

CHAPTER 5 FIRE OPERATIONS FEATURES

SECTION FC 501 GENERAL

501.1 Scope. This chapter shall govern the design, installation, operation and maintenance of buildings, structures and premises with respect to requirements designed to ensure safe and effective firefighting operations.

501.2 Permits. Permits shall be required as set forth in FC105.6.

501.3 Reserved.

501.4 General. Buildings, structures and premises shall be designed, installed, operated and maintained in accordance with this chapter.

501.4.1 Newly-constructed buildings and structures. When fire apparatus access roads, frontage spaces, private hydrants or yard hydrants are required to be installed in connection with a newly constructed building or structure, such roads, frontage spaces and hydrants shall be installed and made serviceable prior to and during the time of construction, except that, in connection with a phased development, the provision of fire apparatus access and water supply shall be as set forth in design and installation documents approved by the department. Interim access and water supply arrangements will be considered pending completion of heavy construction that would damage the roads or piping, provided that such arrangements would not unduly impair firefighting operations. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by motor vehicles in accordance with FC505.2.

501.4.2 Lawfully existing fire department access. Fire department access to buildings, structures and premises not fronting on a public street may be continued in compliance with the provisions of FC 102.3, 102.4, and 102.5, when such fire department access was lawfully existing as of June 30, 2008 or the date of an amendment to this code relating to fire department access. The private roads providing such lawfully existing fire department access shall be deemed to constitute fire apparatus access roads pursuant to this chapter.

501.4.3 Alterations and change of occupancy. A building or structure undergoing alteration or a change of occupancy under the circumstances set forth in FC 501.4.3.1 and 501.4.3.2 shall comply with the requirements set forth in said sections.

501.4.3.1 Provision of sprinkler protection in altered buildings on substandard width public streets and fire apparatus access roads. An existing building or structure that undergoes alteration or a change in use or occupancy and which is located on a public street or fire apparatus access road that has a substandard road width as set forth in FC 503.2.10 or 503.3.2 shall install a sprinkler system throughout such building, when:

1. The cost of making alterations to the building (other than alterations made to Group R-3 occupancies) in any 12-month period exceeds 60 percent of the value of the building, as set forth in New York City Administrative Code §27-115; or
2. By reason of alteration or otherwise, there is a change in the “main use or dominant occupancy” of the building, as determined by the New York City Department of Buildings for purposes of assigning a single occupancy classification to the building, including any change from a Group R-3 occupancy to a Group R-2 occupancy, but excluding a change in use or occupancy that is limited to restoring a building that was originally constructed as a one-family or two-family dwelling to its original one-family or two-family use and occupancy; or
3. There is an increase of more than 125 percent in the square footage of the floor area of a building (excluding attic, basement and cellar space, as those terms are defined in Section 202 of the Building Code); or
4. There is a change constituting an alteration under the Building Code (excluding rooftop equipment installations) to a building of combustible (non-fireproof) construction with a height of 35 feet (10 668 mm) or less above the grade plane, that increases the height of such building to more than 35 feet (10 668 mm) above the grade plane (with the terms “grade plane” and “building height” having the meanings set forth in Section 502.1 of the Building Code); or
5. A one-family Group R-3 occupancy is being altered to a two-family Group R-3 occupancy, except where:
 - 5.1. the alteration involves converting a basement space to a separate dwelling unit, and the new basement dwelling unit is protected throughout by a sprinkler system; or
 - 5.2. the alteration does not involve converting a basement space to a separate dwelling unit, and either at least two lawful accessory off-street parking spaces are provided on the premises, or sufficient space exists to park two motor vehicles on a common driveway shared exclusively with an adjoining Group R-3 occupancy.

501.4.3.2 Compliance with rooftop access requirements on altered rooftops. The rooftop of an existing building or structure that undergoes alteration shall comply with the requirements of FC504.4.

SECTION FC 502 DEFINITIONS

502.1 Definitions. The following terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

CITYWIDE STANDARD KEY. A key of special or controlled design, also known as a “2642” key, approved by the commissioner which serves to operate elevator emergency recall and emergency in-service operation service switches and other devices or locks as required by the construction codes, including the Building Code, this code or the rules.

FIRE APPARATUS ACCESS ROAD. A road that serves to provide access for fire apparatus from a public street to the frontage space of one or more buildings not directly fronting on a public street. A fire apparatus access road includes any road that serves such purpose whether denominated as a driveway, parking lot lane, private road or private street.

