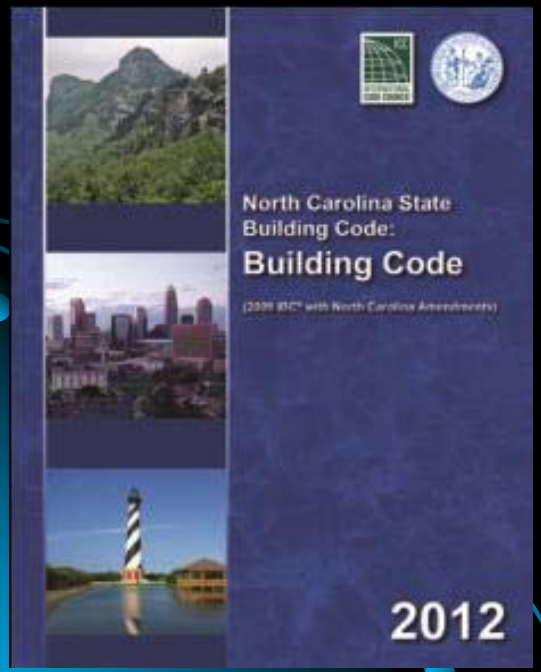
31st Annual State Construction Conference

March 22nd, 2012



Significant Changes to the 2012 NC State Building Code

By: Farouk Zaman. RA

31st Annual State Construction Conference

March 22nd, 2012

REMINDER: ALL APPENDIXES AT THE BACK OF THE NC STATE BUILDING CODE 2012 HAD BEEN ADOPTED BY THE STATE AND ARE AN INTEGRAL PART OF THIS CODE.

ALL NEW AND CHANGES TO THE 2012 CODE ARE HIGHLIGHTED IN RED.

REFERENCE TO 2009 CODE ARE HIGHLIGHTED IN BLUE.

31st Annual State Construction Conference

March 22nd, 2012

STAFF ARCHITECTS

Farouk Zaman, RA	farouk.zaman@doa.nc.gov
Steve Key, RA	steve.key@doa.nc.gov
Eric Tjalma, RA	eric.tjalma@doa.nc.gov
Ronald Little, RA	ronald.little@doa.nc.gov
Jim Lora, RA	jim.lora@doa.nc.gov

SCO Website – http://www.nc-sco.com

STATE CONSTRUCTION OFFICE WEBSITE

Code Effective Dates

Code	Optional Effective Date	Mandatory Enforcement Date	Notes
Building	Sep 1 2011	Jun 1 2012	
Residential	Jan 1 2011	March 1 2012	Per SL2011-269
Mechanical	Sep 1 2011	Jun 1 2012	
Plumbing	Sep 1 2011	Jun 1 2012	
Fuel Gas	Sep 1 2011	Jun 1 2012	
Fire Prevention	Sep 1 2011	Jun 1 2012	
Energy Conservation	Jan 1 2011	March 1 2012	Per SL2011-269
Law and Administration	Jan 1 2011	Jun 1 2012	
Electrical	N/A	N/A	Held at Legislature

2012 NC STATE BUILDING CODE SIGNIFICANT CHANGES:

NSCBC Chapter 5

NSCBC Chapter 7

NSCBC Chapter 9

NSCBC Chapter 10

ICC A117.1-2009 Chapter 11

NCSBC 2009 2012

TABLE 503

ALLOWABLE BUILDING HEIGHTS AND AREAS

		TYPES OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	HEIGHT	UL	160	65	55	65	55	65	50	40
GROUP	STORIES (S) / AREA (A)									
B	S	UL	11	5	4 3	5	4 3	5	3	2
	A	UL	UL	37500	23000	28500	19000	36000	18000	9000
M	S	UL	11	4	2	4	2	4	3	1
	A	UL	UL	21500	12500	18500	12500	20500	14000	9000
S-1	S	UL	11	4	2	3	2	4	3	1
	A	UL	48000	26000	17500	26000	17500	22500	14000	9000
S-2	S	UL	11	5	4 3	4	4 3	5	4	2
	A	UL	79000	39000	26000	39000	26000	38500	21000	13500

TABLE 508.2.5 (2009) (2012)

INCIDENTAL USE AREAS	
ROOM OR AREA	**SEPARATION AND/OR PROTECTION**
Storage rooms over 100 square feet Group I-2 Storage rooms over 100 square feet	1 hour or provide automatic fire-extinguishing system 1 hour
Parking garage, Section 406.2 Rooms containing fire pumps in non-high-rise buildings	2 hours; or 1 hour and provide automatic fire-extinguishing system throughout the building 2 hours; or 1 hour and provide automatic sprinkler system throughout the building
Rooms containing fire pumps in high-rise buildings	2 hour

TABLE 508.4

Table 302.3.2 NCSBC 2006 Separation of Occupancies

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (hours)

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

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. For Group H-5 occupancies, see Section 903.2.5.2.
b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1-hour, but not less than 1 hour.
c. See Section 406.1.4.
d. Commercial kitchens need not be separated from the restaurant seating areas that they serve.
e. Separation is not required between occupancies of the same classification unless separated mixed use is implemented.
f. For Group H-5 occupancies, see Section 415.8.2.2.
g. Groups A-1, A-2, A-3, A-4 and A-5 must be separated by the designated fire-resistance rating unless they are to be nonseparated mixed use.
h. Groups R-1, R-2, R-3 and R-4 must be separated by the designated fire-resistance rating unless they are to be nonseparated mixed use.

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (hours)

OCCUPANCY		A	B	E	F-1	F-2	H-1	H-2	H-3
A	S	2 e,g	1	1	1	N	NP	3	2
	NS	2 e,g	2	2	2	1	NP	4	3
B	S	1	2 e	1	2	1	NP	2	1
	NS	2	2 e	2	3	2	NP	3	2
E	S	1	1	2 e	1	N	NP	3	2
	NS	2	2	2 e	2	1	NP	4	3
F-1	S	1	2	1	3 e	1	NP	2	1
	NS	2	3	2	3 e	2	NP	3	2
F-2	S	N	1	N	1	2 e	NP	3	2
	NS	1	2	1	2	2 e	NP	4	3

TABLE 508.4 - Footnotes

e. Separation is not required between occupancies of the same classification unless separated mix use is implemented.

f. For Group H-5 occupancies, see Section 415.8.2.2 Separation.

g. Groups A-1, A-2, A-3, A-4 and A-5 must be separated by the designated fire-resistance rating unless they are to be non-separated mixed use.

h. Groups R-1, R-2, R-3 and R-4 must be separated by the designated fire-resistance rating unless they are to be non-separated mixed use.

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (hours)

OCCUPANCY		A	B	E	F-1	F-2	H-1	H-2	H-3
A	S	2 e,g	1	1	1	N	NP	3	2
	NS	2 e,g	2	2	2	1	NP	4	3
B	S	1	2 e	1	2	1	NP	2	1
	NS	2	2 e	2	3	2	NP	3	2
E	S	1	1	2 e	1	N	NP	3	2
	NS	2	2	2 e	2	1	NP	4	3
F-1	S	1	2	1	3 e	1	NP	2	1
	NS	2	3	2	3 e	2	NP	3	2
F-2	S	N	1	N	1	2 e	NP	3	2
	NS	1	2	1	2	2 e	NP	4	3

SECTION 706.3.9 SINGLE-OCCUPANCY FIRE AREAS. The fire barrier or horizontal ... separating a single occupancy into ...erent fire areas shall ... fire-resistance rating of not ... than that indicated in TABLE ... 3.9.

TABLE 706.3.9
FI... RESISTA... RATING REQUIREMENTS FO... RE
B... RRIER ASSEM... ES OR HORIZONTAL ASEMB... S
BETW... N FIRE AREAS

...CUPANCY GROUP	FIRE-... STANCE RATING (ho...)
H-1, H-2	4
...-1, H-3 S-1	
A, B, ...2, H-4 H-5, I, M... S-2	2
U	

TWO CODE SECTIONS REFERENCED

SECTION 707.3.9 FIRE AREAS: The fire barriers or horizontal assemblies, or both, separating a single occupancy or multiple occupancies into different fire areas shall have a fire-resistance rating of not less than that indicated in **TABLE 508.4.**

SECTION 901.7 FIRE AREAS

Where buildings, or portions thereof, are divided into fire areas so as not to exceed the limits established for requiring fire protection system in accordance with this chapter, such fire areas shall be separated by fire barriers having a fire resistance rating of not less than that determined in accordance with Section 706.3.9 constructed in accordance with Section 707 or both, having a fire resistance rating of not less than that determined in accordance with **Section 508.4**. [Separated Occupancies and **Table 508.4** Required Separation of Occupancies.]

TABLE 508.4
REQUIRED SEPARATON OF OCCUPANCIES (hours)

OCCUPANCY		A	B	E	F-1	F-2	H-1	H-2	H-3
A	S	2 e,g	1	1	1	N	NP	3	2
	NS	2 e,g	2	2	2	1	NP	4	3
B	S	1	2 e	1	2	1	NP	2	1
	NS	2	2 e	2	3	2	NP	3	2
E	S	1	1	2 e	1	N	NP	3	2
	NS	2	2	2 e	2	1	NP	4	3
F-1	S	1	2	1	3 e	1	NP	2	1
	NS	2	3	2	3 e	2	NP	3	2
F-2	S	N	1	N	1	2 e	NP	3	2
	NS	1	2	1	2	2 e	NP	4	3

TABLE 704.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS

	FIRE SEPARATION DISTANCE (feet)						
CLASSIFICATION OF OPENINGS	0 to 3	Greater than 5 to 10	Greater than 10 to 15	Greater than 15 to 20	Greater than 20 to 25	Greater than 25 to 30	Greater than 30
UNPROTECTED	Not Permitted	Not Permitted	10%	15%	25%	25%	No Limit
PROTECTED	Not Permitted	15%	20%	45%	No Limit	No Limit	No Limit

TABLE 705.8 MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION

FIRE SEPARATION DISTANCE (feet)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA
0 to less than 3	Unprotected , Nonsprinklered (UP, NS)	Not Permited
	Unprotected , Sprinklered (UP, S)	Not Permited
	Protected (P)	Not Permitted
3 to less than 5	Unprotected , Nonsprinklered (UP, NS)	Not Permited
	Unprotected , Sprinklered (UP, S)	15%
	Protected (P)	15%
5 to less than 10	Unprotected , Nonsprinklered (UP, NS)	10%
	Unprotected , Sprinklered (UP, S)	25%
	Protected (P)	25%

ABLE 1005.1 (2009)
EGRESS WIDTH OCCUPANT SERV

OCCUPANCY	WITHOUT SPRINKLER SYSTEM		WITH SPRINKLER SYSTEM	
	Stairways (Inches per occupant)	Other egress components (Inches per occupant)	Stairways (Inches per occupant)	Other egress components (Inches per occupant)
Occupancies other than those listed below	0.3	0.2	0.2	0.15
Hazardous: H-1, H-2, H-3 and H-4	0.07	0.04		0.02
Institutional: I-2	NA	NA		0.02

