for the rigid type. Flexible revetments must be porous enough to allow for water passage and thereby relieve hydrostatic pressure behind the face.

SECTION 3608
CONSTRUCTION OF GROINS AND JETTIES

3608.1 Groins.

3608.1.1 Groins are designed and constructed for the purpose of building or maintaining a protection beach by trapping littoral drift (beach materials) or to retard the recession of an eroding shoreline. The planning and design of a groin/groin system shall be based on wave height, period and direction, characteristics of beach material and beach slope.

3608.1.2 Location. Groins shall extend landward a sufficient distance to prevent flanking.

3608.1.3 Types. Groins shall be either (1) very low, impermeable and nonadjustable or (2) impermeable and adjustable.

3608.1.4 General specifications. Adjustable groins shall be maintained at elevations in accord with actual beach needs and development of desirable changes of the beach profile, and so as to avoid damage to adjacent beaches. In no case shall the top of such groins be set higher than 2 feet (610 mm) above the beach profile. Impermeable, nonadjustable groins shall not extend seaward beyond the mean low water line, and their top elevation shall not be higher than 6 inches (152 mm) above the beach profile. Considerations of the degree of beach protection to be provided by proposed groins, and the acceptability of such installations, will be based primarily on the following factors: direction and volume of littoral drift; wave force and direction; wind force and direction; land usage; type of bulkhead; type of groin; and spacing and lengths of groins.

A complete coastal engineering study may be required before approval is given to the number, type and length of groins. The design should account for the wave and current forces focused on the beach. The groin/groin system should not adversely modify the littoral drift to the extent to cause severe erosion on the lee side of the structure.

3608.2 Groins and jetties. There is no universal type of groin/groin system or jetty because of the wide variations in conditions at each location. It is incumbent on the owner of a groin or jetty type structure to recognize the legal implications of the coastal structure and to plan, design, construct and maintain the structure accordingly. It is thus prudent to seek the advice of a professional engineer or architect with coastal engineering experience.

SECTION 3609
DEFINITIONS

BASIN, BOAT. A naturally or artifically enclosed or nearly enclosed harbor area for docking and securing small craft.

BULKHEAD. A vertical wall structure designed to retain shoreline material and prevent erosion due to wave activity.

BULKHEAD LINE. The line formed along the shore by the most seaward elements of the bulkhead.

CATWALK. A narrow footway platform extending alongside a structure.

DATUM, PLANE. The horizontal plane to which soundings, ground elevations water surface elevations are referenced.

DOCK. A pier, wharf or platform for the unloading of materials or living beings.

FETCH. The area in which waves are generated having a rather constant direction or speed.

GANGWAY. A narrow footway bridge extending from the shore, usually to a floating structure.

GROIN. A shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion of the shore.

GROIN SYSTEM. A series of groins that function to protect a section of shoreline.

JETTY. A structure designed to protect and/or stabilize a navigation entrance.

KING PILE. The primary structural member that supports horizontal panels to form a vertical wall sometimes used in bulkhead or groin construction.

LITTORAL DRIFT. The sedimentary material transported along the shore by waves and currents.

LONGSHORE TRANSPORT. The movement of littoral drift (material) running parallel to the shoreline.

PIER. An elevated deck structure, usually pile supported, extending out into the water from the shore.

PIERHEAD LINE. The limiting line to which any pier or dock structure can extend into the water.

PILE. A cylindrical timber, concrete or metal member embedded into the ground to support or brace a structure.

PILE, SHEET. A pile with a generally slender flat cross section to be embedded into the ground or seabed and meshed or interlocked with like members to form a diaphragm, wall or bulkhead.

REVETMENT. A flexible structure usually constructed of stone or concrete and placed on a bank slope to protect it against erosion by wave and current action.

SEAWALL. A massive structure built along and parallel to a shoreline for the purpose of protecting and stabilizing the shore against erosion resulting from heavy wave activity.

WAVE, DESIGN. A wave that is potentially most damaging to an economically feasible structure, or wave for which a structure is designed.

The delayed effective date of this Rule is March 24, 2025.
The Statutory authority for Rule-making is G. S. 143-136; 143-138.