FIRE DEPARTMENT STANDARD KEY. A key of special or controlled design, also known as a “1620” key, for the use of department personnel and others specifically authorized by the commissioner, which serves to operate all switches, locks and other devices required to be operable by a citywide standard key.

FIRE LANE. A public or private road, roadway lane, parking lot lane or other surface designed to allow vehicular access, that has been specifically designated by means of signs or roadway markings as a priority thoroughfare for fire apparatus.

FRONTAGE SPACE. A street or an open space in front of and adjoining the main front entrance to the building and not less than 30 feet (9144 mm) in any dimension that is accessible from a public street or fire apparatus access road, provides access to the building, and serves as a staging area for firefighting and other emergency operations. It shall be designed and constructed to allow operation of department apparatus on the front side of the building and shall be maintained free of obstructions that may interfere with its use by the department.

KEY BOX. A secure device with a lock operable only by a citywide standard key or other approved key.

MULTI-FLOOR DWELLING UNIT. A dwelling unit or other residential occupancy with living space on a floor other than the floor upon which the entrance door to such room, unit or occupancy is located, or which is accessed by means of an interior stair or passageway from an entrance door on another floor.

PRIVATE ROAD. A private driveway, lane or street, or other means of vehicular access to one or more buildings, structures or premises not directly fronting on a public street. A private road does not include a public street.

PUBLIC STREET. All streets, including mapped streets, record streets, marginal streets and restricted use streets, established on the city map maintained pursuant to Section 198 of the New York City Charter or dedicated for general public use and accepted for such purposes by the City of New York.

SPEED BUMP. Any raised roadway designed to reduce the speed of traffic to 20 miles per hour (32.2 kilometers per hour) or less, including any speed hump, speed table or other raised speed reducer, commonly referred to as “speed bumps.”

SECTION FC 503 FIRE APPARATUS ACCESS

503.1 General. Buildings shall be accessible to department fire apparatus by way of a public street or approved fire apparatus access road. The public street or fire apparatus access road shall provide access to the frontage space of the building.

503.2 Fire apparatus access roads. Fire apparatus access roads shall be provided, designed, installed and maintained in accordance with this section.

503.2.1 Where required. Where the frontage space to a building does not directly front on a public street, a fire apparatus access road shall be provided from the public street to the frontage space of such building.

503.2.2 Design and construction. Except as otherwise provided in FC503.2.4, a fire apparatus access road shall be designed and constructed in accordance with the standards of the New York City Department of Transportation and in compliance with the following requirements:

503.2.2.1 Surface. Fire apparatus access roads shall have an all-weather driving surface constructed of asphalt, concrete or other approved permeable or impermeable material.

503.2.2.2 Load-bearing capacity. Fire apparatus access roads shall be capable of supporting the imposed load of department apparatus weighing at least 80,000 pounds (36 320 kg) and the operational load of department apparatus outrigger of 52,000 pounds (23 608 kg) over a 2 foot (610 mm) by 2 foot (610 mm) area.

503.2.2.3 Grade. The grade of the fire apparatus access road shall not exceed 10 percent unless approved by the commissioner.

503.2.2.4 Turning radius. The required turning radius of a fire apparatus access road shall be determined by the commissioner.

503.2.2.5 Bridges and elevated surfaces. Any bridge or elevated surface on a fire apparatus access road shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Signs shall be posted at both entrances to any bridge or elevated surfaces not capable of carrying such a load. Roadways or surfaces not capable of carrying such load that adjoin fire apparatus roads shall be separated by approved barriers and/or marked by approved signs.

503.2.2.6 Angles of approach. The angles of approach and departure for fire apparatus access roads shall be within the limits established by the department based on the department's fire apparatus.

503.2.3 Roadway width and vertical clearance. Fire apparatus access roads shall have an unobstructed width of not less than 34 feet (10 363 mm) excluding shoulders, except as

provided in FC 503.2.3.1 through 503.2.3.4, and an unobstructed vertical clearance of not less than 14 feet (4267 mm).

503.2.3.1 Special zoning districts. In Special Hillside Preservation Districts complying with the requirements of Section 119-214 of the Zoning Resolution, or other special zoning district regulation restricting the width of streets or private roads to less than 34 feet (10 363 mm), a fire apparatus access road shall have an unobstructed width of not less than 30 feet (9144 mm), excluding shoulders.

503.2.3.2 Small residential developments. Where access is being provided to residential developments of not more than five dwelling units, and all buildings to which the road provides access are protected throughout by a sprinkler system, a fire apparatus access road shall have an unobstructed width of not less than 30 feet (9144 mm), excluding shoulders.

