780 CMR: MASSACHUSETTS AMENDMENTS TO THE *INTERNATIONAL BUILDING CODE 2021*

CHAPTER 9: FIRE PROTECTION SYSTEMS

901.1 Add five notes, as follows:

Note 1. In subsections 904.2, 907.1.1, 909.7, 909.8, 909.9, 909.10, 909.19 the term "fire official" or "building official" is to be substituted with the terms "*building official* in consultation with the fire official". The fire official may appeal a *building official* action per Chapter 1.
Note 2. In subsection 903.1.1, the term "fire code official" is to be substituted with the term "*building official* and fire official".
Note 3. In subsection 918, the term "fire code official" is to be substituted with the term "*fire official*".
Note 4. Reference to the International Fire Code shall be applied in accordance with subsection 101.4.5 of this code.
Note 5: Reference to the International Fire Code shall mean the International Fire Code in the following sections: Table 903.2.11.6, 905.1, Table 906.1, 906.1#5, 907.2.15, 910.2.2.

901.2 Revise the exception as follows:

Exceptions: Any *fire protection or life safety system* or portion thereof not required by this code shall be permit- ted to be installed for partial or complete protection provided that such system shall meet the requirements as set forth in the applicable NFPA standard in Chapter 35.

901.2.1 Add section 901.2.1 as follows:

901.2.1 Alternative Fire Protection Designs. Where alternative fire protection designs, which vary from any prescriptive requirements of this Chapter, are to be utilized, the owner shall engage an independent registered design professional, to review said alternative design. The scope of the review shall include, but not be limited to:

a. Design assumptions, methodologies, and resulting proposed system designs, to determine whether or not:
i. the proposed fire protection systems and any other systems which are affected by the alternative design, are consistent with the objectives and prescriptive provisions of this Chapter;
ii. they all conform to accepted engineering practice.

b. Preparation of a written report to the building official as to the appropriateness of the proposed design specifically listing any variances from the prescriptive provisions of this Chapter and describing, in detail, the design provisions used to achieve compliance. If the reviewing engineer concurs with the proposed design, the owner shall make application for a variance, to the Appeals Board per Chapter 1. In addition to all supporting information and materials, the reviewing engineering's report required per this exception shall be included in the application for variance. A permit shall not be issued until the variance, if required, has been granted, or unless the permit is issued in part per Chapter 1.

When a variance is granted per this exception for a bulk merchandising retail building as defined in Chapter 4 and when the condition is common to future buildings of the owner, the BBRS, upon request of the owner, may provide that the variance shall be applicable to such future buildings. If such request is made, a quorum of the BBRS shall hear the appeal. Each such application to a future building will be subject to determination as prescribed per Chapter 1 by the building official in consultation with the fire official.

901.2.2 Add section as follows:

901.2.2 Submittal Process. This process includes the three tiers of the minimum document submittal requirements. This process does not preclude the permit applicant from submitting additional documents; for example, shop drawings along with the construction documents at time of permit application.

1. **Tier One, Construction Documents**. Prior to issuance of a Building permit, construction documents for the fire protection system must be submitted in accordance with section 107. The construction documents shall contain sufficient information to completely describe each of the fire protection system(s) for which a Building permit is to be issued. The construction documents shall include the following:

Fire Protection Narrative. A Registered Design Professional shall coordinate into a single document, a narrative report which contains the integrated operational aspects of the systems and features identified below. This professional is not required to assume design responsibility for each system. The responsibility for the design of these systems remains with the Design Professional of Record for the individual fire protection system.

Part A - Integrated Systems Provide a summary outlining the integration of fire protection systems provided.

i. Design Methodology for the protection of the occupancy and hazards in accordance with this code and applicable NFPA Standards and,
ii. Input/Output Matrix of sequence of operations of all fire and life safety systems and operations, including integrated fire and life safety systems; and,
iii. Testing criteria to be used for final system acceptance.

Part B - Individual System Information Provide a summary outlining the following information for each system provided, with identification of specific permit documents conveying the details of the system being narrated.

1. Fire Department Access Roadways.
   a. Site access
   b. Building access
   c. Fire alarm control panel/Remote annunciator panels/Fire Command Center location
   d. Hydrant Locations
   e. Fire department connection type(s) and location.
   f. Fire command center location.
2. Automatic Sprinkler System.
   a. Type/description and design layout of the automatic sprinkler system(s).
   b. Automatic sprinkler system(s) control equipment location.
   c. Fire protection system(s) equipment identification and operation signs.
3. Standpipe Systems.
   a. Type/description and design layout of the automatic standpipe system(s).
   b. Standpipe system hose valve(s) type and location.
4. Water Supply / Fire Pumps / Fire Department Connections.
5. Alternative Automatic Fire-Extinguishing Systems.
   a. Type/description and design layout of special suppression system(s).
   b. Special suppression system(s) control equipment location.
   c. Special suppression system(s) equipment room location.
6. Fire Alarm and Detection Systems.
   a. Type/description and design layout of the fire protective signaling system(s).
   b. Fire alarm and signaling system(s) control equipment and remote annunciator locations.
   c. Fire protection system(s) equipment identification and operation signs.
   d. Fire protection system(s) alarm/ supervisory signal transmission method and location.
   e. Door Release Systems and
   f. Elevator recall systems.
7. Fire Command Center.
8. Mass Notification System.
9. Carbon Monoxide Detection a. Type/description and location of any carbon monoxide protection.
10. Emergency Alarm Systems
    a. Fire protection system(s) equipment identification and operation signs.
11. Gas Detection Systems.
12. Emergency Responder Communication Coverage
    a. Emergency Responder Radio Coverage type/location.
13. Smoke Control Systems / Smoke & Heat Removal
    a. Type/description and design layout of the smoke control or exhaust system(s).
    b. Smoke control or exhaust system(s) control equipment location.

14. Fire Extinguishers.

2 **Tier Two, Shop Drawings**. Prior to installation of fire protection systems, shop drawings, where applicable, shall be submitted in accordance with section 107.1.2 and shall contain, but not be limited to; detailed design layout, equipment specifications, and system sequence of operation identified in the input/output matrix. Shop drawings shall note the name(s), license number(s), and license expiration date(s) of the contractor(s) installing the fire protection systems and be reviewed and accepted by the Registered Design Professional in accordance with Section 107.