SECTION 1005.1
MINIMUM REQUIRED
EGRESS WIDTH

Stairs: Exit width per occupant **0.3 inch.**

Other egress components: Exit width per occupant **0.2 inch.**

SECTION 1005.1
MINIMUM REQUIRED
EGRESS WIDTH

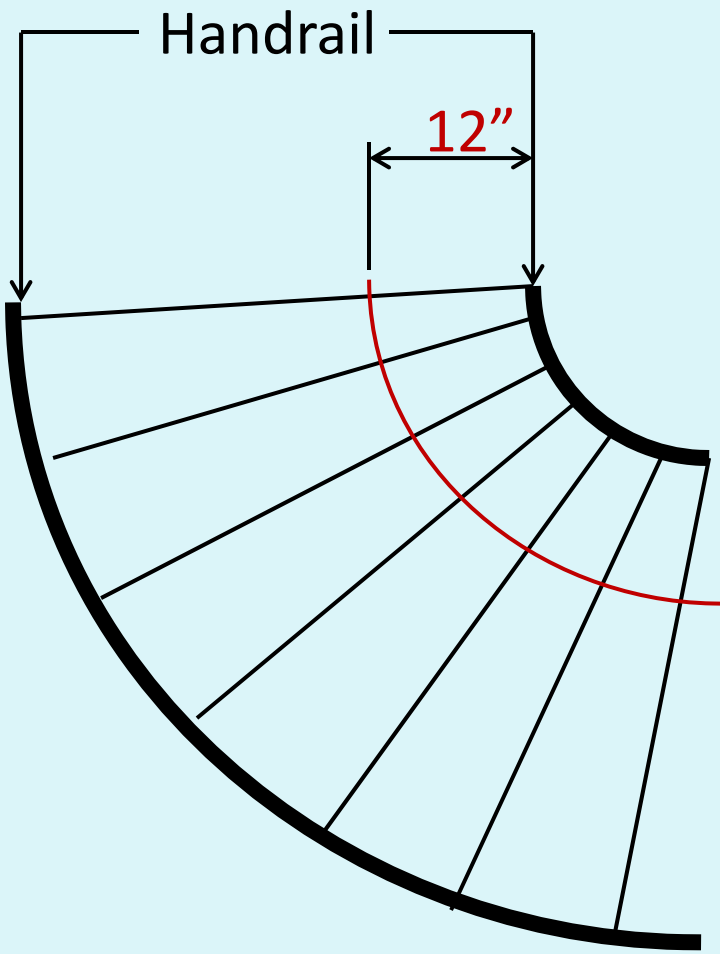
Example: 2 story building with 1,000 occupants per floor

Building (2009) - Sprinklered
Stair width: 1000 x 0.2 = 200”
Other width: 1000 x 0.15 = 150”

Building (2012) – Sprinklered or Nonsprinklered
Stair width: 1000 x 0.3 = 300” 50% increase
Other width: 1000 x 0.2 = 200” 33.3% increase

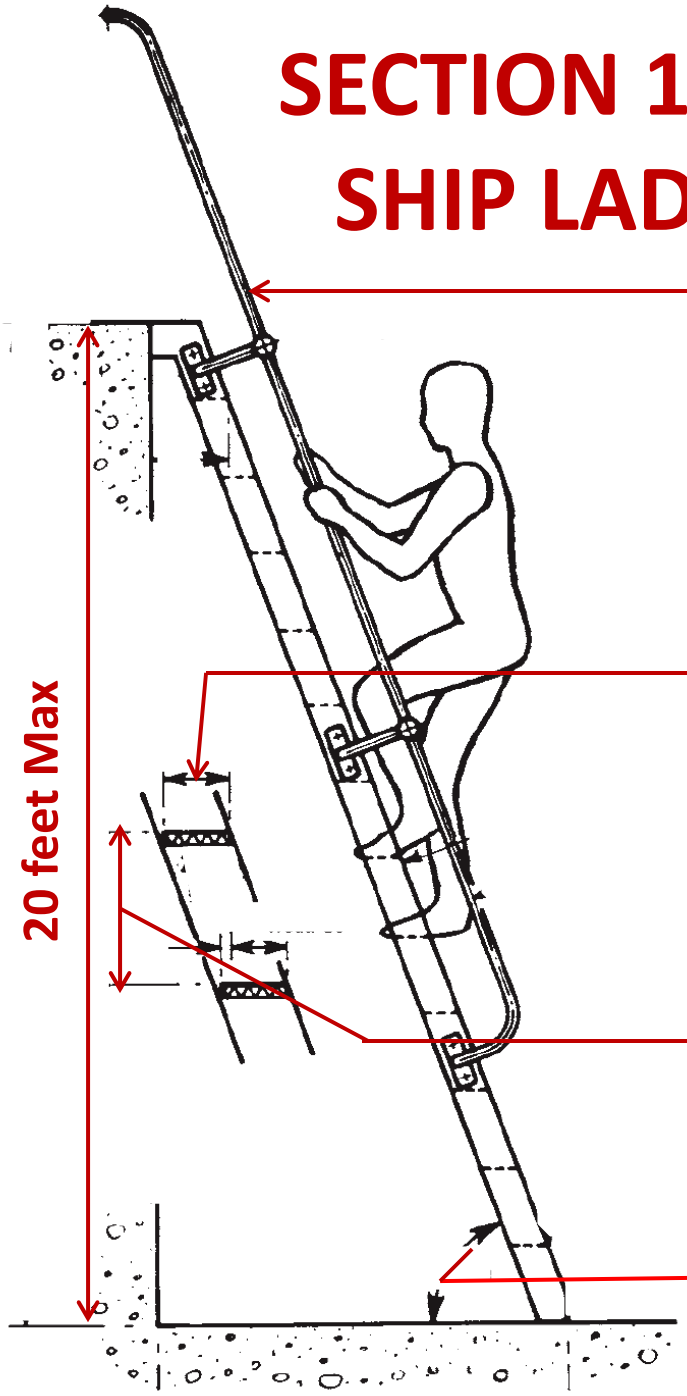
CURVED STAIRS & WINDERS

SECTION 1009.3 WALKLINE



Walkline across winder treads shall be concentric to the direction of travel and located 12” horizontally from the handrail where the winder is narrow.

SECTION 1009.11
SHIP LADDERS



Pipe rail:1¼” dia.

Tread : Min. 5” deep

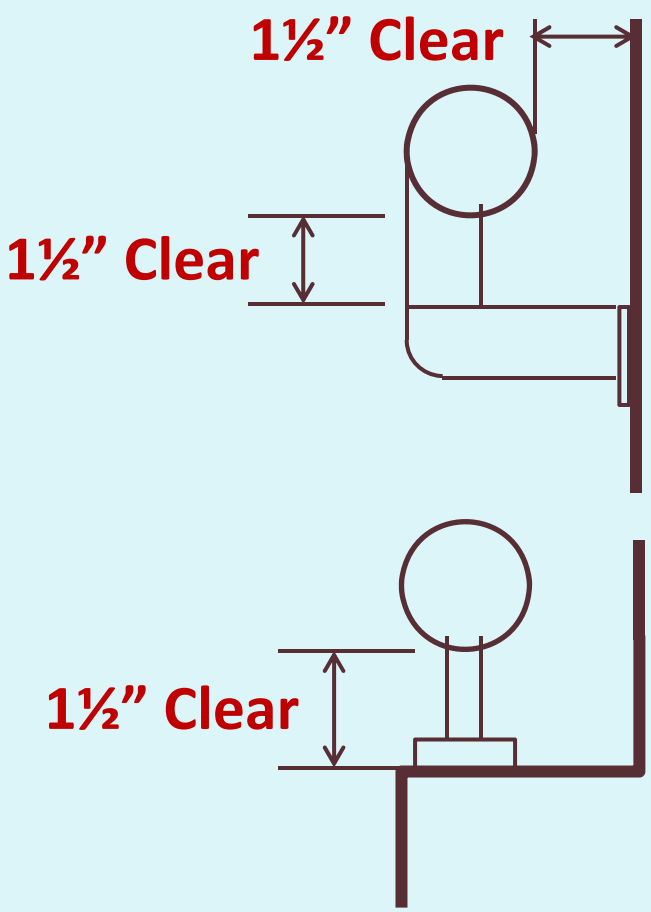
30” max. width

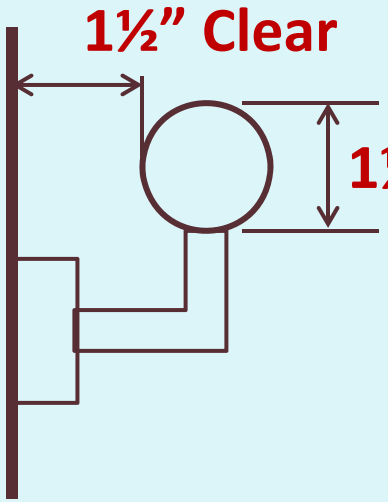
Riser: 9½” min. to 12” max.

