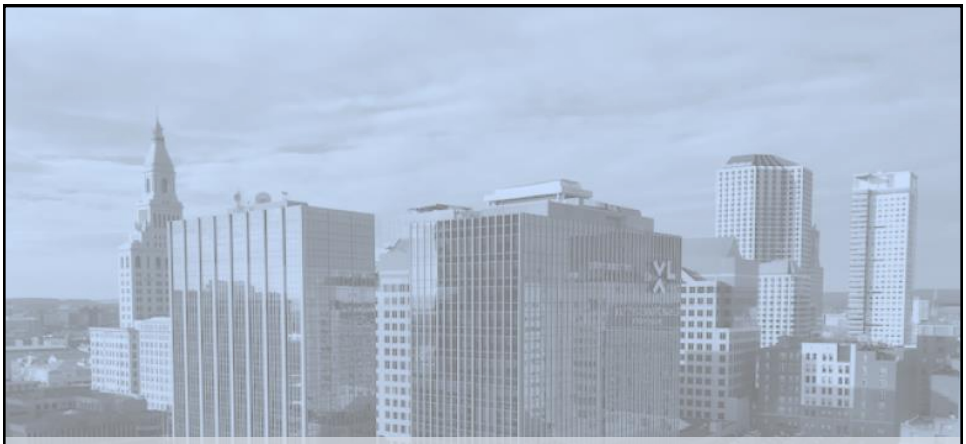
2020 Connecticut State Building and Fire Codes

Find the most current schedule at
https://portal.ct.gov/DASCodeChange

Completed: 2020 Amendments Drafted and Code Change Proposals Received

- 11/13/19 Committees/Work Groups Review
- 12/11/19 Final Drafts Developed
- 1/8/20 Drafts Reviewed
- 2/16/20 Codes and Standards Drafts Approval
- 2/29/20 Public Comment Period
- 5/31/20 Legislative Review/Approval
- 10/1/20 Code Takes Effect



Fire Protection Systems

Spring 2020 Career Development Series

Brad Cronin, CFPS, Vice President, Fire Protection
Strategic Code Solutions

DAS Office of Education and Data Management

Course Objectives

At the end of this session, participants will be able to:

1. Define and identify Fire sprinkler systems; Fire-extinguishing systems; Standpipe systems; Fire alarm and detection systems; Smoke control systems; and Smoke removal systems
2. Explain why a fire protection system must conform to code criteria and referenced standards.

3

Course Objectives

3. Determine where and when fire protection systems are required.
4. Explain the principles of how a fire protection system detects and manages a fire.
5. Understand the relationship between the codes and the referenced standards including the IFC, the IBC, State Fire Prevention Code and reference standards including from NFPA.

4

Fire Protection Systems Types

5

Fire Protection System Types

- Active Systems
  - *Power* needed for operation

- Passive Systems
  - Do not require power

6

Active Systems

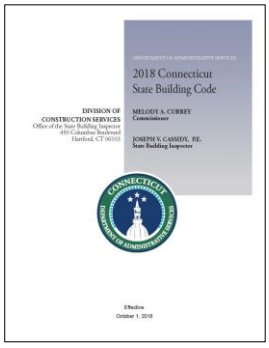
- Built to achieve a goal of fire protection
  - Detect
  - Suppress
  - Notify

7

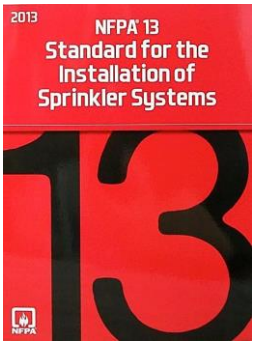
Automatic Sprinkler Systems

8

Sprinkler Systems



Where a system is needed



How a system is to be installed

9

Sprinkler Systems

- Built to control or suppress a fire
- Need one capable automatic water supply
  - Flow
  - Pressure
  - Duration

10

Installation Rules

- Mandated by NFPA 13, 2013 edition
- Sprinklers installed throughout
- Specific distances from standard and listing rules
  - Max/min from ceiling
  - Max/min from next sprinkler
  - Max/min from wall or obstructions
- Areas where sprinklers can be omitted