3 **Tier Three, Record Drawings**. As built plans shall be provided to the owner for all fire protection and life safety systems as reviewed and accepted by the registered design professional of record or legally recognized professional performing Construction Control. Where changes to original shop drawings are minor, a list of as-built changes shall be permitted to be submitted where sealed and reviewed and approved by the registered design professional of record or legally recognized professional performing Construction Control in accordance with 780 CMR per Chapter 1.

901.3 Revise section as follows:

901.3 Maintenance. All fire protection systems shall be maintained in accordance with 527 CMR 1.00 and the requirements of the applicable reference standards listed in Chapter 35.

The owner of every building or structure shall be responsible for the care and maintenance of all fire protection systems, including equipment and devices, to ensure the safety and welfare of the occupants.

No person shall shut off, disconnect, obstruct, remove or destroy, or cause or permit to be shut off, disconnected, obstructed, removed or destroyed, any part of any sprinkler system, water main, hydrant or other device used for fire protection or carbon monoxide detection and alarm in any building owned, leased or occupied by such person or under his control or supervision, without first procuring a written permit so to do from the head of the fire department of the city or town wherein such building is situated in accordance with M.G.L. c. 148, § 27A.

When installations of fire protection systems are interrupted for repairs or other necessary reasons, the owner shall immediately advise the local fire department and shall diligently prosecute the restoration of the protection. The local fire department shall also be advised when the system is put back in service.

901.5 Revise section as follows:

901.5 Acceptance Tests. Fire protection systems shall be tested in accordance with the requirements of this code, 527 CMR 1.00 and NFPA Standards and approved testing criteria and operational sequence as submitted in Section 901.2.1, Tier One, Item a. When required, the tests shall be conducted in the presence of the building official and fire official or their designee. The building official may authorize the fire official as designee. The fire official may authorize the building official as designee. Tests required by this code, the *International Fire Code* and the standards listed in this code shall be conducted at the expense of the owner or the owner's authorized agent. It shall be unlawful to occupy portions of a structure until the required fire protection systems within that portion of the structure have been tested and *approved*.

901.5.1 Add subsection as follows:

901.5.1 Certificate of Occupancy. Prior to the issuance of a Certificate of Occupancy and prior to witness of acceptance testing the following documents must be submitted to the building and fire officials, or designees.

1. Certification from the registered design professional, or other legally recognized professional, responsible for the construction documents per Section 107.6, stating that the *fire protection systems* have been installed in accordance with applicable codes and standards, in accordance

with the approved construction documents and that the record drawings indicate any deviations, if any.
2. Confirmation by the *owner* that they have received the as-built record drawings.
3. Material, Test, Performance, and Completion Certificates, properly executed by the installing contractor in accordance with the applicable NFPA standards.
4. Successful integrated testing documentation of active fire and life safety systems as required by 901.6.2.
5. NFPA 4 documentation for high-rise buildings and buildings with smoke control systems as required by 901.6.2.

901.6 Revise section as follows:

901.6 Supervisory service. Where required, fire protection systems shall be monitored by an approved supervising station in accordance with NFPA 72.

901.6.4 Revise section as follows:

901.6.4 Group H. Supervision and monitoring of emergency alarm, detection and automatic fire-extinguishing systems in Group H occupancies shall be in accordance with this code and the International Fire Code.

901.7 Revise section as follows:

901.7 Fire Areas. For the purpose of this chapter, fire area shall be defined as: "The aggregate area of a building, regardless of subdivisions by fire barriers, fire walls, or horizontal assemblies."

901.8 Revise section as follows:

901.8 Signs. All signs required by this code or by reference standard to identify fire protection equipment, equipment rooms and equipment locations shall be constructed of durable materials, be permanently installed and be readily visible. Letters and numbers shall contrast with the sign background, shall be at least two inches in height and shall have an appropriate width-to-height ratio to permit the sign to be read easily from a distance of ten feet. The sign and location shall be approved by the local fire department.

903.1.2 Add section as follows:

903.1.2 Elevator Machine Rooms, Hoistways and Pits. Sprinklers shall be provided in elevator machine rooms, hoistways and pits in accordance with 524 CMR.

903.2 Revise the section and the exceptions as follows:

903.2 Where required. Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in Sections 903.2.1 through 903.2.12.

EXCEPTIONS: Automatic sprinkler systems shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic smoke detection system and notification in accordance with section 907 that will respond to visible or invisible particles of combustion.

1. Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic smoke detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than l-hour fire barriers constructed in accordance with Section 707 or not less than 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

2. Noncombustible and limited combustible concealed spaces and plenums that contain electrical, data, communications and other cables that are of the types and in the configurations permitted in such spaces by 527 CMR 12.00.
3. Transformer Vaults where all the following conditions are satisfied:
   a. The cable within the vault is flame retardant or limited combustible.
   b. The dielectric fluid is a limited combustible fluid.
   c. The vault is enclosed in three hour fire resistance rated construction.
   d. The vault is at grade or no more than one level below grade. Access to the vault is directly from the exterior or via a dedicated two hour passageway.
   e. The vault is protected with automatic smoke detection connected to the building fire alarm system which notifies the fire department upon activation.
   f. The room is limited to the sole use of the transformer equipment and is limited in size to accommodate said equipment only. Storage is prohibited in the vault enclosure.
   g. The vault is provided with spill containment.
   h. An emergency fire plan has been developed with and approved by the fire department.
   i. Continuous ventilation is provided for the vault enclosure in accordance with the ventilation requirements of NFPA 30.
   j. The ventilation equipment is dedicated to serve the vault only.
   k. Standby emergency power, in addition to the normal power source, is provided for the ventilation equipment.
   l. The vault is no larger in area than 2,400 sq. ft.
4. Transformer Vaults where an alternative suppression system is provided for the vault in accordance with Section 904 and 903.2 exception 4. Conditions i., j., and k. are met.