Pitch: 60 to 70 degrees

SECTION 1012.3
HANDRAIL GRASPABILITY

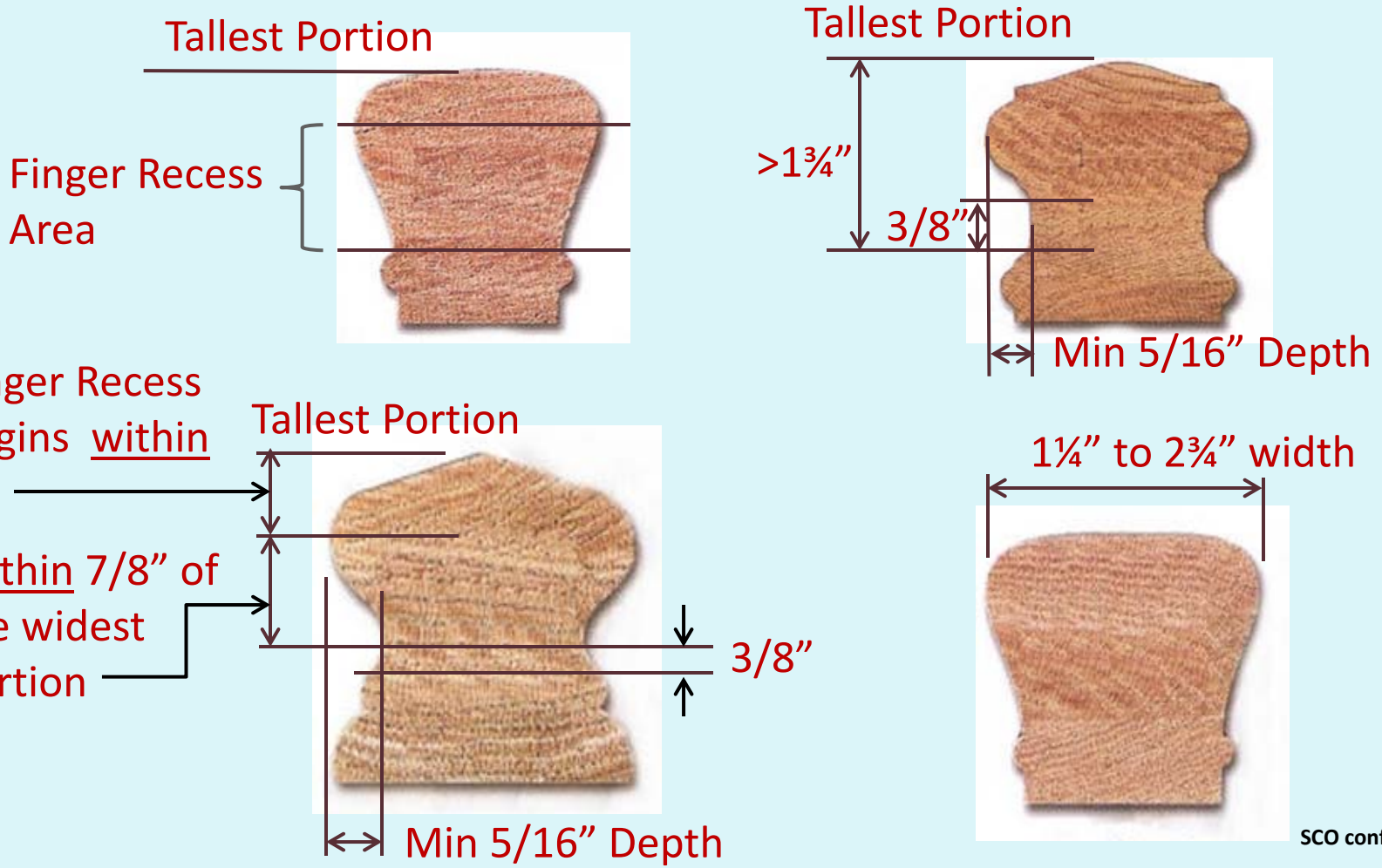
Section 1012.3.1 Type I. <6¼" Perimeter



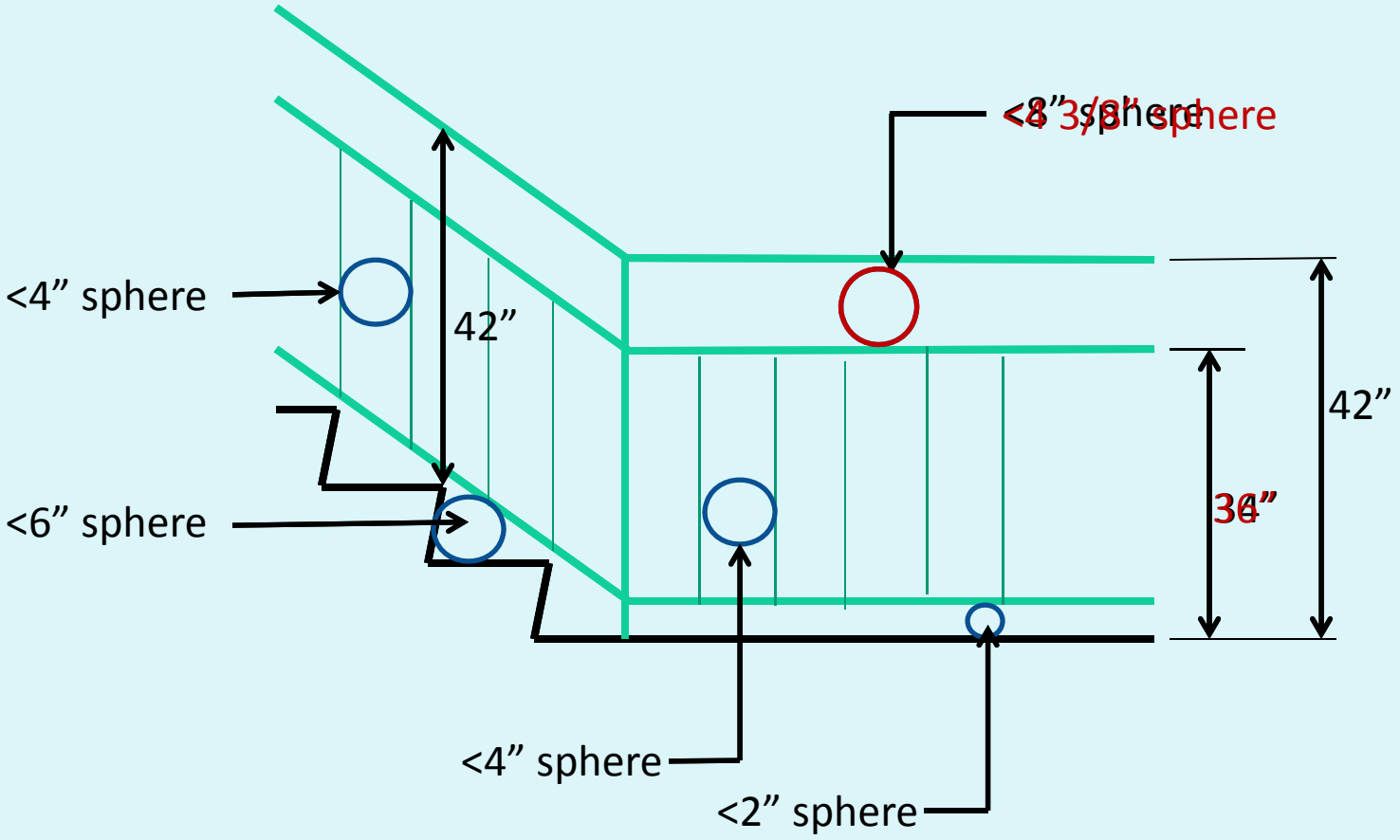


4" to 6¼" perimeter dim. or circumference

SECTION 1012.3
HANDRAIL GRASPABILITY
Section 1012.3.2 Type II. <u>>6¼" Perimeter</u>



SECTION 1013.3
OPENING LIMITATIONS



SECTION 1014.3
COMMON PATH OF EGRESS TRAVEL
EXCEPTION 4

The length of a common path of egress travel in a Group R-2 occupancy shall not be more than 125 feet provided that the building is protected throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Section 903.3.1.1 = NFPA 13 Sprinkler system
Section 903.3.1.2 = NFPA 13R Sprinkler System

TABLE 1016.1

EXIT ACCESS TRAVEL DISTANCE		
OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1 , I-4	200	250
I-1	Not Permitted	250
I-2, I-3, I-4	Not Permitted 150	200

SECTION 1017.3
DEAD ENDS
Exception 2

In occupancies in Groups B, E, F, H-1, M, R-1, R-2, R-4, S and F where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the length of dead-end corridors shall not exceed 50 feet.

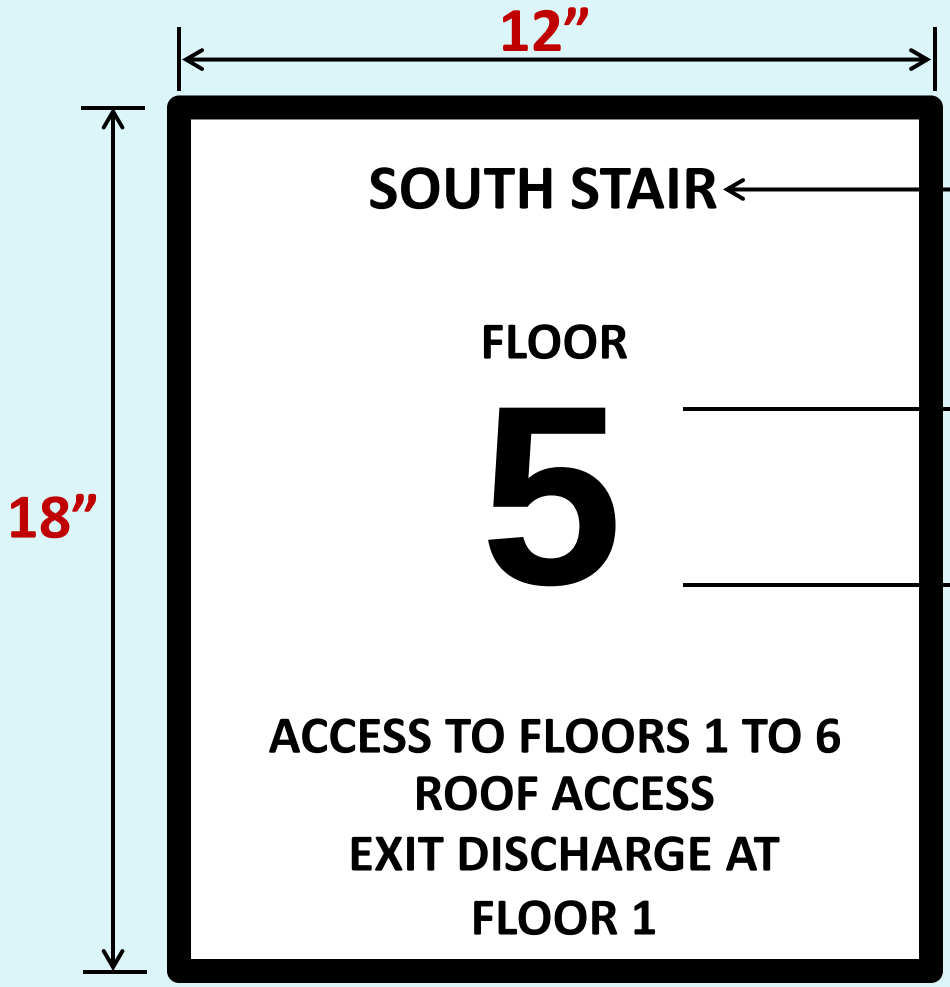
TABLE 1019.2
BUILDINGS WITH ONE EXIT

STORY OCCUPANCY	MAX. OCCUP. (or DWELLING UNITS) / FLOOR AND TRAVEL DISTANCE
A, B[d], E, F[d], M, U, S[d]	49 occup. 75 feet
First story or basement — H-2, H-3	3 occup. 25 feet
First story or basement — H-4, H-5, I-1, I-4, R	10 occup. 75 feet
First story or basement — S	29 occup. 100 feet
Second story — B, F, M, S	20 occup. 75 feet
Second story — R-2	4 dwell units. 50 feet
Third story — R-2	4 dwell units. 50 feet

TABLE 1021.2
STORIES WITH ONE EXIT
FOOTNOTES

d. Group B, F and S occupancies in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 shall have a maximum travel distance of 100 feet.