11

Occupancy Classification

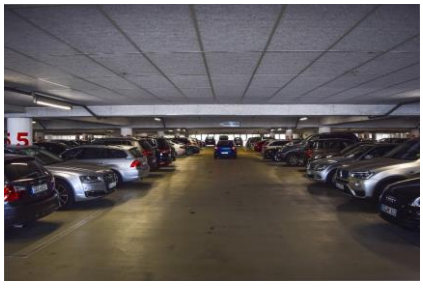
- Each area classified based on expected fire
  - Heat release and speed of movement
- Dictates location of sprinklers and water discharge requirements
- A change requires an evaluation of the system
  - NFPA 25

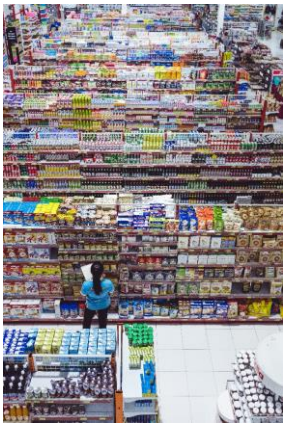
12

Light Hazard

13

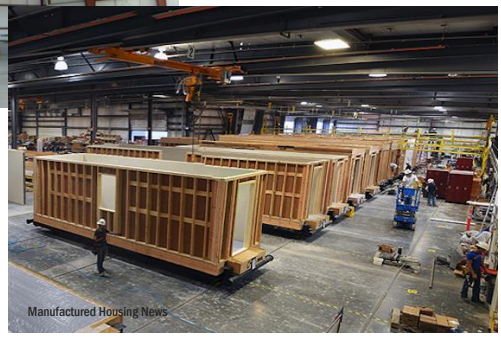
Ordinary Hazard





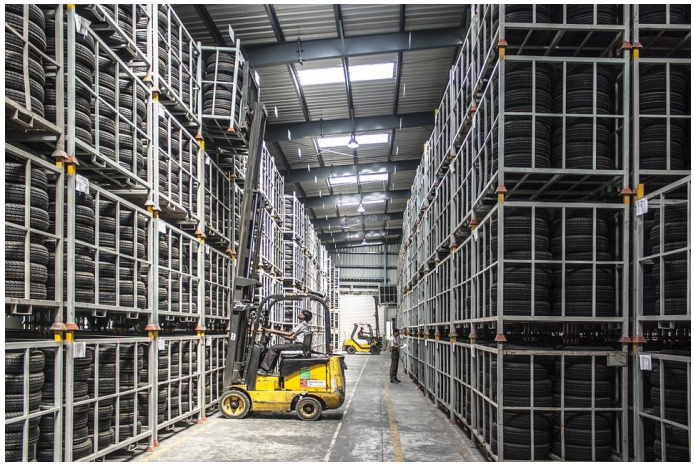
14

Extra Hazard



15

Commodity Classification



16

Commodity Classification

- Type of product
- Type of packaging
- Type of pallet

17

System Types

- Wet System
- Dry System
- Preaction System
- Deluge System
- Antifreeze
- Circulating Closed Loop
- Commercial Cooking Protection

18

Wet System

19

Dry System

20

Preaction System

https://www.victaulic.com/

21

Deluge System

https://www.reliablesprinkler.com/

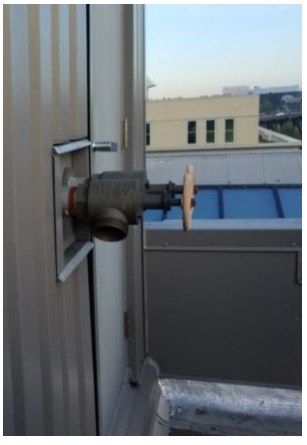
22

Standpipe Systems

23

Standpipe Systems

- Types
  - Automatic
  - Semi-automatic
  - Manual
- Classes
  - Class I
  - Class II
  - Class III



- NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2013 edition

24

Standpipe Types

- Manual
  - No automatic water supply
  - FD supplies flow and pressure
- Automatic
  - Built in water supply
  - Building supplies flow and pressure
- Semi-automatic
  - Needs manual intervention to start
  - Otherwise, same as above

25

Standpipe Classes

- Class I
  - 2 ½" hose connection for FD use
- Class II
  - 1 ½" hose station for trained occupant use
- Class III
  - Both Class I and II combined

26

Class I

27

Class II

Downtowngal [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)]

28

Class III

29

Fire Pumps and Tanks

30

Fire Pumps

- Not required by building or fire code
- Necessary where pressure increase needed to meet design
- Follows NFPA 20, *Stationary Pumps for Fire Protection*, 2013 edition