503.2.3.3 Buildings set back from street. Where the main front entrance to a building is set back more than 40 feet (12 192 mm) from the curb line, a fire apparatus access road shall have the unobstructed width and comply with the other requirements set forth in FC503.2.4.

503.2.3.4 Special conditions. Where the commissioner determines that the nature and location of the building served by the fire apparatus road or other site conditions render such roadway width or vertical clearance inadequate for firefighting or other emergency response operations, the commissioner may require that the roadway width or vertical clearance be increased.

503.2.4 Buildings set back from street. Where the main front entrance to a building is set back more than 40 feet (12 192 mm) from the curb line, a fire apparatus access road with the unobstructed roadway width required by FC503.2.3 shall be provided to the frontage space of the building, except as otherwise provided in FC 503.2.4.1 through 503.2.4.3.

503.2.4.1 Group R-3 occupancies set back 100 feet or less. The fire apparatus access road to a Group R-3 building with any main front entrance located more than 40 feet (12 192 mm) but not more than 100 feet (30 480 mm) from the street line (as measured along the route of the fire apparatus access road) may be designed and constructed in compliance with the requirements of the Building Code for driveways where:

1. The driveway is designed and is used exclusively to provide access only to a single Group R-3 building, and to no other buildings; and
2. The height of the Group R-3 building does not exceed 35 feet (10 668 mm) above the grade plane (with the terms “building height” and “grade plane” having the meanings set forth in Section BC502.1 of the Building Code); and
3. The driveway provides access to the frontage space of each occupancy, except as otherwise provided in FC504.1.2; and

4. The dwelling units are equipped with interconnected smoke alarms, in accordance with Section 907.2.10 of the Building Code.

503.2.4.2 Group R-3 occupancies set back more than 100-150 feet. The fire apparatus access road to a Group R-3 building with any main front entrance located more than 100 feet (30 480 mm) but not more than 150 feet (45 720 mm) from the street line (as measured along the route of the fire apparatus access road) shall be designed and constructed with an unobstructed width of not less than 20 feet (6096 mm) in accordance with FC503.2.2 where:

1. The fire apparatus access road is designed and is used exclusively to provide access only to a single Group R-3 building, and to no other buildings; and
2. The height of the Group R-3 building does not exceed 35 feet (10 668 mm) above the grade plane (with the terms “building height” and “grade plane” having the meanings set forth in Section 502.1 of the Building Code); and
3. The fire apparatus access road provides access to the frontage space of each occupancy, except as otherwise provided in FC504.1.2; and
4. The dwelling units are equipped with interconnected smoke alarms, in accordance with Section 907.2.10 of the Building Code; and
5. The dwelling units are protected throughout by a sprinkler system; and
6. At least two off-street parking spaces for a one-family dwelling, and at least three such spaces for a two-family dwelling are provided on the premises separate from the fire apparatus access road; and
7. Parking is prohibited on the fire apparatus access road, and a “No Parking” sign conforming to the requirements of FC503.2.7.2 is conspicuously posted at the entrance to the access road.

503.2.4.3 Group R-3 occupancies set back more than 150 feet. The fire apparatus access road to a Group R-3 building with any main front entrance located more than 150 feet (45 720 mm) from the street line (as measured along the route of the fire apparatus access road) shall be designed and constructed in compliance with FC503.2.2, except as approved by the commissioner and subject to such conditions as the commissioner may require.

503.2.5 Obstruction. Fire apparatus access roads shall not be obstructed in any manner that impedes vehicular access, except for lawful parking and speed bumps. Speed bumps shall be identified by approved signage or roadway markings.

503.2.6 Secondary fire apparatus access. The commissioner may require more than one fire apparatus access road to one or more buildings where fire apparatus access is impeded to or on the primary access road as a result of substandard width public streets, substandard

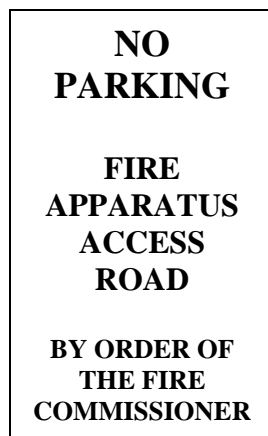
width fire apparatus access roads, traffic patterns, traffic calming devices, railroad crossings, and other conditions that would significantly delay an emergency response.