SECTION 1022.8.1 SIGNAGE REQUIREMENTS > 3 STORIES



1½” IN HEIGHT

CHARACTERS SHALL CONTRAST WITH THEIR BACKGROUND OR VICE VERSA

OTHER CHARACTERS 1” IN HEIGHT

BUILDING OVER 75’-0” IN HEIGHT, SECTION 1024

SECTION 1024
LUMINOUS EGRESS PATH MARKINGS

Section 1024.1 General. Approved luminous egress path markings delineating the exit path shall be provided in buildings of Groups A, B, E, I, M and R-1 having floors located more than 75' above the lowest level of fire department vehicle access in accordance with Sections 1024.1 and 1024.5.

SECTION 1024.4
SELF-LUMINOUS AND PHOTOLUMINESCENT

Luminous egress path markings shall be permitted to be made of any materials, including paint, provided an electrical charge is not required to maintain the required luminance. Such materials shall include but are not limited to self-luminous materials and photoluminescent materials. Comply with UL 1994 or ASTM E 2072

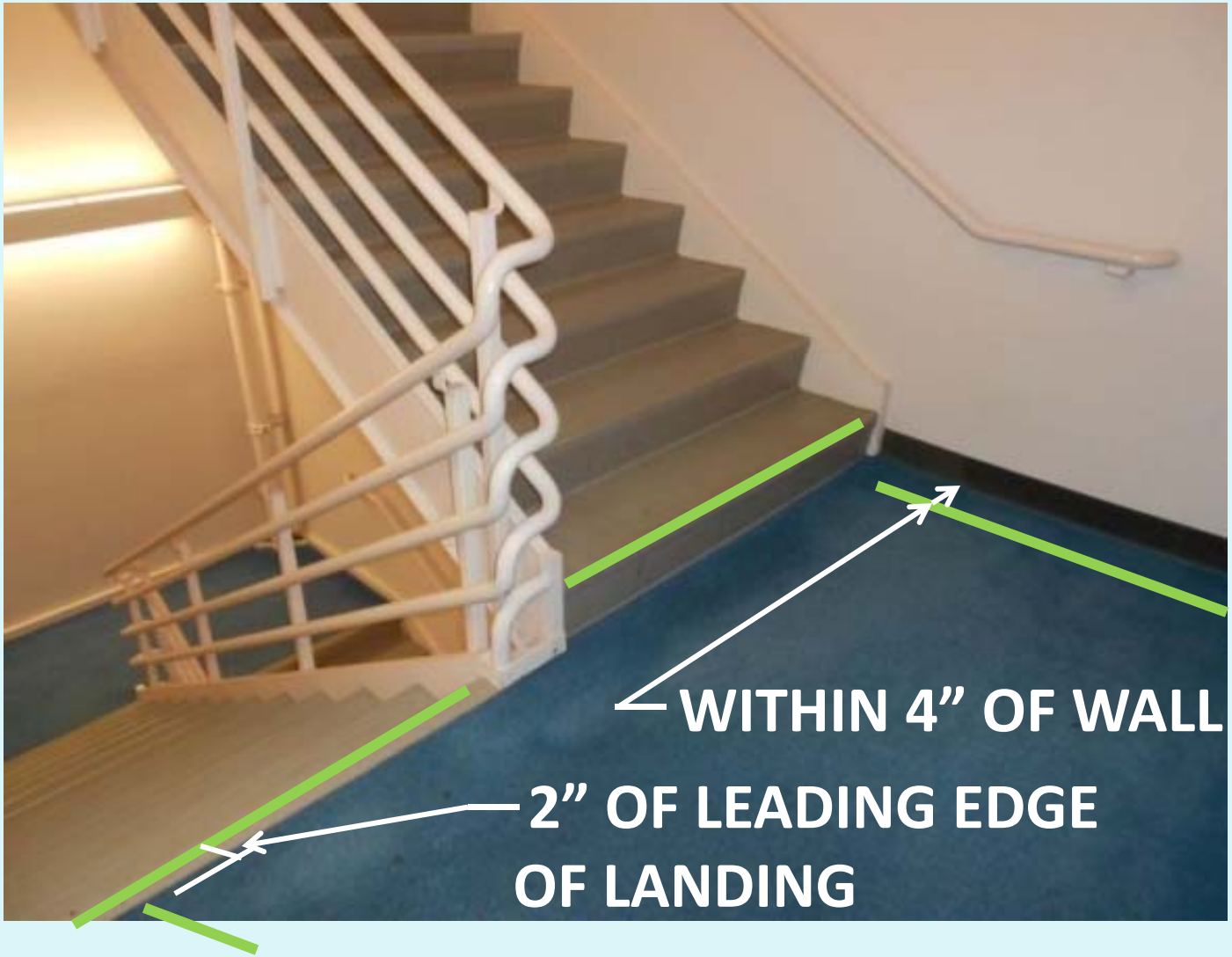
SECTION 1024.5 ILLUMINATION

Minimum means of egress illumination for at least 60 minutes prior to periods when the building is occupied.