31

Tanks for Fire Protection

- May be required by building or fire code
  - Special circumstances, very tall buildings
- Necessary where volume of water is needed and not available
- Follows NFPA 22, *Standard for Water Tanks for Private Fire Protection,* 2008 edition

32

Fire Alarm Systems

33

Fire Alarm System Types

- Protected Premises Fire Alarms
- Emergency Communications Systems (ECS)
- Supervising Station Alarms

34

Protected Premises

- Signals on-site
- Notify occupants or staff of emergency
- Activated by manual and automatic means

35

Emergency Communications

- Voice alarm
- Mass notification
- Wide-area notification
- Two-way communication

36

Supervising Station

- Central Station
- Proprietary Station
- Remote Station

https://www.firelite.com/

37

Initiating Devices

- Automatic
  - Respond to certain conditions (smoke/heat)
- Manual
  - Need human intervention

Ben Schumin

https://www.lifesafetycom.com/

38

Notification

- Public mode
  - Meant for notification and evacuation of occupants
- Private mode
  - Notify staff and elicit response

39

Smoke Control Systems

40

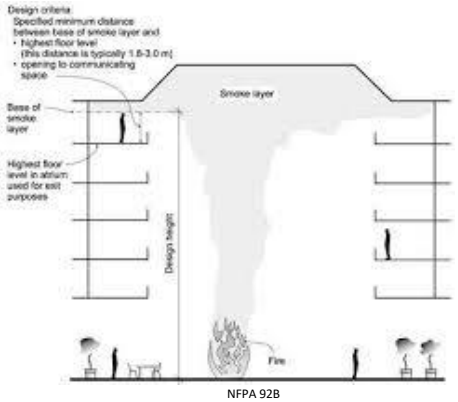
Smoke Control

- Managing the movement of smoke in certain areas
- Uses mechanical venting
- Pressurizing areas such as stairwells and elevator lobbies
- Used in large spaces such as atria, mall buildings and high-rise

41

Smoke Control

- Not prescriptive in nature
- Goal based design by engineer
- NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*



NFPA 92B

42

Smoke and Heat Venting

43

Smoke and Heat Venting

- Applies to large areas open areas
- Attempts to limit horizontal fire spread
- Uses curtains to create compartment and vents in roof
- Controversial when used with sprinklers
- NFPA 204, *Standard for Smoke and Heat Venting*

44

Building Code Requirements

45

Sprinkler Requirements

46

Sprinkler Systems

- Driven by
  - Height and area
  - Construction type
  - Occupancy and occupant load
- May be a trade-off

47

Building Height Table

TABLE 504.3[a]
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
A, B, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
H-1, H-2, H-3, H-5	NS[c, d]	UL	160	65	55	65	55	65	50	40
	S									
H-4	NS[c, d]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-1 Condition 1, I-3	NS[d, e]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-1 Condition 2, I-2	NS[d, f, e]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85						
I-4	NS[d, g]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
R	NS[d, h]	UL	160	65	55	65	55	65	50	40
	S13R	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	85	70	60

For SI: 1 foot = 304.8 mm.

Note: UL = Unlimited; 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.

48

Stories Above Grade

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

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION									
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V		
		A	B	A	B	A	B	HT	A	B	
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					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	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	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.

49

Allowable Area

TABLE 506.2[a, b]—continued
ALLOWABLE AREA FACTOR (A_a = NS, S1, S13R, or SM, as applicable) IN SQUARE FEET