NOTE: Also see Subsections 903.3.1.1.1, 903.1.1.2, 903.3.1.2.1, 903.3.1.2.2 and 903.3.1.2.3.

TABLE 903.2 OCCUPANCY AUTOMATIC SPRINKLER REQUIREMENTS

Building having occupancy	Provide automatic fire sprinkler system throughout building if one of the following conditions will exist (see Note a)		
	Fire Area	Building occupant load	Occupancy location
A-1	>0 ft^2	> 0	Any level
A-2 [Nightclub]	>5,000 ft^2	≥ 50	Any floor other than the level of exit discharge for A-2 Use.
A-2 [all others]	>5,000 ft^2	≥ 100	Any floor other than the level of exit discharge for A-2 Use.
A-3	>5,000 ft^2	≥ 300	Any floor other than the level of exit discharge for A-3 Use.
A-4	>7,500 ft^2	≥ 300	Any floor other than the level of exit discharge for A-4 Use.
A-5	See Note b		
Assembly occupancies on roofs	See Note c		
Multiple fire areas of Group A-1, A-2, A-3, or A-4	See Note d		
B [Ambulatory Health Care]	See Note e		
B	>12,000 ft^2	---	---
E [other than the level of exit discharge]	See Note f		
E [all others]	>12,000 ft^2	---	---
F-1 [Upholstered furniture or mattresses]	See Note g		
F-1 [Distilled spirits]	See Note g		

F-1 [Woodworking Operations]	See Note g		
F-1 [all others]	>12,000 ft^2	---	More than three (3) stories above grade plane
H [Pyroxylin Plastics]	See Note h		
H-5	See Note i		
H [all others]	>0 ft^2	> 0	Any level
I[a]	>0 ft^2	> 0	Any level
M [bulk merchandising]	>0 ft^2	> 0	Any level
M [upholstered furniture display/sale]	>0 ft^2	> 0	Any level
M [storage of merchandise in high-piled or rack storage arrays]	See Note j		
M [all others]	>12,000 ft^2	---	More than three (3) stories above grade plane
R[a]	>0 ft^2	> 0	Any level
S-1 [upholstered furniture or mattresses/storage]	>2,500 ft^2	--	More than three (3) stories above grade plane
S-1 [with commercial motor vehicles]	>5,000 ft^2	---	More than three (3) stories above grade plane
S-1 [with repair garage, building two or more stories above grade]	>10,000 ft^2	---	1. In basement; or 2. More than three (3) stories above grade plane
S-1 [with repair garage, building one story above grade]	>12,000 ft^2	---	In basement
S-1 [with commercial motor vehicles repair]	>5,000 ft^2	---	1. In basement; or 2. More than three stories above grade plane
S-1 [with tire storage]	See Note k		
S-1 [with distilled spirits or wine]	See Note k		
S-1 [with upholstered furniture and mattresses]	See Note k		
S-1 [all others]	>12,000 ft^2	---	More than three (3) stories above grade plane
S-2	See Notes l & m		

Note a:

1. For Use Group R and I-1 buildings with an aggregate building area of 12,000 ft^2 or more, and mixed use buildings containing R-Uses, the sprinkler system shall be designed and installed throughout the structure in accordance with NFPA 13.
2. Buildings of entire R-Use, other than R-1 Occupancies and R-2 Dormitories, having no more than three dwelling units and also less than a 12,000 ft^2 Fire Area shall be permitted to have an automatic fire suppression system installed in accordance with section 903.3.1.3; provided that every automatic sprinkler system shall have at least one automatic water supply, or a stored water supply source, in accordance with NFPA 13D where the minimum quantity of stored water shall equal the water demand rate times 20 minutes.
3. An automatic sprinkler system installed in accordance with section 903.3.1.3 shall be permitted in Group R-3 occupancies.
4. An automatic sprinkler system installed in accordance with section 903.3.1.3 shall be permitted in Group R-4 Condition 1 occupancies.
5. An automatic sprinkler system installed in accordance with section 903.3.1.2 shall be permitted in Group R-4 Condition 2 occupancies.
6. An automatic sprinkler system installed in accordance with section 903.3.1.3 shall be permitted in care facilities with five or fewer individuals in a single-family dwelling.
7. Townhouses are required to be protected by automatic sprinkler systems.

Note b: Group A-5. An automatic sprinkler system shall be provided in concession stands, retail areas, press boxes, and other accessory use areas in excess of 1,000 ft^2. For spaces under grandstands or bleachers; Enclosed spaces under grandstands or bleachers shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 where either of the following exist: 1. The enclosed area is 1,000 square feet or less and is not constructed in accordance with Section 1030.1.1.1. 2. The enclosed area exceeds 1,000 square feet.
Note c: Assembly occupancies on roofs. Where an occupied roof has an Assembly Occupancy with an occupancy load exceeding 1. 100 for Group A-2, or; 2. 300 for all other Group A occupancies. All floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with sections 903.3.1.1 or 903.3.1.2. EXCEPTION: Open parking garages in Type I or Type II construction.
Note d: Multiple fire areas. An automatic sprinkler system shall be provided where multiple fire areas of GroupA-1, A-2, A-3 or A-4 occupancies share exit or exit access components and the combined occupant load of these fire areas is 300 or more.
Note e: Group B ambulatory health care facilities. An automatic sprinkler system shall be installed throughout all fire areas containing a Group B ambulatory health care facility occupancy when either one of the following conditions exists at any time: 1. Four or more care recipients are incapable of self-preservation. 2. One or more care recipients who are incapable of self-preservation are located at other than the level of exit discharge serving such an occupancy. In buildings where ambulatory care is provided on levels other than the level of exit discharge, and automatic sprinkler system shall be installed throughout the entire floor where such care is provided as well as all floors below, and all floors between the level of ambulatory care and the nearest level of exit discharge, including the level of exit discharge.
Note f: Group E. An automatic sprinkler system shall be provided as follows: 1. Throughout all Group E fire areas greater than 12,000 ft^2 in area. 2. The Group E fire area is located on a floor other than a level of exit discharge serving such occupancies. 3. The Group E fire area has an occupant load of 300 or more.
Note g: Group F-1 (Woodworking Operations). An automatic sprinkler system shall be installed throughout buildings that contain woodworking operation(s) in excess of 2,500 ft^2(232 m^2) in area Group F-1 [Distilled Spirits]. An automatic sprinkler system shall be installed throughout a Group F-1 fire area used for the manufacture of distilled spirits. Group F-1 [Upholstered furniture or mattresses]. An automatic sprinkler system shall be installed throughout a Group F-1 fire area that exceeds 2,500 square feet used for the manufacturing of upholstered furniture or mattresses.
Note h: Pyroxylin Plastics. An automatic sprinkler system shall be provided in buildings, or portions thereof, where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds.
Note i: Group H-5. An automatic sprinkler system shall be installed throughout buildings containing Group H-5 occupancies. The design of the sprinkler system shall be not less than that required by 780 CMR for the occupancy hazard classifications in accordance with Table 903.2.5.2. Where the design area of the sprinkler system consists of a corridor protected by one row of sprinklers, the maximum number of sprinklers required to be calculated is 13.
Note j: High-piled storage. An automatic sprinkler system shall be provided in accordance with the IFC, and applicable provisions of 527 CMR in all buildings of Group M where storage of merchandise is in high-piled or rack storage arrays.
Note k: Bulk storage of tires. An automatic sprinkler system shall be provided throughout buildings and structures where the area for the storage of tires exceeds 20,000 ft^3 (566 m^3), in accordance with section 903.3.1.1. Group S-1 Distilled spirits or wine. An automatic sprinkler system shall be provided throughout