SECTION 1024.2.1 Steps

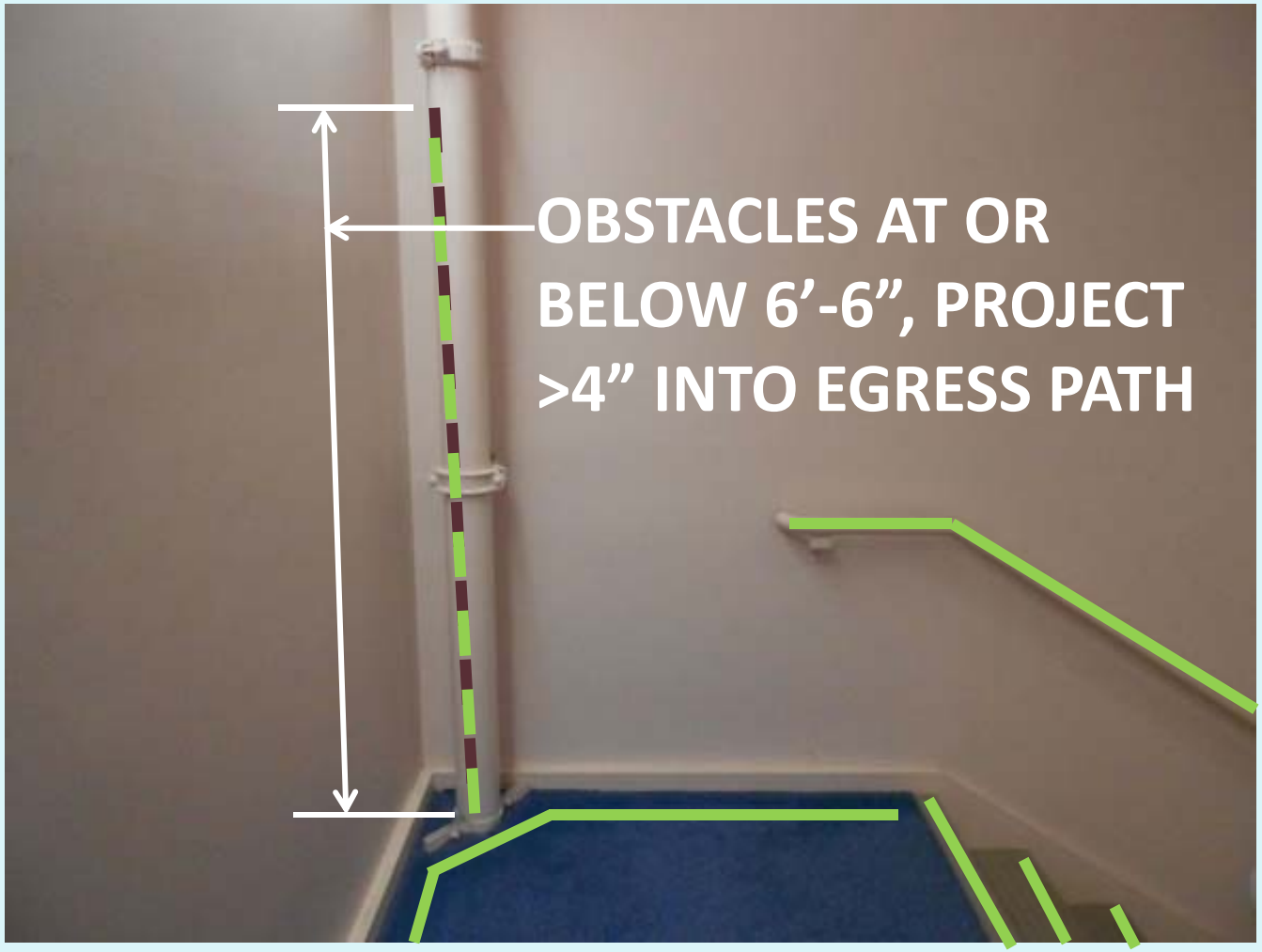
SECTION 1024.2.3 Handrails

SECTION 1024.2.4.1
Floor-mounted demarcation lines

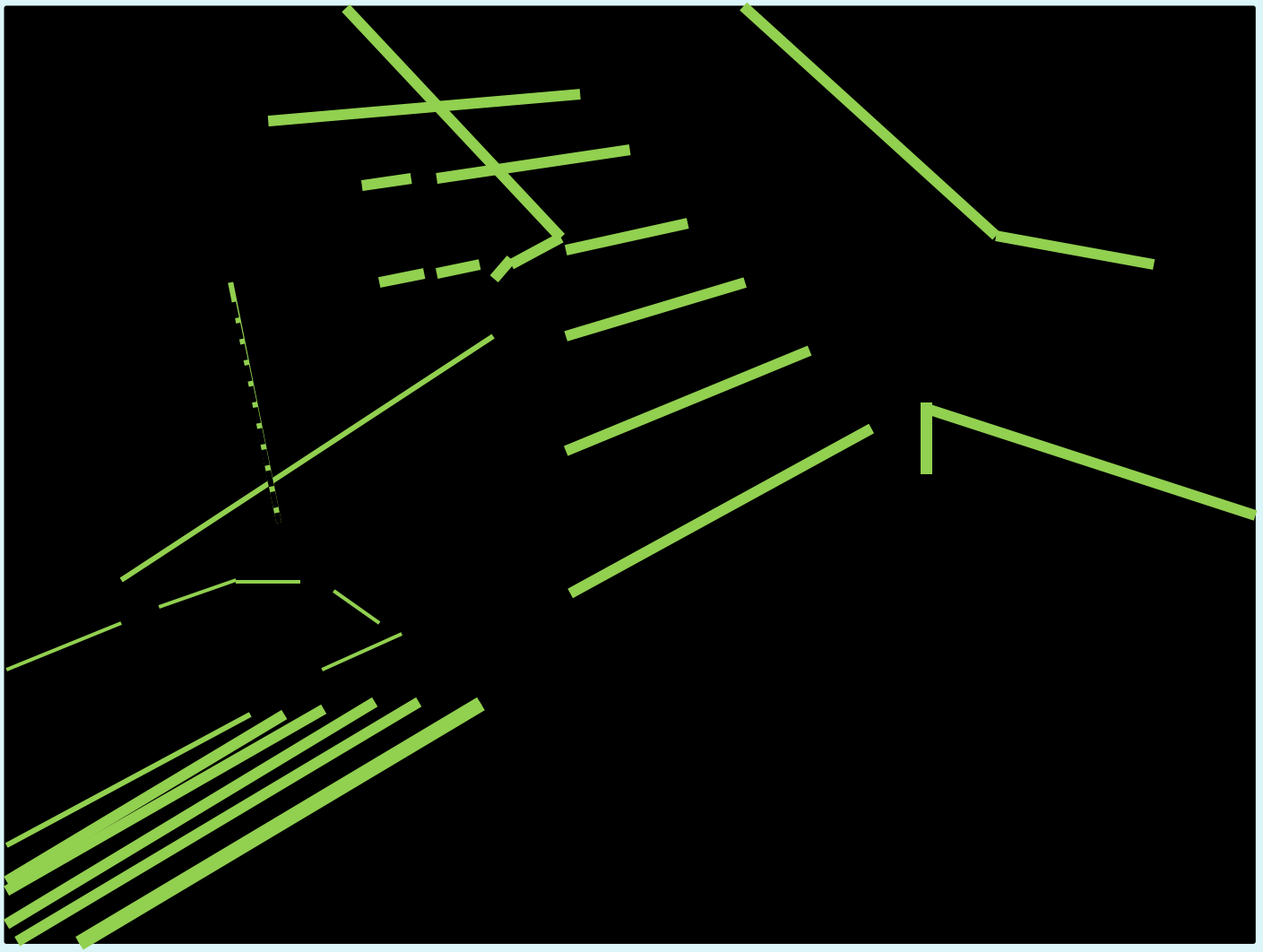


SECTION 1024.2.4.2
Wall Demarcation Lines

SECTION 1024.2.5 Obstacles



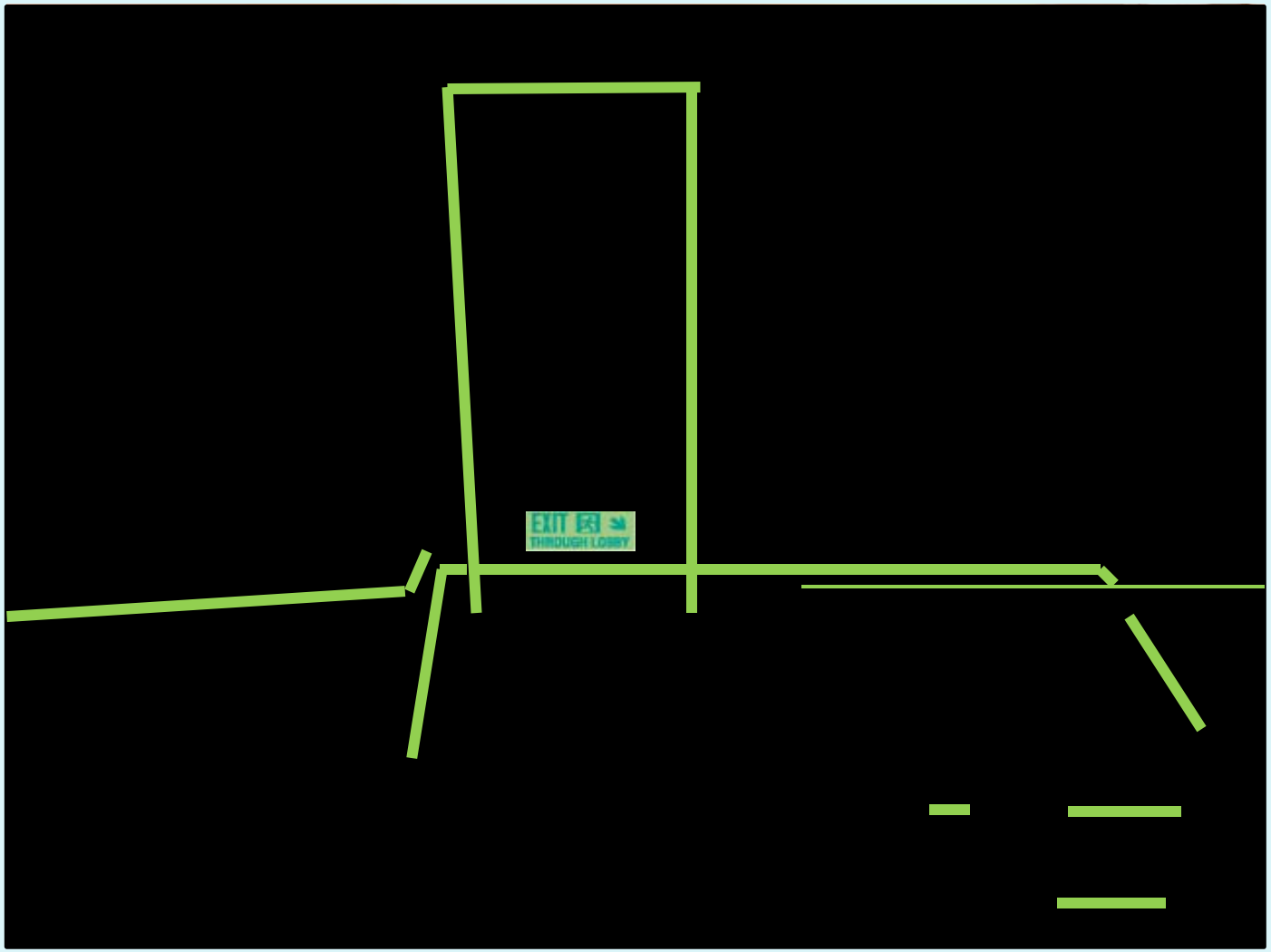
SECTION 1024
LUMINOUS EGRESS PATH MARKINGS



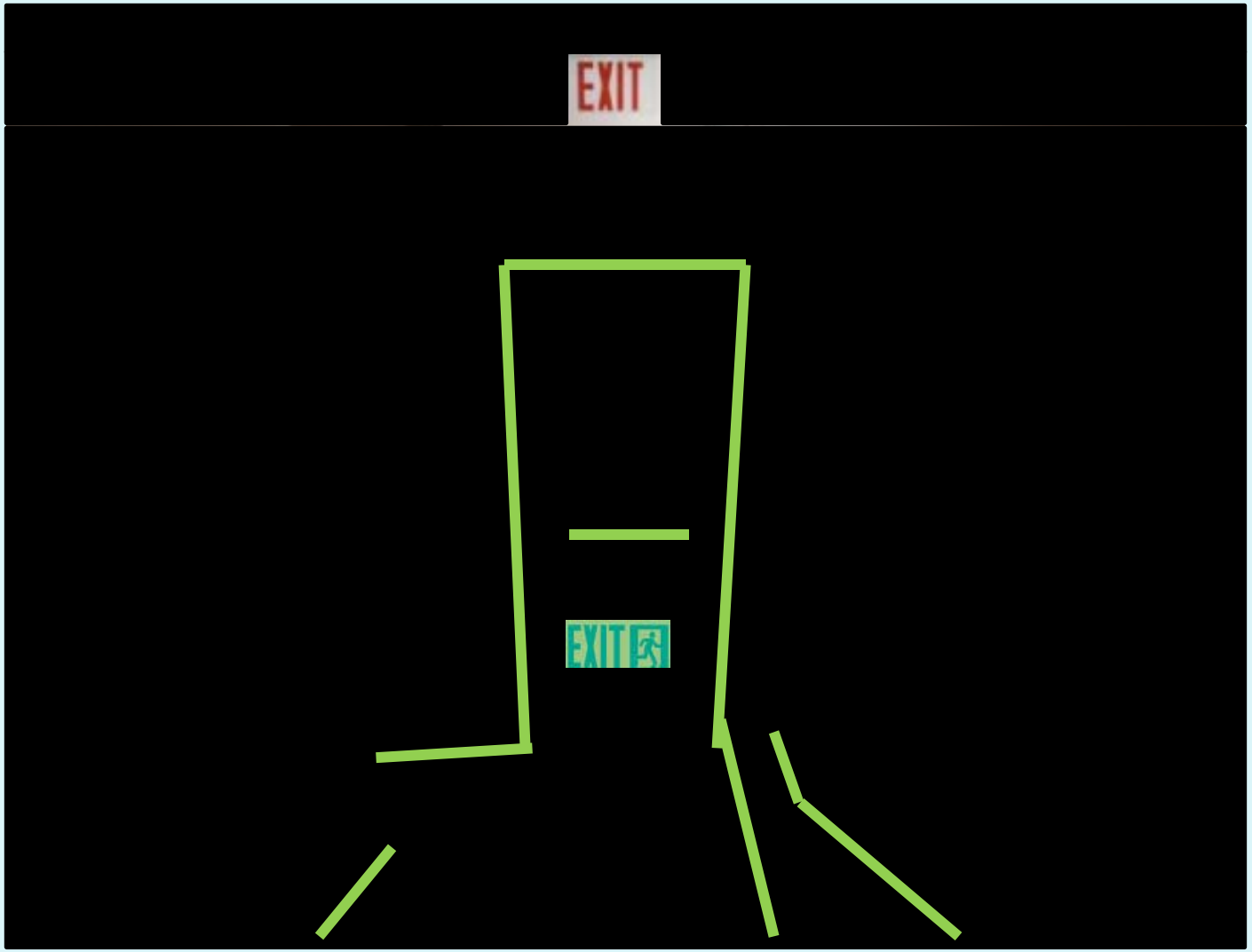
SECTION 1024.2.6.2
Door hardware markings

16 square inches of luminous material.

SECTION 1024.2.6.3
Door frame markings



SECTION 1024.2.6
Door from exit enclosure



ICC A117.1-2009
CHAPTER 11
RECREATIONAL FACILITIES

1. Recreational Boating Facilities.
2. Fishing Piers and Platforms.
3. Swimming Pools.

U.S. DEPARTMENT OF JUSTICE
2010 ADA STANDARD IS MANDATORY ON MARCH 15, 2012.

Thank you!

? Questions ?