503.2.7 Parking. Motor vehicles shall not be parked on fire apparatus access roads except in lawful parking spaces that do not obstruct fire apparatus access. Curbside street parking that is lawfully established in accordance with the Zoning Resolution, Building Code and/or other applicable laws, rules and regulations is allowed on any fire apparatus access road if such curbside street parking does not reduce the usable roadway width to less than 18 feet (5486 mm). This requirement shall not be applicable to fire apparatus access roads whose design and use for parking was lawfully existing prior to the effective date of this section. For purposes of this usable roadway width determination, the dimensions of each parking space shall not be less than established by the department, consistent with the regulations of the New York City Department of Transportation for vehicles intended to be parked in such spaces, or, in the absence of such standard, as approved by the department.

503.2.7.1 Parking regulations necessitated by roadway configuration. The commissioner may restrict parking on fire apparatus roads where the angle of approach, curvature of the road, or other roadway configuration or site conditions impede the ability of fire apparatus to make turns or otherwise navigate the fire apparatus access road. Such restrictions shall constitute an operational requirement of this code.

503.2.7.2 Signage and roadway markings. On any fire apparatus access road upon which parking is prohibited, or upon which there are both lawful curbside street parking and parking restrictions, appropriate signage and/or roadway markings shall be provided in accordance with this section.

503.2.7.2.1 Signage. Fire apparatus access roads subject to parking restrictions shall be marked with permanent NO PARKING—FIRE APPARATUS ACCESS ROAD signs complying with FC Figure 503.2.7.2.1. Signs shall have a minimum dimension of 12 inches (305 mm) wide by 18 inches (457 mm) high and have red letters on a white reflective background. Signs shall be posted on the sides of the fire apparatus access road upon which parking is prohibited.



**FC FIGURE 503.2.7.2.1
NO PARKING SIGN
FIRE APPARATUS ACCESS ROAD**

503.2.7.2.2 Roadway markings. Where required by the commissioner, approved roadway markings that include the words NO PARKING—FIRE APPARATUS ACCESS ROAD shall be provided for fire apparatus access roads to identify them as fire apparatus access roads.

503.2.8 Gates. The design of gates across a fire apparatus access road shall be in accordance with this section.

503.2.8.1 Design requirements. Gates across a fire apparatus access road shall comply with the following requirements:

1. The gates shall not encroach upon or otherwise reduce the required or approved width of a fire apparatus access road.
2. Gates shall be of the swinging or sliding type.
3. Manually-operated gates shall be designed to allow for operation by one person.
4. Only approved locking devices shall be used.
5. Manually-operated gates shall not be locked with a padlock or chain and padlock unless the padlock and chain are capable of being cut with standard bolt cutters.
6. Automatically-operated gates shall be designed and installed in accordance with ASTM F 2200 and UL 325, as applicable, and shall have an approved means of manual operation for emergency access by firefighters and other emergency response personnel.

503.2.8.2 Use to restrict access. The commissioner may require the installation of locked gates where access to a road is to be restricted for fire apparatus use. It shall be unlawful to operate or park a motor vehicle on a fire apparatus access road restricted in this manner unless authorized by the commissioner.

503.2.9 Dead-end turnarounds. Dead-end fire apparatus access roads more than 150 feet (45 720 mm) in length, as measured from the curb line of the nearest public street which is not itself a dead-end, shall be provided with an approved turnaround area for fire apparatus in accordance with FC Table 503.2.9. Such roads more than 150 feet (45 720 mm) but not more than 400 feet (121 920 mm) in length shall not require a turnaround if all buildings served by the road that are further than 150 feet (45 720 mm) from the curb line of the nearest public street that is not a dead-end are protected throughout by a sprinkler system, excluding buildings in which the lack of a sprinkler system is a lawfully existing condition pursuant to FC 102.3, 102.4 and 102.5. Dead-end fire apparatus roads shall not exceed 400 feet (121 920 mm) in length unless approved by the commissioner.