a Group S-1 fire area used for the bulk storage of distilled spirits or wine. Group S-1 upholstered furniture and mattresses. An automatic sprinkler system shall be provided throughout a Group S-1 fire area where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m2). Exception: Self-service storage facilities not greater than one story above grade plane where all storage spaces can be accessed directly from the exterior.
Note l: Group S-2. An automatic sprinkler system shall be provided for Group S-2 occupancies as follow: 1. Throughout buildings classified as Group S-2 Enclosed Parking in accordance with Section 406.6 exceeding 12,000 square feet. 2. Throughout Group S-2 Enclosed Parking located beneath other groups in accordance with Section 406.6. EXCEPTION: Enclosed parking garages located beneath R-3 occupancies. 3. Where the fire area of the open parking garage in accordance with Section 406.5 exceeds 48,000 square feet (4460 m2). 4. Mechanical access enclosed parking garages.
Note m: Commercial Parking Garages. An automatic sprinkler system shall be provided throughout buildings having storage of commercial motor vehicles where the aggregate area used for parking exceeds 5,000 ft^2 (464m^2).

903.2.1 Replace with the following:

903.2.1 Massachusetts Sprinkler Laws: The following information is provided for reference. These provisions are not enforceable under the building code but are enforceable through the respective law.
a. The following M.G.L. Chapter 148 statutes are enforced by the head of the fire department, and must be appealed through the automatic sprinkler appeals board:
i. M.G.L c. 148 §26A1/2: certain high-rise buildings constructed prior to 01/01/1975;
ii. M.G.L c. 148 §26G: certain non-residential structures that exceed 7,500 square feet;
iii. M.G.L c. 148 §26G1/2: Existing bars, nightclubs, dance halls, and discotheques with a capacity of 100 or more persons; and
iv. M.G.L c. 148 §26H (if adopted through local option): lodging or boarding houses with six or more persons boarding or lodging
b. M.G.L. c. 148 §26A: certain high-rise buildings. This statute is enforced by the head of the fire department, and must be appealed through the Building Code Appeals Board:
c. M.G.L. c. 148 §26I (if adopted by the local jurisdiction): certain multiple dwelling units. This statute is enforced by the head of the fire department, and must be appealed through a court of competent jurisdiction:
d. M.G.L. c. 272 §86 through §86d. Certain stables, as required by law. This provision is enforced by the head of the fire department, or his designee, and must be appealed through a court of competent jurisdiction.

903.2.2 Add section as follows:

903.2.2. Occupancies Other than Groups I and R: As required by Table 903.2.

903.2.3 Add section as follows:

903.2.3 Group I and R Occupancies: As required by Table 903.2.

903.2.4: Replace with the following: RESERVED

903.2.5: Revise as follows:

Delete 903.2.5 and 903.2.5.1. Retain 903.2.5.2.

903.2.5.3 through 903.2.10: Replace with the following: RESERVED.

Delete 903.2.4 through 903.2.5. Delete 903.2.5.3 through 903.2.10"

903.2.11.7 Laboratory suites. An automatic fire sprinkler system shall be installed for Class A, B, C, or D *laboratory suites* in accordance with NFPA 13 for ordinary hazard group 2.

903.2.12 Strike "of the International Fire Code".

903.3.1.3 Revise subsection as follows:

> **903.3.1.3 NFPA 13D sprinkler systems.** *Automatic sprinkler systems* installed in one- and two- family dwellings; Group R-3; Group R-4, Condition 1; and *townhouses buildings containing no more than 2 contiguous units*, shall be permitted to be installed throughout in accordance with NFPA 13D.

903.3.1.3.1 Add subsection as follows:

> **903.3.1.3.1 Modified NFPA 13D**. R-2 Buildings containing no more than 3 dwelling units and less than 12,000 gsf in the aggregate, shall be permitted to install an automatic sprinklers system in accordance with NFPA 13D provided the water supply, automatic or stored, is capable of providing the water demand for a period of 20 minutes.

903.3.5.2 Revise subsection as follows:

> **903.3.5.2 Combination Services.** A single combination water supply shall be permitted provided that the domestic and/or commercial demand is added to the sprinkler demand as required by NFPA 13, NFPA 13D or NFPA 13R as applicable.

903.4 Exception #1 revise as follows:

> **903.4 Sprinkler system supervision and alarms.**
> **Exceptions:**
> 1. *Automatic sprinkler systems* protecting buildings sprinklered throughout in accordance with 903.3.1.3.