Farouk Zaman, RA farouk.zaman@doa.nc.gov

Steve Key, RA steve.key@doa.nc.gov

Eric Tjalma, RA eric.tjalma@doa.nc.gov

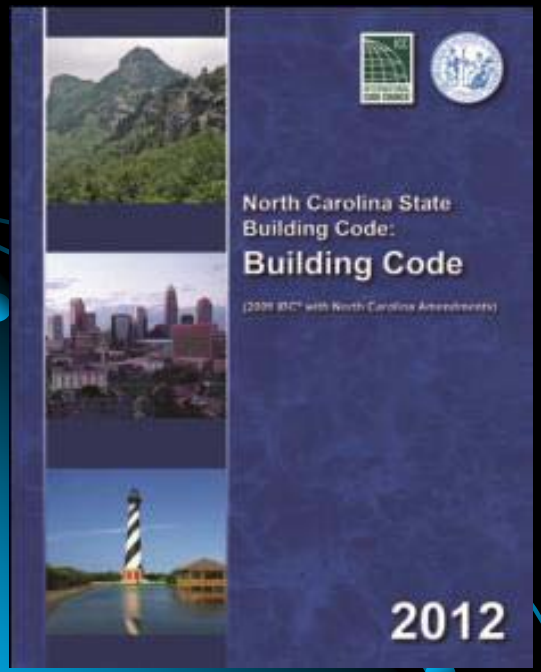
Ronald Little, RA ronald.little@doa.nc.gov

Jim Lora, RA jim.lora@doa.nc.gov

SCO Website – http://www.nc-sco.com

31st Annual State Construction Conference

March 22nd, 2012



Significant Changes to the 2012 NC State Building Code Chapters 16-23

By: Bert Neily, PE

STAFF
CIVIL/STRUCTURAL
ENGINEERS

Bert Neily, PE herbert.neily@doa.nc.gov

Mike Ali, PE michael.ali@doa.nc.gov

Tim Langford, PE tim.langford@doa.nc.gov

SCO Website – http://www.nc-sco.com

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Structural Chapters 16 - 23

2009 IBC

"There were more than **350 proposed code changes** to the structural provisions in **Chapters 16 through 23 of the 2006 IBC**. Of these proposed code changes, **approximately 200 were successful** and [were] incorporated into the **2009 edition** of the IBC." - *Structural Engineer* Magazine

2012 NC

About **60 code changes** via the **2012 NC Amendments**.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Structural Chapters 16 - 23

2009 IBC

2012 NC

Ch. 16 – Structural Design

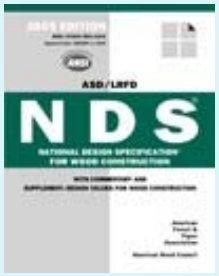
Ch. 21 – Masonry

Ch. 23 – Wood

Increasing Migration to Referenced Standards

ASCE 7-05

ACI 530-08



AF&PA NDS-05

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

TABLE 1604.5
OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

OCCUPANCY CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Occupancy Categories I, III and IV
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000[a]. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Occupancy Category IV. • Buildings and other structures not included in Occupancy Category IV containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released.
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.
b. Not intended for such uses in Categories I, II and III.

Table 1604.5

Is significant because:

- Determines Importance Factors 'I_x'
- Influences Seismic Design Category (SDC = 'C', etc.)
- Determines Req't. for Spec. Insp.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

TABLE 1604.5
OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

2009: • Buildings and other structures with an occupant load greater than 500 for colleges or adult education facilities.

III	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities. • Group I-3 occupancies.

University Dormitory (R-2) with >500 Occupants is a Category II structure.

2012: • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500.

IV	• Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.
b. Not intended for such uses in Categories I, II and III.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

TABLE 1604.5
OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

OCCUPANCY CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Occupancy Categories I, III and IV
	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant
IV	• Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.
b. Not intended for such uses in Categories I, II and III.

• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.

Not a Change Here, But….

"Primary Occupancy" Is not defined in 2012 Code or acknowledged in Appendix 'B'

See IBC Commentary

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

TABLE 1604.5
OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

OCCUPANCY CATEGORY	NATURE OF OCCUPANCY
III	limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000[a]. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Occupancy Category IV.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.
b. Not intended for such uses in Categories I, II and III.

New Footnotes:

- Any other occupancy with an occupant load greater than 5,000[a].

Footnote a.

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

TABLE 1604.5
OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

OCCUPANCY CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Occupancy Categories I, III and IV
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not • Water storage facilities and pump structures required to maintain water pressure for fire suppression[b]. • Buildings and other structures not included in Occupancy Category IV containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released.
IV	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Not intended for such uses in Categories I, II and III.

New Footnotes:
Footnote b.
(NC Amendment)

• Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

b. Not intended for such uses in Categories I, II, and III.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Risk

TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

TABLE 1604.5
OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES

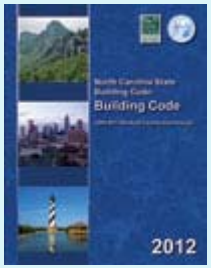
OCCUPANCY CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Occupancy Categories I, III and IV
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000[a]. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Occupancy Category IV. • Buildings and other structures not included in Occupancy Category IV containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released.
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression[b].

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.
b. Not intended for such uses in Categories I, II and III.

Future Change:
"Occupancy Category"
will become
"Risk Category"
In
2012 IBC /2015 NC

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Section 1609 Wind Loads



Wind Application Reference

ASCE 7-05

ASCE 7-02

ASCE 7-98

2012 NC / 2009 IBC

2009 NC / 2006 IBC

2006 NC / 2003 IBC

2002 NC / 2000 IBC

Method 1 – Simplified Procedure (≤ 60'H, etc.)

Method 2 - Analytical Procedure (aka "Difficult")

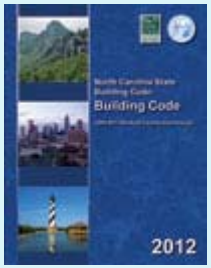
Method 3 – Wind Tunnel Procedure (Infrequent)

Section 1609.6 Simplified wind load method.

Section 1609.6 All-heights method.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Section 1609 Wind Loads



Wind Application Reference

ASCE 7-05

ASCE 7-02

ASCE 7-98

2012 NC / 2009 IBC

2009 NC / 2006 IBC

2006 NC / 2003 IBC

2002 NC / 2000 IBC

Method 1 – Simplified Procedure (≤ 60'H, etc.)

Method 2 - Analytical Procedure (Most SCO)

Method 3 – Wind Tunnel Procedure (Infrequent)

Section 1609.6 Simplified wind load method.

Section 1609.6 All-heights method.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Section 1609 Wind Loads
Section 1609.6 All-heights method.

Features:

- Provides tables for net pressure coefficient "C_{net}"; consolidating multiple ASCE 7 coefficients.
- Eliminates ASCE 7 "zones" for Main Wind Force Resisting System (MWFRS).
- Component & cladding tables still reference ASCE 7 zoned figures.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Section 1609 Wind Loads
Section 1609.6 All-heights method.

"More-heights" ?

Limitations:

- Height Limitation of 75-feet.
- Height/Width Ratio ≤ 4
- Frequency ≥ 1 Hertz ("rigid" structure).
- Must have ASCE 7 simple diaphragm.
- Can't be fully open, have multiple gables, roof steps, or roof slope > 45°.

When Using:

- Stay within limitations.
- Don't mix with other methods.

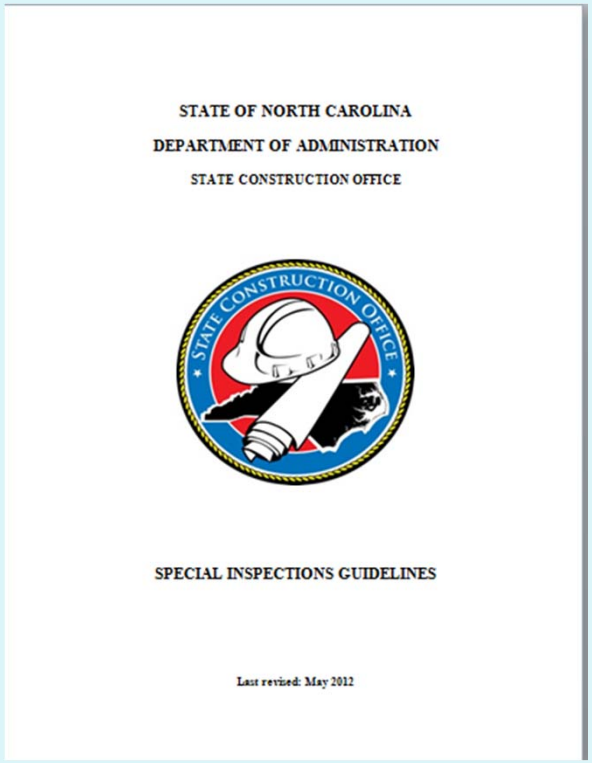
Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Section 1614 Structural Integrity

- Pertains to High-Rise Category III & IV Buildings.
  - Hospitals
  - University Classroom/Lab Buildings
- Structural Continuity & Progressive Collapse
  - Based on ACI 318 structural integrity requirements.
  - IBC adoption prompted by WTC studies.
- Implications
  - Concrete: Minimal – ACI 318
  - Steel: Moderate – Beam & Column Tension
  - Bearing Wall Structures: Substantial – Tie Req’ts.

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Chapter 17
Structural Tests and Special Inspections


STATE OF NORTH CAROLINA
DEPARTMENT OF ADMINISTRATION
STATE CONSTRUCTION OFFICE

SPECIAL INSPECTIONS GUIDELINES

Last revised: May 2012

SCO Special Inspections Guidelines

- Being updated to 2012 Code
- Ready in May 2012

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Chapter 17
Structural Tests and Special Inspections

- 1706 Spec. Insp. For Wind Resistance
- 1707 Spec. Insp. For Seismic Resistance &
  1708 Structural Testing for Seismic Resistance

1704.1.2 Special Inspections requirement.

Established in 2007

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

"Whole Bldg."

1704.1.2 Special inspections requirement. *Special inspections* per Section 1704 are required for building, building components or other structures per the following:

Cat. II
>45'High
>3 Stories
"Tall"

1. Buildings or other structures listed in Table 1604.5 in Occupancy Category II if:
   1.1. Building height exceeds 45 feet (13.7 m) or three stories, or
   1.2. The building is an underground building per Section 405.1:

Cat. III or IV

2. Buildings or other structures listed in Table 1604.5 in Occupancy Categories III or IV;

---

3. Piles, piers and special foundations per Sections 1704.8 through 1704.11, 1810.3.5.2.4 and 1810.3.5.2.5;

4. Retaining walls exceeding 5 feet (1524 mm) height per Section 1806.2 1807.2;

5. Smoke control and smoke exhaust systems;

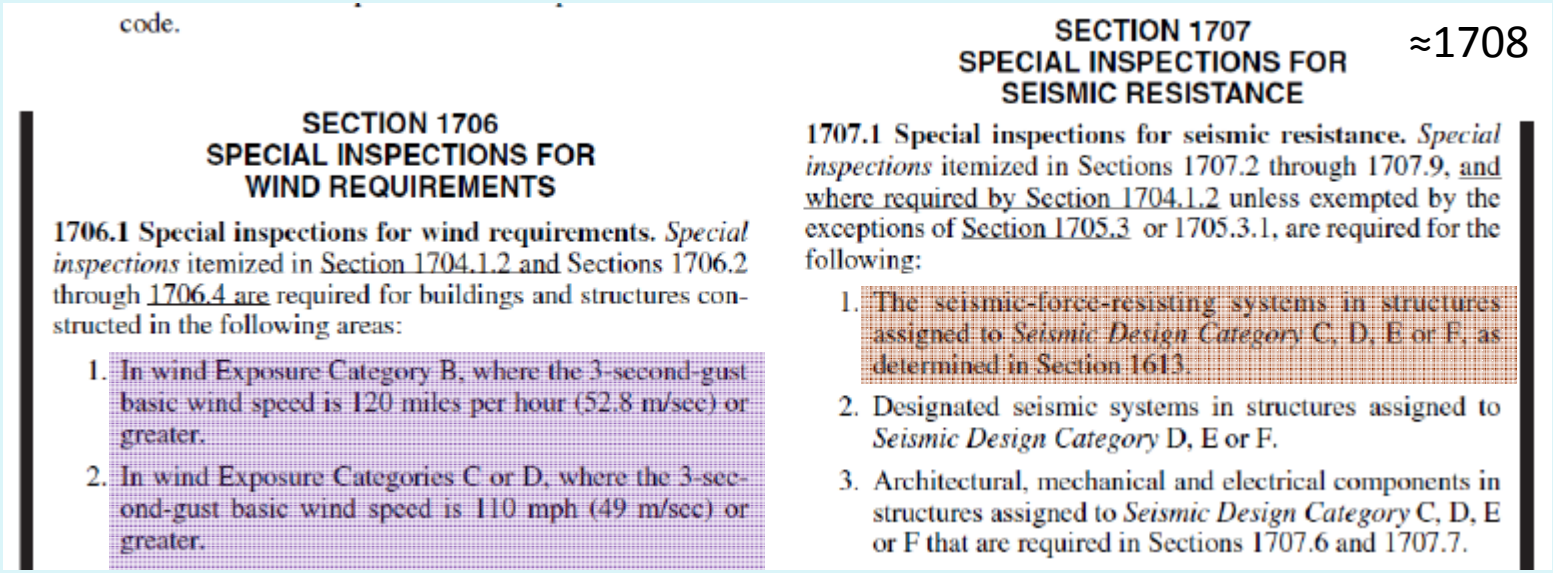
6. Sprayed fire-resistant materials; or

7. Special case described in Section 1704.15.

"Itemized"

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

- 1706 Spec. Insp. For Wind Resistance
- 1707 Spec. Insp. For Seismic Resistance &
  1708 Structural Testing for Seismic Resistance



code.

SECTION 1706
SPECIAL INSPECTIONS FOR WIND REQUIREMENTS

1706.1 Special inspections for wind requirements. *Special inspections* itemized in Section 1704.1.2 and Sections 1706.2 through 1706.4 are required for buildings and structures constructed in the following areas:

1. In wind Exposure Category B, where the 3-second-gust basic wind speed is 120 miles per hour (52.8 m/sec) or greater.
2. In wind Exposure Categories C or D, where the 3-second-gust basic wind speed is 110 mph (49 m/sec) or greater.

SECTION 1707
SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

≈1708

1707.1 Special inspections for seismic resistance. *Special inspections* itemized in Sections 1707.2 through 1707.9, and where required by Section 1704.1.2 unless exempted by the exceptions of Section 1705.3 or 1705.3.1, are required for the following:

1. The seismic-force-resisting systems in structures assigned to *Seismic Design Category* C, D, E or F, as determined in Section 1613.
2. Designated seismic systems in structures assigned to *Seismic Design Category* D, E or F.
3. Architectural, mechanical and electrical components in structures assigned to *Seismic Design Category* C, D, E or F that are required in Sections 1707.6 and 1707.7.

Exp. Cat. B, ≥ 120 MPH
Exp. Cat. C, ≥ 110 MPH
"High Wind"

Seismic Design Categories C, D, E, F
"High Seismic"

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

code.

NC Amendments

SECTION 1706
SPECIAL INSPECTIONS FOR WIND REQUIREMENTS

1706.1 Special inspections for wind requirements. *Special inspections* itemized in Section 1704.1.2 and Sections 1706.2 through 1706.4 are required for buildings and structures constructed in the following areas:

1. In wind Exposure Category B, where the 3-second-gust basic wind speed is 120 miles per hour (52.8 m/sec) or greater.
2. In wind Exposure Categories C or D, where the 3-second-gust basic wind speed is 110 mph (49 m/sec) or greater.

≠

SECTION 1707
SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

1707.1 Special inspections for seismic resistance. *Special inspections* itemized in Sections 1707.2 through 1707.9, and where required by Section 1704.1.2 unless exempted by the exceptions of Section 1705.3 or 1705.3.1, are required for the following:

1. The seismic-force-resisting systems in structures assigned to *Seismic Design Category* C, D, E or F, as determined in Section 1613.
2. Designated seismic systems in structures assigned to *Seismic Design Category* D, E or F.
3. Architectural, mechanical and electrical components in structures assigned to *Seismic Design Category* C, D, E or F that are required in Sections 1707.6 and 1707.7.

"….an act of abject inconsistency…"

Member of Ad-Hoc Structural Committee, NC Code Council

Intended inconsistency: In NC,
High Wind Event is *More Likely* than Seismic Event

Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Chapter 17 Structural Tests and Special Inspections

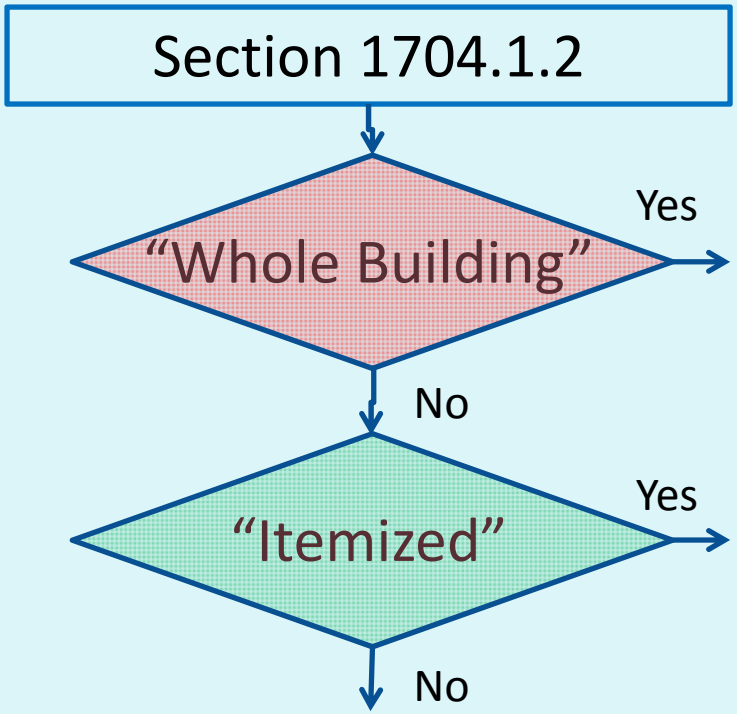
Section 1704.1.2

"Whole Building"

1. Cat. II - "Tall" only
2. Cat. III or IV

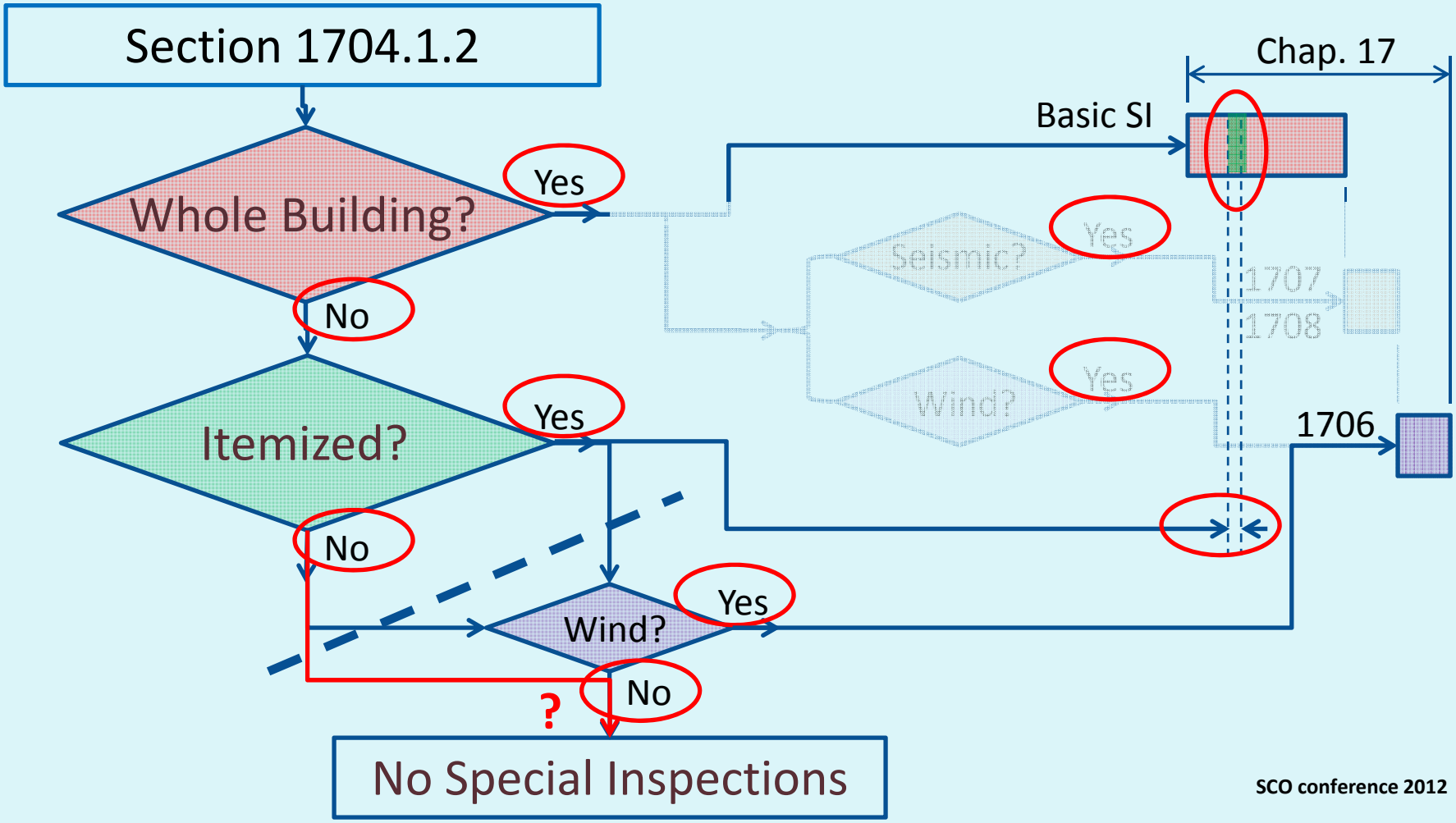
"Itemized"