**FC TABLE 503.2.9
REQUIREMENTS FOR DEAD-END FIRE APPARATUS ACCESS ROADS**

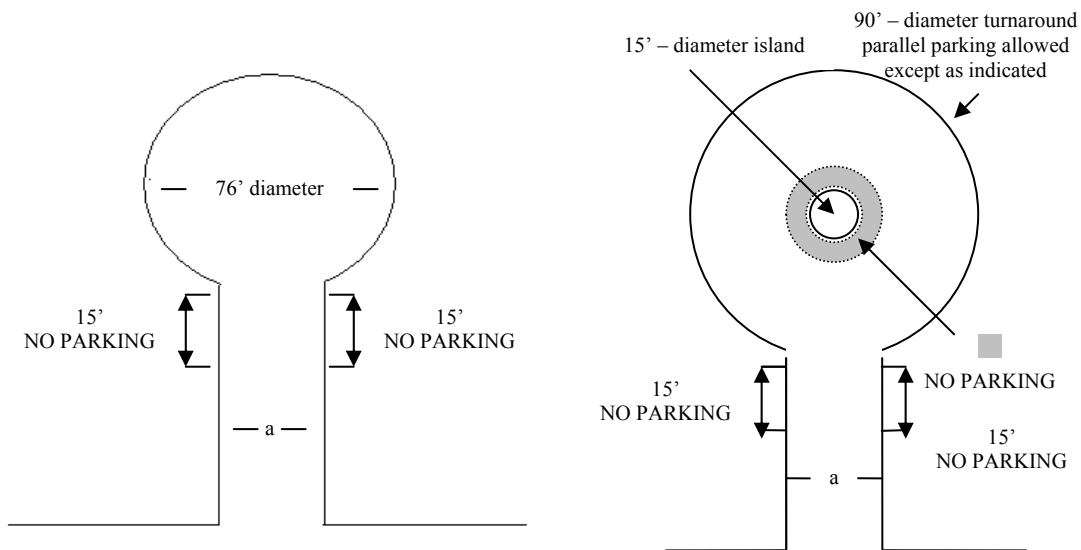
LENGTH (feet)	WIDTH (feet) ^b	TURNAROUNDS REQUIRED
0-150	34	None required
> 150 and ≤ 400 ^a	34	90-foot hammerhead, or 76-foot-diameter unobstructed turnaround, 90-foot-diameter turnaround with a 15-foot-diameter island, or other approved means. ^c
> 400	As approved	Such roads are allowed only where approved by the commissioner

For SI: 1 foot = 304.8 mm.

a. A turnaround shall not be required if all buildings served by the road are protected throughout by a sprinkler system.

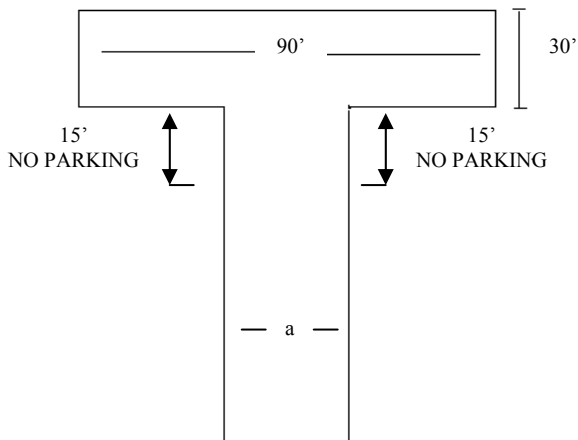
b. Except as otherwise provided in FC503.2.3.

c. See FC Figure 503.2.9.



1. 76-Foot-Diameter Turnaround

2. 90-Foot-Diameter Turnaround with up to 15-Foot-Diameter Island



3. 90-Foot Hammerhead

a. 34 feet (10 363 mm) except as otherwise provided in FC503.2.3.

FC FIGURE 503.2.9 DEAD-END FIRE APPARATUS ACCESS ROAD TURNAROUND

503.2.10 Substandard width roads. Buildings on fire apparatus access roads that have an unobstructed roadway width of less than 34 feet (10 363 mm) shall be protected throughout by a sprinkler system. Buildings served by a substandard width fire apparatus access road that is a lawfully existing condition pursuant to FC 102.3, 102.4 and 102.5 shall comply with this requirement when undergoing alteration or a change of occupancy in accordance with FC501.4.3. This requirement shall not apply to any detached, unheated, carport, garden shed, greenhouse, private parking garage for not more than three motor vehicles, tower or other accessory building, that is:

1. Classified by the Building Code as a Group U occupancy;
2. Not occupied or designed to be occupied for residential, commercial or office purposes; and
3. Accessory to a Group R-2 or Group R-3 occupancy.

503.3 Public streets. Buildings fronting on public streets shall comply with the requirements of FC 503.3.1 and 503.3.2.

503.3.1 Dead-end turnarounds. Dead-end public streets in excess of 150 feet (45 720 mm) in length, as measured from the curb line of the nearest public street that is not a dead-end, shall be provided with an approved turnaround area for fire apparatus that complies with the requirements of FC503.2.9.