903.4.1 Revise subsection as follows:

> **903.4.1 Monitoring.** Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to one of the following NFPA 72 locations. The *owner* has the choice of which single option to employ.
>
> 1. UL listed or FM approved central supervising station, or
> 2. Approved proprietary supervising station or approved remote supervising station, or
> 3. Alarm signals to an approved Auxiliary Fire Alarm System in accordance with NFPA 72, with supervisory signals supervised by method a or b identified above, or at a constantly attended location approved by the local fire department, having personnel on duty trained to recognize the type of signal received and to take prescribed action. This shall be permitted to be a location different from that at which alarm signals are received.

903.4.2 Revise subsection as follows:

> **2 Alarms.** An approved audible and visual device, located on the exterior of the building in an approved location, shall be connected to each *automatic sprinkler system.* Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Activation of the sprinkler waterflow alarm devices shall activate a fire alarm system installed throughout the building in accordance with Section 907**.**

903.4.2.1 Add subsection as follows:

> **903.4.2.1** Where and automatic sprinkler system is required by this code, a fire alarm system shall be provided. The manner of installation shall be consistent with NFPA 72 and Section 907.

903.4.4 Add subsection as follows:

> **903.4.4 Transmission of Alarm Signals.** In all cases, alarm signals shall transmit within 180 seconds to the fire department having jurisdiction.

904.12 Revise section as follows:

> **904.12 Aerosol fire-extinguishing systems.** Aerosol fire-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 2010, and their listing. Such devices and appurtenances shall be listed and installed in compliance with manufacturers' instructions. Records of inspections and testing shall be maintained.

904.15 Add section as follows:

> **904.15 Water Spray Fixed Systems.** Water spray fixed systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 15 and the listings contained therein.

905.3.6 Revise subsection as follows: Strike "International Fire Code", add text from the International Fire Code.

> **905.3.6 Helistops and heliports.** Buildings with a rooftop helistop or heliport shall be equipped with a Class I or III standpipe system extended to the roof level on which the helistop or heliport is located. All portions of the helistop or heliport area shall be within 150 feet (45 720 mm) of a 2 1/2-inch (63.5 mm) outlet on the standpipe system.

905.3.9 Add subsection as follows:

> **905.3.9 High-piled Combustible Storage.** A class I automatic wet or manual standpipe system shall be provided in all exit passageways of areas containing high-piled combustible storage.

906.1 Revise #4 as follows:

> **906.1 Where required.**
>
> 4. On each floor of structures under construction in accordance with Chapter 33.

906.4 Revise section as follows: add "527 CMR 1.00" and "Strike 906.4.1 and 906.4.2 of the International Fire Code, as applicable".

> **906.4 Cooking grease equipment fires.** Fire extinguishers provided for the protection of cooking grease equipment shall be of an approved type compatible with the automatic fire-extinguishing system agent. Cooking equipment involving solid fuels or vegetable or animal oils and fats shall be protected by a Class K-rated portable extinguisher in accordance with Sections 906.1, Item 2, and 527 CMR 1.00.

906.4.1 Add subsections as follows.

> **906.4.1 Portable fire extinguishers for solid fuel cooking appliances.** Solid fuel cooking appliances, whether or not under a hood, with fireboxes 5 cubic feet (0.14 m3) or less in volume shall have a minimum 2.5-gallon (9 L) or two 1.5-gallon (6 L) Class K wet-chemical portable fire extinguishers located in accordance with Section 906.1.

906.4.2 Add subsections as follows.

906.4.2 Class K portable fire extinguishers for deep fat fryers. Where hazard areas include deep fat fryers, listed Class K portable fire extinguishers shall be provided as follows:
1. For up to four fryers having a maximum cooking medium capacity of 80 pounds (36.3 kg) each: one Class K portable fire extinguisher of a minimum 1.5-gallon (6 L) capacity.

2 For every additional group of four fryers having a maximum cooking medium capacity of 80 pounds (36.3 kg) each: one additional Class K portable fire extinguisher of a minimum 1.5-gallon (6 L) capacity shall be provided.

3. For individual fryers exceeding 6 square feet (0.55 m2) in surface area: Class K portable fire extinguishers shall be installed in accordance with the extinguisher manufacturer's recommendations.

907.1.2 Revise subsection as follows

907.1.2 Fire alarm shop drawings. Shop drawings for fire alarm systems shall be prepared in accordance with Section 901.2.2 and NFPA 72 and submitted for review and approval prior to system installation.

907.2 Revise section as follows.

907.2 Where required—new buildings and structures. An approved fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.24, and in buildings equipped with an automatic sprinkler system, and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

907.2.5 Revise section as follows.

907.2.5 Group H. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group H-5 occupancies and in occupancies used for the manufacture of organic coatings. An automatic smoke detection system shall be installed for highly toxic gases, organic peroxides and oxidizers.

907.2.8.3.1 Add subsection as follows:

907.2.8.3.1 Annunciation. In buildings that are not equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or Section 903.3.1.2, the smoke detectors in guestrooms shall be connected to the buildings fire alarm systems for the purpose of notifying the guestroom occupants and shall be annunciated by guestroom at a constantly attended location from which the fire alarm system is capable of being manually activated.

907.2.9.1 Exception #2 Revise as follows:

907.2.9.1 Manual fire alarm system.
Exceptions:
2. Manual fire alarm boxes are not required 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 or 903.3.1.3 and the occupant notification appliances will automatically activate throughout the notification zones upon a sprinkler water flow.

907.2.10.1 Add subsection as follows:

907.2.10.1 Group S-1. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group S-1 occupancies where one of the following conditions exists:

1. The area of boat storage exceeds 5,000 SF.

907.2.11 Revise section and add exception as follows:

907.2.11 Single- and multiple-station smoke alarms. Listed single- and multiple-station smoke alarms complying with UL [2]17 8th edition or later shall be installed in accordance with Sections

Exception: Addressable System Option. A fully addressable fire alarm system complying with UL 268 seventh edition or later is permitted where system smoke detectors and alarm notification devices can perform the functions as required in sections 907.2.11 through 907.2.11.7 and NFPA 72.