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
I-1	NS[f, *]	UL	55,000	19,000	10,000	16,500	10,000	18,000	10,500	4,500
	S1	UL	220,000	76,000	40,000	66,000	40,000	72,000	42,000	18,000
	SM	UL	165,000	57,000	30,000	49,500	30,000	54,000	31,500	13,500
I-2	NS[f, *]	UL	UL	15,000	11,000	12,000	NP	12,000	9,500	NP
	S1	UL	UL	60,000	44,000	48,000	NP	48,000	38,000	NP
	SM	UL	UL	45,000	33,000	36,000	NP	36,000	28,500	NP
I-3	NS[f, *]	UL	UL	15,000	10,000	10,500	7,500	12,000	7,500	5,000
	S1	UL	UL	45,000	40,000	42,000	30,000	48,000	30,000	20,000
	SM	UL	UL	45,000	30,000	31,500	22,500	36,000	22,500	15,000
I-4	NS[f, #]	UL	80,500	28,500	13,000	23,500	13,000	25,500	18,900	9,000
	S1	UL	121,000	106,000	52,000	94,000	52,000	102,000	74,000	36,000
	SM	UL	181,500	79,500	39,000	70,500	39,000	76,500	55,500	27,000
M	NS	UL	UL	21,500	12,500	18,500	12,500	20,500	14,000	9,000
	S1	UL	UL	86,000	50,000	74,000	50,000	82,000	56,000	36,000
	SM	UL	UL	64,500	37,500	55,500	37,500	61,500	42,000	27,000
R-1	NS[f, h]	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
R-2	NS[f, h]	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
R-3	NS[f, h]									
	S13R	UL	UL	UL	UL	UL	UL	UL	UL	UL

50

Assembly

- Sprinklers cover the assembly area
- Must also cover any stories between assembly use and level of exit discharge
- Required where assembly use is not on the level of exit discharge
- Required for specific groups…

51

Sprinklers Required

- For A-1, A-3, and A-4
  - >12,000 ft^2
  - OL >300
  - Multitheater (A-1 only)

52

Group A-2 – Fire Area

- >5,000 ft^2
- OL >300 or >100 in…

53

Ambulatory Care

- Sprinklers cover entire floor and to level of exit discharge
- 4 or more occupants incapable of self-preservation
- Any located above L.E.D.

54

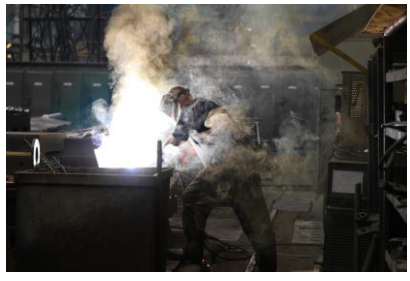
Educational

- Fire area >12,000 ft^2
- Below L.E.D.
- Gen Statutes of CT, Sec 29-315 supersedes building code

55

Group F-1 – Fire Area

- >12,000 ft^2
- >3 stories above grade
- >24,000 ft^2 cumulative of all F-1 fire areas
- >2,500 ft^2 when
  - Upholstered furniture
  - Mattresses
  - Woodworking



56

High-Hazard Occupancies

- Required in all
- Specific sprinkler criteria for H-5

57

Institutional

- Required in all with some exception
  - 13R allowed in I-1 Cond 1
  - I-4 at L.E.D with each room having exterior door
  - I-4 just that level and down to L.E.D

58

Mercantile

- Throughout building
- Group M fire area
  - >12,000 ft^2
  - >3 stories above grade
  - Combined area of all group m 24,000 ft^2
- Throughout stories below L.E.D >2,500 ft^2

59

High-Piled Storage

- "Big-box" stores
- All require sprinklers

60

Residential

- All newly constructed
- Existing with change of use or addition
- Exceptions:
  - Bed and breakfast
  - R-2 conversion with criteria
  - Older R-2 conversion
  - Horizontal additions, sprinkler in new only
  - Only 2 dwelling units with criteria

61

Storage

- Moderate Hazard (S-1) fire area
  - >12,000 ft^2
  - >3 stories above grade
  - Combined areas >24,000 ft^2
  - Commercial motor vehicle storage >5,000 ft^2
  - Upholstered furniture or mattress storage >2,500 ft^2
- Enclosed Parking Garage (S-2)
  - 12,000 ft^2
  - Beneath other use groups other than R-3

62

Storage

- Repair Garage
  - ≥ 2 stories and >10,000 ft^2 fire area
  - 1 story and >12,000 ft^2 fire area
  - Below grade repair garage
  - Commercial motor vehicle repair >5,000 ft^2

63

Tire Storage

- Storage over 20,000 ft^3
- Whole building protected

64

Other Areas

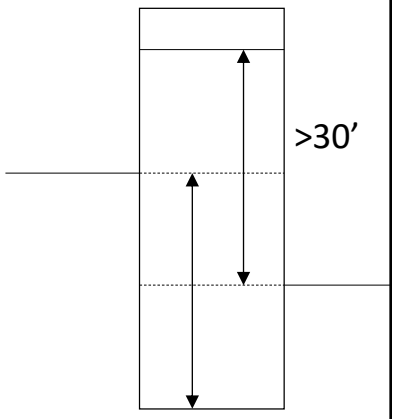
- Buildings with limited openings
- Trash & linen chutes
- Tall buildings
- Special occupancy requirements, Building Code Ch 4