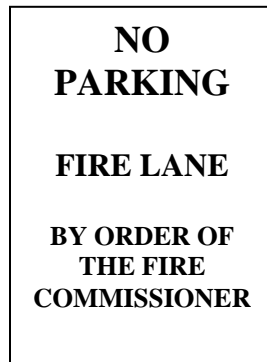
Exception: A turnaround shall not be required for dead-end public streets more than 150 feet (45 720 mm) in length if all buildings on such street further than 150 feet (45 720

mm) from the curb line of the nearest street that is not a dead-end are protected throughout by a sprinkler system, excluding buildings in which the lack of a sprinkler system is a lawfully existing condition pursuant to FC 102.3, 102.4 and 102.5.

503.3.2 Substandard width. Buildings on public streets that have an unobstructed width of less than 34 feet (10 363 mm) shall be protected throughout by a sprinkler system. Buildings on substandard width public streets that were not required prior to the effective date of this section to be protected throughout by a sprinkler system shall comply with this requirement when undergoing alteration or a change of occupancy subject to FC501.4.3. This requirement shall not apply to any Group U occupancy complying with the requirements of FC503.2.10.

503.4 Fire lanes. It shall be unlawful to park on a fire lane. Where other vehicular traffic is allowed on a fire lane, such traffic shall yield to fire apparatus or other department emergency response vehicles.

503.4.1 Signage. Fire lanes subject to parking restriction shall be marked with permanent NO PARKING-FIRE LANE signs complying with FC Figure 503.4.1, and/or approved roadway markings. Signs shall have a minimum dimension of 12 inches (305 mm) wide by 18 inches (457 mm) high and have red letters on a white reflective background. Signs shall be posted on the sides of the fire lane upon which parking is prohibited.



FC FIGURE 503.4.1 FIRE LANE SIGN

503.5 Outdoor parking lots. Outdoor parking lot lanes between rows of parking spaces and aisle space between motor vehicles shall comply with the requirements of the Building Code and Zoning Resolution, except that parking lot lanes that serve as the fire apparatus access road to the main front entrances of buildings situated in parking lots shall comply with the fire apparatus access requirements set forth in this code or such other roadway width requirements established by the Fire Department by rule.

SECTION FC 504 BUILDING AND ROOFTOP ACCESS

504.1 Frontage space. Buildings shall be provided with a frontage space in compliance with the requirements of this chapter and the Building Code. The term “frontage space” shall have the

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meaning set forth in FC502 for purposes of this code. For purposes of the Building Code, “frontage space” shall have the meaning set forth in Section 502 thereof.

Exception: Accessory buildings or structures classified by the Building Code as a Group U occupancy.

504.1.1 Main front entrance. The main front entrance of a building is the entrance that is designed to serve as the primary means of ingress and egress to the building, and which is located on a side of the building that contains windows, emergency escape and rescue openings, outdoor building corridors or other building openings that serve to afford firefighters access to the upper floors of the building. Where a building has more than one entrance that is so designed and situated, the owner may designate one such entrance as the main front entrance of the building, provided, however, that if such entrance does not provide an appropriate location for firefighting operations, the commissioner may require that another entrance be designated the main front entrance.

504.1.2 Occupancies with separate entrances. When a building contains more than one occupancy and separate entrances are provided for individual occupancies, there shall be a main front entrance for each such occupancy, and a separate frontage space shall be provided for each main front entrance, except that a second frontage space is not required for a two-family Group R-3 occupancy if unobstructed access, 5 feet (1524 mm) in width, is provided to the rear yard and to the main front entrance of any dwelling unit from either side of the building that is not directly accessible from the public street, fire apparatus access road, or driveway. An open accessory parking area not less than 5 feet (1524 mm) in width shall be sufficient to constitute unobstructed access to the rear yard, regardless of the presence of parked vehicles in such parking area.

504.1.3 Building access. An approved access walkway leading from the fire apparatus access road or driveway to the main front entrance of each occupancy or other exterior openings shall be provided when required by the commissioner.

504.1.4 Frontage space obstructions. Obstructions, such as planters, fences and bollards, shall not be placed in the required frontage space unless they have been approved by the Commissioner of Buildings, the Commissioner of Transportation, or the commissioner, as applicable.