907.2.11.3 Add subsection as follows:

907.2.11.3 Other sleeping areas. Where rooms or spaces are used for sleeping purposes in other than Use Group R or I occupancies, single- or multiple-station smoke alarms shall be installed and maintained regardless of occupant load at all of the following locations:
1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms or sleeping areas.
2. In each room or area used for sleeping purposes.
3. In each story, including basements but not including crawl spaces and uninhabitable attics.

907.2.11.4 Revise subsection as follows:

907.2.11.4 Installation near cooking appliances. Smoke alarms shall be installed in accordance with their listing and NFPA 72.

907.2.11.3 through 907.2.11.7 Revise the section numbers as follows

907.2.11.3 Installation near cooking appliances.

907.2.11.4 Installation near bathrooms.

907.2.11.5 Interconnection.

907.2.11.6 Power source.

907.2.11.7 Smoke detection system.

907.2.13.2 Revise subsection as follows.

907.2.13.2 Fire department communication system. Where a wired communication system is approved in lieu of an in-building two-way emergency responder communication coverage system in accordance with Section 918, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

907.2.15 Delete Exception

907.2.23 Revise subsection as follows:

907.2.23 Energy storage systems. An automatic smoke detection system or radiant-energy detection system shall be installed in, areas containing stationary battery systems. A radiant-energy detection system shall be installed to protect open parking garages or roof-top installations.

907.2.24 Add section as follows:

907.2.24 Other sleeping areas.

907.2.24.1 Add subsections as follows:

907.2.24.1 Where a building is not classified as R or I, but there are rooms or areas used for sleeping, single- and multiple-station smoke alarms shall be installed in accordance with 907.2.11.

907.2.24.2 Add subsections as follows:

907.2.24.2 Buildings containing sleeping areas shall be equipped with occupant notification throughout, in accordance with 907.5.

907.5.2.2.6 Add subsection as follows:

907.5.2.2.6 Evacuation. Where the head of the fire department or his/her designee determines that partial or selective evacuation is not desired but rather total evacuation is required, then a distinctive signal in lieu of a voice alarm is permitted.

907.5.2.3 Revise subsection as follows:

907.5.2.3 Visible alarms. Visible alarm notification appliances shall be provided in accordance with Sections 907.5.2.3.1 through 907.5.2.3.3. Also refer to 521 CMR for visible alarm requirements in buildings, or portions thereof, open to the public.

907.6.6.1 Revise subsection as follows:

907.6.6.1 Transmission of alarm signals. Transmission of alarm signals shall be in accordance with NFPA 72 and Section 903.4.4.

909.2 Revise section as follows:

909.2 General design requirements. Buildings, structures or parts thereof required by this code to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions. An independent third party review is required for smoke control system designs incorporating performance analysis under section 909 (design fire analysis, rational analysis, timed egress analysis), or the smoke control methods of sections 909.6, 909.7, or 909.8 or other alternative design method selected by the registered design professional. The independent third party reviewer shall prepare a written report documenting the review, and submit it to the registered design professional and the building and fire officials. If all parties concur that the analyses are appropriate, the design may be approved pursuant to section 104.11.

909.6.3 Revise subsection as follows:

909.6.3 Pressurized stairways and elevator hoist-ways. Where stairways or elevator hoistways are pressurized, such pressurization systems shall comply with Section 909 as smoke control systems, in addition to the requirements of Sections 909.20 and 909.21 of this code.

909.15 Revise section as follows:

909.15 Control Diagrams. Identical control diagrams showing all devices in the system and identifying their location and function shall be maintained current and kept on file with the fire official and shall be kept on site adjacent to the fire alarm panel in a format and manner *approved* by the fire chief.

909.16 Add exception as follow:

909.16 Fire fighter's smoke control panel.
Exception: Existing buildings with an existing dedicated smoke control panel that has been maintained in original working order.

909.18.8.3.1 Revise subsection as follows:

909.18.8.3.1 Report filing. Identical copies of the final report shall be filed with the fire official, filed with the Building Official and shall be maintained in an approved location at the building.

909.19 Revise section as follows:

909.19 System acceptance. Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the fire code official determines that the provisions of this section have been fully complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system and a written maintenance program complying with the requirements of 527 CMR 1.00: 11.8 has been submitted and approved by the fire code official.

909.20 Revise section as follows.

909.20 Smokeproof enclosures. Where required by Section 1023.12, a smokeproof enclosure shall be constructed in accordance with this section. A smokeproof enclosure shall consist of an interior exit stairway or ramp that is enclosed in accordance with the applicable provisions of Section 1023 and an open exterior balcony, ventilated vestibule or pressurized stair and pressurized entrance vestibule meeting the requirements of this section. Where access to the roof is required by this code, such access shall be from the smokeproof enclosure where a smokeproof enclosure is required.

909.20.7.1.1 Add subsection as follows:

909.20.7.1.1 Intake Duct Detection. An intake duct smoke detector shall be installed just downstream of the fresh air fan. Activation of this detector shall annunciate at the control panel and shall shut down the fan for that particular smoke proof enclosure.

909.20.7.3 Revise section as follows:

909.20.7.3 Acceptance and testing. Before the mechanical equipment is approved, the system shall be tested in the presence of the building official, the fire official or their designees to confirm that the system is operating in compliance with these requirements. The building official may authorize fire official as designee. The fire official may authorize building official as designee.

909.22 through 909.22.6 Add section and subsections as follows:

909.22 Maintenance. Smoke control systems shall be maintained to ensure to a reasonable degree that the system is capable of controlling smoke for the duration required. The system shall be maintained in accordance with the manufacturer's instructions and Sections 909.22.1 through 909.22.5.

909.22.1 Schedule. A routine maintenance and operational testing program shall be initiated immediately after the smoke control system has passed the acceptance tests. A written schedule for routine maintenance and operational testing shall be established.

909.22.2 Written Record. A written record of smoke control system testing and maintenance shall be maintained on the premises. The written record shall include the date of the maintenance, identification of servicing personnel, and notification of any unsatisfactory condition and the corrective action taken, including parts replaced.

909.22.3 Testing. Operational testing of the smoke control system shall include all equipment such as initiating devices, fans, dampers, controls, doors and windows.