65

Standpipe Requirements

Standpipes

- Class III required where…
  - Floor level
  - FD Access
- Class I with sprinklers



67

Open Parking

- Manual allowed up to 150’
- Manual dry allowed

68

Assembly Use

- OL >1,000 and nonsprinklered
  - Class I automatic wet
- Exception
  - Open-air seating
  - Can be manual or semiautomatic in non-highrise

69

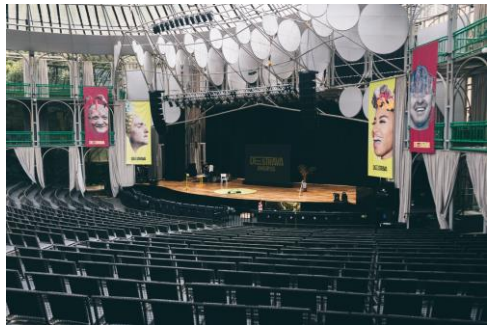
Covered Malls

- If not triggered by height then…
- Class I hose connections to sprinkler system
  - Design for 250 gpm, <50 psi drop

70

Stages

- When >1,000 ft^2
  - Class III wet
  - 1 ½" connections with sprinklers



71

Other Areas

- Underground buildings
- Helistops and heliports
- Marinas and boatyards
- Rooftop gardens and landscaped roofs

72

Fire Alarm Requirements

73

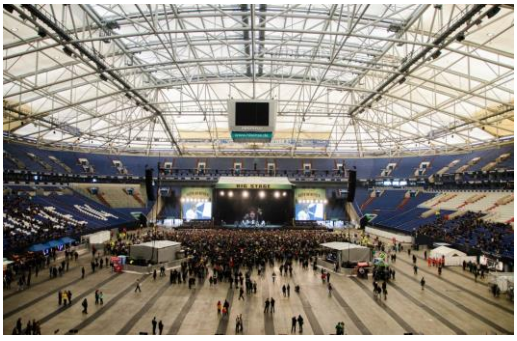
Fire Alarm Requirements

- Driven by occupancy or hazard
- Minimum one manual pull station
  - Exempts systems dedicated to elevator recall and…
  - R-2

74

Assembly

- OL >300
- OL >1,000 needs voice communication



75

Business

- OL on all floors ≥ 500
- OL >100 above or below L.E.D.
- Ambulatory Health Care
  - Smoke detection throughout and in public use areas
  - Above exempt with sprinklers

76

Education

- EVAC system
- No manual w/OL <50
- No EVAC w/OL <100
- Manual omitted w/automatic detection
  - Corridor smokes
  - Heat detection in other areas

77

Factory/Industrial

- Manual when…
  - ≥ 2 stories
  - ≥ 500 above or below L.E.D.
- Sprinkler exception

78

Hazard/Industrial

- Manual in…
  - H-5 and organic coatings manufacture
- Automatic smoke detection
  - Highly toxic gases, organic peroxides, and oxidizers
  - Follow IFC

79

Institutional

- Manual fire alarm required
  - Can be at attended staff locations
  - Private mode signaling acceptable

80

Occupancy Requirements

- Continues through remaining sections of 907 of the building code
- Specific for hazards found in certain occupancies

81

Smoke Control Systems

82

Smoke Control

- Atria
  - Connecting more than 2 stories
  - All in I-2 and I-1 Cond 2
- Underground Buildings
- Windowless Buildings
- Some stages
- Smoke-protected Assembly Seating

83

Smoke Removal

84

Smoke Removal

- Industrial or Storage
  - >50,000 ft^2
- High-Piled Storage

85

Questions?

86

Use of OEDM Training Materials

Use of Office of Education and Data Management (OEDM) training materials must be approved in writing by the State of Connecticut, Department of Administrative Services' Office of Communications. In approving of such use, the State of Connecticut assumes no liability associated with such use, including, but not limited to, the user's dissemination of any inaccurate information or interpretation in connection with its use of these training materials. Use of the training materials is at the sole risk of the user, and the State's approval of the use does not constitute an endorsement of the user or its intended use.

87

Brad Cronin, CFPS

(781) 524-7000 x102

bcronin@codestrategist.com

88