504.2 Maintenance of exterior doors and openings. Exterior doors and openings required by this code or the construction codes, including the Building Code, shall be maintained in a manner that affords access by firefighting personnel in accordance with the requirements of this section, FC Chapter 10, and the Building Code. Exterior doors and their function shall not be eliminated without prior approval of the Department of Buildings. Exterior doors that have been rendered nonfunctional and that retain a functional door exterior appearance shall have a sign affixed to the exterior side of the door with the words THIS DOOR BLOCKED. The sign shall consist of letters having a principal stroke of not less than 0.75 inch (19.1 mm) wide and at least 6 inches (152 mm) high on a contrasting background. Required department access doors shall not be obstructed or eliminated. Exit and exit access doors shall comply with the requirements of FC

Chapter 10 and the construction codes, including the Building Code. Access doors for high-piled combustible storage shall comply with the requirements of FC2306.6.1.

504.3 Stairway access to roof. Stairway access to the roof shall be in accordance with FC Chapter 10 and the construction codes, including the Building Code. Such stairway shall be marked at street and floor levels with a sign indicating that the stairway continues to the roof. Where roofs are used for rooftop gardens or for other lawful purposes, stairways shall be provided as required for such occupancy classification.

504.4 Rooftop access and obstructions. The rooftops of buildings 100 feet (30 480 mm) or less in height, except rooftops with a slope exceeding 20 degrees (0.35 rad) from the horizontal, shall be designed, installed, operated and maintained in accordance with this section and in a manner that avoids or minimizes obstructions that impede firefighting operations such as vertical ventilation of heat and smoke, surveillance of rear yards and courtyards, and rooftop-aided rescues. For purposes of this section only, “rooftop” shall include rooftops of building setbacks, and “obstruction” shall mean any fixture or other item that is not readily movable by one person without the use of tools or equipment, including air conditioning systems, billboards and other signs, cellular antenna equipment, columns and girders, cooling towers, fuel oil storage tanks, generators, heating systems, planters, solar panels, ventilation system ducts, intakes and exhausts, and window cleaning equipment, but shall not include nonmetallic decking that is readily cut by standard power tools.

504.4.1 Rooftop access. Access to building rooftops shall be provided for fire operations by providing unobstructed access to the rooftop, including unobstructed passage across the building parapet, perimeter fence or other obstructions, and a safe landing. Such rooftop access shall be provided in compliance with the following required clearances:

1. For each 12 linear feet (3658 mm) of building perimeter accessible from the frontage space of the building and from any other exposure accessible to fire apparatus, a minimum clearance of 6 feet (1829 mm) in width and 6 feet (1829 mm) in depth from any obstruction shall be provided at the parapet wall or other perimeter of the rooftop.
2. Where such building perimeter is 24 linear feet (7315 mm) or greater, but less than 36 linear feet (10 973 mm), the required clearance openings shall be separated by a distance of not less than 12 linear feet (3658 mm).
3. Where such building perimeter is 36 linear feet (10 973 mm) or greater, the required clearance openings may be contiguous, provided, however, that such contiguous openings shall not exceed 12 linear feet (3658 mm) and shall be separated from other required clearance openings by a distance of not less than 12 linear feet (3658 mm).
4. Each exposure accessible by fire apparatus may be treated separately for purposes of locating clearance openings and otherwise complying with the requirements of this provision.

5. Awnings, sun control devices, solar panels or other structures affixed to an exterior building wall below the roof line shall not obstruct fire apparatus aerial ladder access to the rooftop perimeter access locations.
6. Scaffolding obstructing rooftop access locations shall be designed to provide secure landings at such locations in an approved manner.

504.4.2 Rooftop access signs and markings. Where required by the department, a sign, decal or approved marking shall be provided on the exterior wall of a building, at an approved location on a lower story, directly below the rooftop perimeter access landings, to identify the location of such rooftop access. The department may require such signs or markings when rooftop conditions not apparent from the street make rooftop access unsafe at locations other than the approved building perimeter access landings, or do not allow for access to the roof.

504.4.3 Rooftop access landings. At each rooftop perimeter access location, there shall be a safe landing area not less than 6 feet (1829 mm) in any dimension, connected to the clear path required by FC504.4.4. The landing shall not be obstructed by a fence, except as approved. If approved, such fence shall be provided with a standard 3-foot-wide (914 mm) gate that swings inward. Such gate may be secured by a padlock and chain capable of being cut by standard bolt cutters from either side of the gate, or secured by other approved device.