909.22.4 Dedicated Smoke Control Systems. Dedicated smoke control systems shall be operated for each control sequence semiannually. The system shall also be tested under standby power conditions.

909.22.5 Nondedicated Smoke Control Systems. Dedicated smoke control systems shall be operated for each control sequence annually. The system shall also be tested under standby power conditions.

909.22.6 Components bypassing weekly test. Where components of the smoke control system are bypassed by the preprogrammed weekly test required by Section 909.12.1, such components shall be tested semiannually. The system shall be tested under standby power conditions.

912.4.3 Revise section as follows.

912.4.3 Physical protection. Where fire department connections are subject to impact by a motor vehicle, vehicle impact protection shall be provided in accordance with Sections 912.4.3.1 or 912.4.3.2.

912.4.3.1 Add subsections as follows:

912.4.3.1 Guard Posts. Guard posts shall comply with all of the following requirements: 1. Constructed of steel not less than 4 inches (102 mm) in diameter and concrete filled. 2. Spaced not more than 4 feet (1219 mm) between posts on center. 3. Set not less than 3 feet (914 mm) deep in a concrete footing of not less than a 15-inch (381 mm) diameter. 4. Set with the top of the posts not less than 3 feet (914 mm) above ground. 5. Located not less than 3 feet (914 mm) from the protected object.

912.4.3.2 Add subsections as follows:

912.4.3.2 Other barriers. Barriers, other than posts specified in 912.4.3.1, that are designed to resist, deflect or visually deter vehicular impact commensurate with an anticipated impact scenario shall be permitted where approved.

912.6 Replace “International Plumbing Code” with 248 CMR 10.00: *Uniform State Plumbing Code*.

912.7 Add section as follows:

912.7 Connections. Fire department connections shall be such that attachment to any one water sprinkler connection will serve all sprinklers, and attachment to any one standpipe connection will serve all standpipes within the building.

913.6 Add section as follows:

913.6 Second Power Source. All electric driven fire pumps shall be provided with emergency power from an on-site emergency generator system set when the fire pump is installed as protection for a building or structure with any one of the following characteristics:

1. High-rise building
2. Use Group H
3. Use Group I having surgery or treatment areas for nonambulatory patients.

915.1 Revise section as follows:

915.1 General. Carbon monoxide detection shall be installed in new buildings in accordance with Sections 915.1 through 915.7. Carbon monoxide detection shall be installed in existing buildings in accordance with 527 CMR 1.00: 13.7.

915.1.1 Revise section as follows:

915.1.1 Where required. Carbon monoxide detection shall be provided where any of the conditions in Sections 915.1.2 through 915.1.6 exist.

915.1.3 Revise the exception as follows:

915.1.3 Fuel burning, forced-air furnaces.
Exception: Carbon monoxide detection shall not be required in *dwelling units, sleeping units* and class-rooms if a carbon monoxide detector is provided in the first room or area served by each main duct leaving the furnace, the carbon monoxide alarm signals are automatically transmitted to an approved location, and notification is provided in accordance with 915.6.

915.2 Revise section as follows:

915.2 Locations. Where required by Section 915.1.1, carbon monoxide detection shall be installed in the locations specified in Sections 915.2.1 through 915.2.4, or 915.2.5.

915.2.4 Add subsections as follows:

915.2.4 Newly installed fuel-fired equipment. Carbon monoxide detection shall be installed in accordance with the provisions of 248 CMR 10.

915.2.5 Add subsections as follows:

915.2.5 Technical options. Carbon monoxide detection shall be installed in accordance with the technical options in Section 13.7 of 527 CMR 1.00.

915.3.1 Add subsection as follows:

915.3.1 Interconnection. Where more than one listed carbon monoxide alarm or combination smoke/carbon monoxide detector is required to be installed within a dwelling unit, or E- or I-use area, they shall be interconnected in such a manner that the activation of the carbon monoxide alarm or combination smoke/carbon monoxide detector shall activate the carbon monoxide audible notification devices throughout the individual dwelling unit, or affected area, by detector or separate notification device.

915.6 Revise section as follows.

915.6 Notification. Carbon Monoxide Alarm notification shall be provided in accordance with NFPA 72.

915.7 Add new section number as follows:

915.7 Maintenance. Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with 527 CMR 1.00 and NFPA 72.

916.2 Revise section as follows.

916.2 Permits. Permits shall be required as set forth in Chapter 1 of this code.

916.2.1 Revise subsection as follows:

916.2.1 Construction documents. Documentation of the gas detection system design and equipment to be used that demonstrates compliance with the requirements of this code and the International Fire Code shall be provided with the application for permit as part of the Tier One Document Submittal.

916.10.1 Delete this subsection.

918.1 Revise section as follows:

918.1 General. Emergency responder radio coverage shall be provided in accordance with sections 9168.2 through 9168.6.3 and NFPA 72 and NFPA 1221.

918.2 through 918.6.1 Add sections and subsections as follows:

918.2 Emergency responder communication coverage in buildings. Approved in-building, two-way emergency responder communication coverage for emergency responders shall be provided in all buildings. In-building, two-way emergency responder communication coverage within the building shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead of an approved radio coverage system.
2. Where it is determined by the fire code official that the radio coverage system is not needed.
3. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

918.3 Permit required. A construction permit for the installation of or modification to in-building, two-way emergency responder communication coverage systems and related equipment is required as specified in Section 105.1. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

918.4 Technical requirements. Equipment required to provide in-building, two-way emergency responder communication coverage shall be listed in accordance with UL 2524. Systems, components and equipment required to provide the in-building, two-way emergency responder communication coverage system shall comply with Sections 918.4.1 through 918.4.2.8.

918.4.1 Emergency responder communication coverage system signal strength. The building shall be considered to have acceptable in-building, two-way emergency responder communication system coverage where signal strength measurements in 95 percent of all areas and 99 percent of areas designated as critical areas by the fire code official on each floor of the building meet the signal strength requirements in Sections 918.4.1.1 through 918.4.1.3.