3. Piles, Piers….
4. Retaining Walls
5. Smoke Systems
6. Sprayed Fire Protection
7. Special Conditions



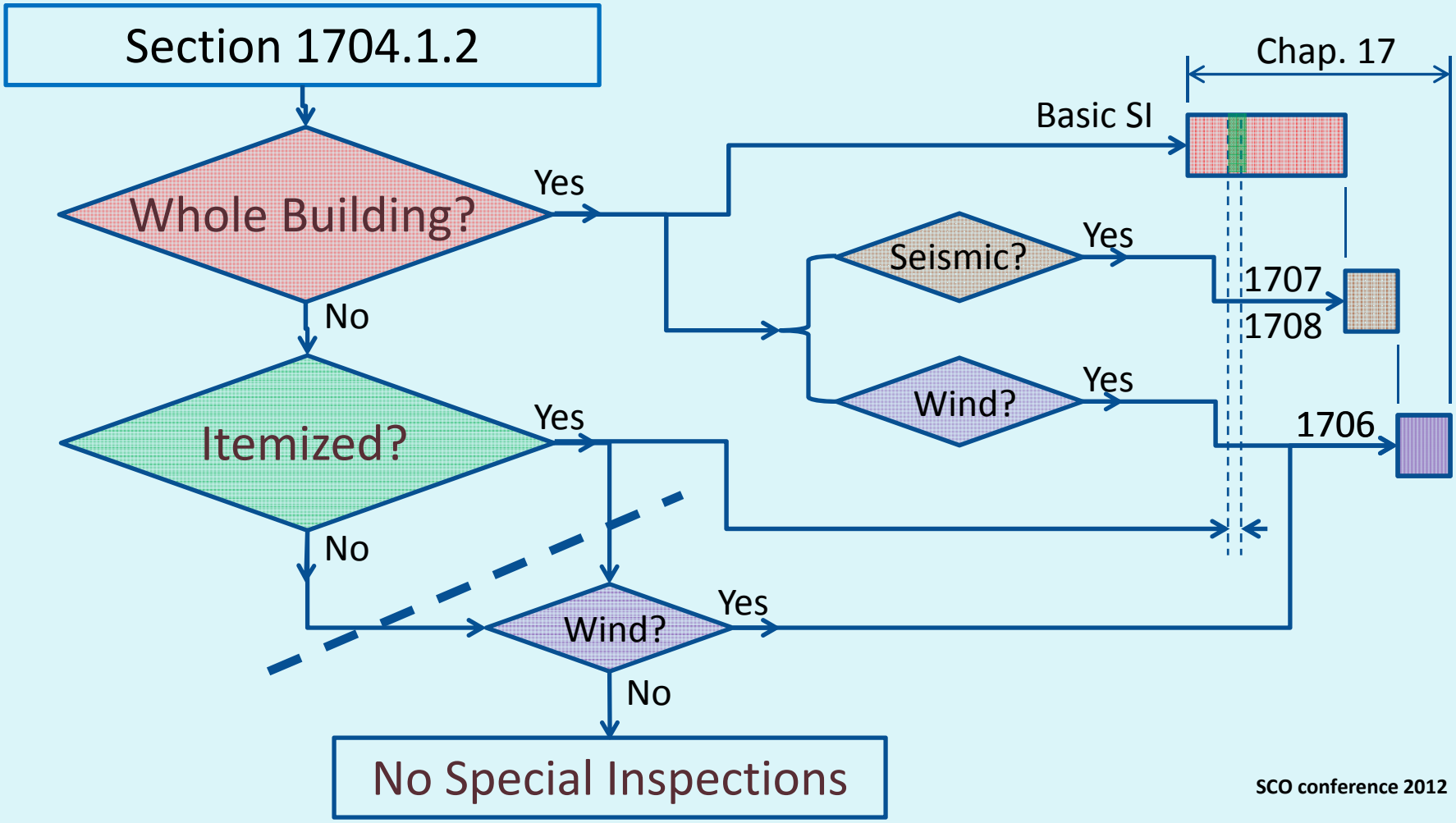
Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Chapter 17 Structural Tests and Special Inspections



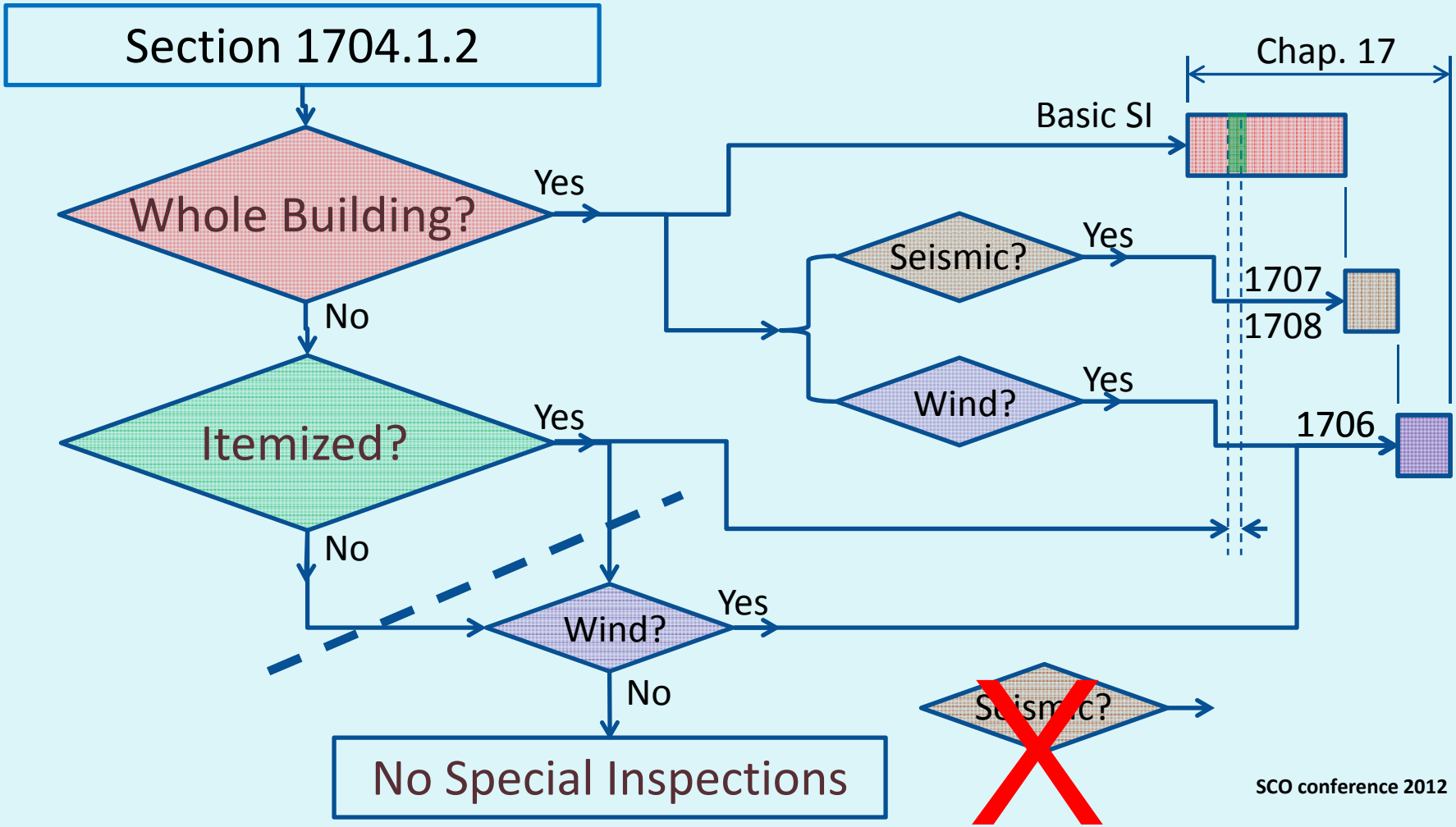
Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Chapter 17 Structural Tests and Special Inspections



Changes to the NORTH CAROLINA STATE BUILDING CODE 2012

Chapter 17 Structural Tests and Special Inspections



Chapter 17
Structural Tests and Special Inspections
Miscellaneous Changes:

- 1704.3.4 & 1704.6.2
  Light Gage Metal Trusses & Wood Trusses
  with Spans > 60':
  Added SI for permanent & temporary bracing.
- 1704.12
  Sprayed Fire-Resistant Materials:
  Increased scope & clarified timing of fireproofing SI.
  Reminder: Sprayed fire-resistant material is an
  "Itemized" SI per Section 1704.1.2.

Chapter 18
Soils and Foundations

- IBC Chapter 18 is completely rewritten.
  No margin bars (|).
- Definitions:
  Extensively revised to reflect current practice.
- Helical Piles:
  Now addressed by Code (Including Chapter 17 SI).

Chapter 18
Soils and Foundations

NC Amendment Carryovers:

- 1805.4.2 Foundation Drain
- 1806.2 Presumptive Load-Bearing Values
- 1807.2.5 Retaining Systems
- 1809.4 Depth and Width of Footings
- 1810.3.5.2.4 &5 Pile Test & (Pile) Qual. Contr.

Chapter 21
Masonry

- Continued migration to ACI 530-08
- Autoclaved Aerated Concrete (AAC) masonry added (w/corresponding Seismic criteria in Chapter 16).
- 2109 Empirical Design of Masonry:

Chapter 21
Masonry

- 2109 Empirical Design of Masonry:

2009 NC / 2006 IBC:

6 Pages of IBC provisions with several NC tables.

2009 IBC:

2109.1 General. Empirically designed masonry shall conform to the requirements of Chapter 5 of TMS 402/ACI 530/ASCE 5, except where otherwise noted in this section.

2012 NC / 2009 IBC: NC Amendment

6 Pages of 2009 NC / 2006 IBC tables/provisions.

Table 2109.1.1 Empirical Wind Limitation *clarified*.

<u>All underlined</u>.

2101.2.3 or the foundation wall provisions of Section 1807.1.5.

Chapter 22
Steel

- 2209 & 2210
  Cold-Formed Steel & Light-Frame Construction:
  - References to AISI Standards for design.
- 2210.3 Trusses: New, *Similar* to Chap. 23 Wood
  - Truss design & placement drawings sealed.
  - Truss submittal package approved by Registered Design Professional In Resp. Charge.
  - >60’ span: Registered Design Prof. does bracing.
  - >60’ span: Special inspections required.

Chapter 23
Wood

- Continued migration to AF&PA NDS-05
- 2303.4 Trusses:
  - Truss design ~~& placement~~ drawings sealed.
  - Truss placement drawings sealed if deviation.
  - Truss submittal package approved by Registered Design Professional In Resp. Charge.
  - >60’ span: Registered Design Prof. does bracing.
  - >60’ span: Special inspections required.

Thank You!
Questions?

Bert Neily, PE herbert.neily@doa.nc.gov

Mike Ali, PE michael.ali@doa.nc.gov

Tim Langford, PE tim.langford@doa.nc.gov

SCO Website – http://www.nc-sco.com