918.4.1.1 Minimum signal strength into the building. The minimum inbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The inbound signal level shall be a minimum of -95dBm throughout the coverage area and

sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 or an equivalent Signal-to-Interference-Plus-Noise Ratio (SINR) applicable to the technology for either analog or digital signals.

918.4.1.2 Minimum signal strength out of the building. The minimum outbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The outbound signal level shall be sufficient to provide not less than a DAQ of 3.0 or an equivalent SINR applicable to the technology for either analog or digital signals.

918.4.1.3 System performance. Signal strength shall be sufficient to meet the requirements of the applications being utilized by public safety for emergency operations through the coverage area as specified by the fire code official in Section 918.4.2.2.

918.4.2 System design. The in-building, two-way emergency responder communication coverage system shall be designed in accordance with Sections 918.4.2.1 through 918.4.2.8 and NFPA 1221.

918.4.2.1 Amplification systems and components. Buildings and structures that cannot support the required level of in-building, two-way emergency responder communication coverage shall be equipped with systems and components to enhance the radio signals and achieve the required level of in-building, two-way emergency responder communication coverage specified in Sections 918.4.1 through 918.4.1.3. In-building, two-way emergency responder communication systems utilizing radio-frequency-emitting devices and cabling shall be approved by the fire code official. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.

918.4.2.2 Technical criteria. The fire code official shall maintain a document providing the specific technical information and requirements for the in-building, two-way emergency responder communication coverage system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.

918.4.2.3 Standby power. In-building, two-way emergency responder communication radio coverage systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Chapter 27. The standby power supply shall be capable of operating the in-building, two-way emergency responder communication coverage system at 100-percent system capacity for a duration of not less than 12 hours.

918.4.2.4 Signal booster requirements. If used, signal boosters shall meet the following requirements:
1. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.
2. Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher-rated cabinet.
3. The signal booster system and battery system shall be electrically supervised and monitored by a supervisory service, or when approved by the fire code official, shall sound an audible signal at a constantly attended location.
4. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
5. Active RF-emitting devices used for in-building, two-way emergency responder communication coverage systems shall have built-in oscillation detection and control circuitry.
6. The installation of amplification systems or systems that operate on or provide the means to cause interference on any in-building, two-way emergency responder communication coverage network shall be coordinated and approved by the fire code official.

918.4.2.5 System monitoring. The in-building, two-way emergency responder communication coverage system shall be monitored by a listed fire alarm control unit, or where approved by the fire code official, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals shall include the following:

1. Loss of normal AC power supply.
2. System battery charger(s) failure.
3. Malfunction of the donor antenna(s).
4. Failure of active RF-emitting device(s).
5. Low-battery capacity at 70-percent reduction of operating capacity.
6. Failure of critical system components.
7. The communications link between the fire alarm system and the in-building, two-way emergency responder communication coverage system.
8. Oscillation of active RF-emitting device(s).

918.4.2.6 Additional frequencies and change of frequencies. The in-building, two-way emergency responder communication coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.

918.4.2.7 Design documents. The fire code official shall have the authority to require "as-built" design documents and specifications for in-building, two-way emergency responder communication coverage systems. The documents shall be in a format acceptable to the fire code official.

918.4.2.8 Radio communication antenna density. Systems shall be engineered to minimize the near-far effect. In-building, two-way emergency responder communication coverage system designs shall include sufficient antenna density to address reduced gain conditions.
Exception: Systems where all portable devices within the same band use active power control features.

918.5 Installation requirements. The installation of the in-building, two-way emergency responder communication coverage system shall be in accordance with NFPA 1221 and Sections 918.5.2 through 918.5.5.

918.5.1 Mounting of the donor antenna(s). To maintain proper alignment with the system designed donor site, donor antennas shall be permanently affixed on the building or where approved, mounted on a movable sled with a clearly visible sign stating "MOVEMENT OR REPOSI-TIONING OF THIS ANTENNA IS PROHIBITED WITHOUT APPROVAL FROM THE FIRE CODE OFFICIAL." The antenna installation shall be in accordance with the applicable requirements in the International Building Code for weather protection of the building envelope.

918.5.2 Approval prior to installation. Amplification systems capable of operating on frequencies licensed to any public safety agency by the FCC or other radio licensing authority shall not be installed without prior coordination and approval of the fire code official.

918.5.3 Minimum qualifications of personnel. The minimum qualifications of the system designer and lead installation personnel shall include both of the following:

1. A valid FCC-issued general radio operators license.
2. Certification of in-building system training issued by an approved organization or approved school, or a certificate issued by the manufacturer of the equipment being installed.

These qualifications shall not be required where demonstration of adequate skills and experience satisfactory to the fire code official is provided.

918.5.4 Acceptance test procedure. Where an in-building, two-way emergency responder communication coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 905 percent. The test procedure shall be conducted as follows:
1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system or equipment approved by the fire code official.

3. Failure of more than one test area shall result in failure of the test.
4. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 905 percent coverage requirement.
5. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be permitted.
6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and at subsequent annual inspections.
8. Systems shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from the indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 918.4.1.1 and 918.4.1.2.

918.5.5 FCC compliance. The in-building, two-way emergency responder communication coverage system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

918.6 Maintenance. The in-building, two-way emergency responder communication coverage system shall be maintained operational at all times in accordance with Sections 918.6.1 through 918.6.4.

918.6.1 Testing and proof of compliance. The owner of the building or owner's authorized agent shall have the in-building, two-way emergency responder communication coverage system inspected and tested annually or where structural changes occur, including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:
1. In-building coverage test as described in Section 918.5.4.
2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.
3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.
4. All active components shall be checked to verify operation within the manufacturer's specifications. At the conclusion of the testing, a report, which shall verify compliance with Section 918.5.4, shall be submitted to the fire code official.

918.6.2 Additional frequencies. The building owner shall modify or expand the in-building, two-way emergency responder communication coverage system at his or her expense in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority. Prior approval of an in-building, two-way emergency responder communication coverage system on previous frequencies does not exempt this section.

918.6.3 Nonpublic safety system. Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the in-building, two-way emergency responder communication coverage system, the nonpublic safety amplification system shall be corrected or removed.

918.6.4 Field testing. Agency personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.