504.4.4 Rooftop clear path. A clear path of not less than 6 feet (1829 mm) horizontal width and 9 feet (2743 mm) in height shall be provided from the front of the building to the rear of the building and from one side of the building to the other for each 100 linear feet (30 480 mm) of rooftop width and depth. Such path shall comply with the following requirements:

1. Such clear path shall be accessible from each rooftop perimeter access landing required pursuant to FC504.4.3.
2. Such clear path shall afford reasonable access to bulkhead doors, fire escapes, access ladders, cockloft vents, skylights, scuttles and shafts. Such access shall include, to the maximum extent practicable, 3-feet (914 mm) clearance on three sides of the skylight or scuttle.
3. A conduit or pipe may cross such clear path in accordance with FC504.4.7.
4. Any lawful fence obstructing such clear path shall be provided with a standard 3-foot-wide (914 mm) gate, which may be secured by padlock or chain capable of being cut by standard bolt cutters, or secured by other approved device.
5. When the main building rooftop has more than one level, a fixed ladder or other approved means shall be provided to afford access along the clear path from one roof level to the next, excluding any height differential between levels exceeding one story or 16 feet (4077 mm), and any level with a rooftop area that is less than 6 feet (1829 mm) in any dimension.

6. On an “H”-shaped building or other building whose irregular configuration renders a single clear path inadequate to provide access to each wing of the building or other rooftop area, the commissioner may require one or more additional clear paths to provide adequate access to such rooftop areas.

504.4.5 Rooftop clear path protection. Adequate protection, in the form of a securely affixed protective railing or barrier that is 42 inches (1067 mm) above the roof surface in height along the clear path, shall be provided for any shaft, building perimeter or elevation adjoining the clear path or rooftop perimeter access landing (except the rooftop access landing itself).

Exception: Height differentials of 6 feet (1829 mm) or less.

504.4.6 Required rooftop clearances. A minimum clearance of 6 feet (1829 mm) in all directions shall be provided from each door opening onto a rooftop from a dwelling unit, stairway, bulkhead, or other occupied space or means of egress, as measured from the door hinge. A minimum clearance of 3 feet (914 mm) in all directions shall be provided from any fire escape or rooftop access ladder, as measured from each side of the ladder or landing.

504.4.7 Rooftop conduits and piping. To the maximum extent practicable, conduits, including cable trays, and piping, shall be installed at rooftop locations where they do not obstruct rooftop access landings, clear path or required clearances. If it is impracticable to avoid these areas, conduits and piping shall be designed and installed to facilitate access and minimize tripping hazards. Steps or ramps (or platforms with steps, ramps or ladders) shall be provided that are constructed of noncombustible material, equipped with railings, and designed to allow any conduit or piping installations that exceed 1 foot (305 mm) in height above the roof surface, or more than 24 inches (610 mm) in width, to be readily traversed. Steps, ramps, platforms and ladders shall not be placed in areas or in a manner that would obstruct any door or means of egress. All conduits and piping installations shall be color-coded with continuous, durable and weatherproof reflective or luminescent markings as follows, and for conduit and piping installed after July 1, 2014, shall be continuously labeled in an approved manner to indicate its contents:

1. High voltage wiring – Red.
2. Low voltage wiring – Orange.
3. Natural gas piping – Yellow.
4. Other compressed gas piping – Yellow, labeled at regular intervals with the type of gas.
5. Fuel oil piping – Yellow with black stripes.

504.4.8 Rooftop telecommunications installations. Telecommunications installations on building rooftops, including cellular antenna installations, shall additionally comply with the following requirements:

1. Transmitting antennas shall be identified by affixing to the antenna, the antenna mounting, or a conspicuous location near the antenna, continuous, durable and weatherproof reflective or luminescent markings and not less than 3-inch (76-mm) lettering that reads, "TRANSMITTER."
2. A durable sign shall be conspicuously posted on or near any equipment closet, roof base station or similar telecommunications antenna installation, identifying the owner of the installation, providing a 24-hour/7-day per week telephone number by which such owner can be contacted, and identifying the installation, including antennas and other powered equipment associated with the installation, by number or other unique designation.

504.4.9 Rooftop gardens. Rooftop gardens and landscaping, including living walls, shall be designed, installed, operated and maintained in compliance with the requirements of the construction codes, including the Building Code and this section.

504.4.9.1 Perimeter and clear path access. Rooftop gardens and landscaping shall not obstruct any rooftop area access to which is required pursuant to this section, including rooftop perimeter access and landings, clear path and clearances.

504.4.9.2 Landscaped rooftops. Rooftop access landings, clear paths and other areas access to which is required pursuant to FC 504.3 and 504.4.4 may be landscaped in compliance with the following requirements:

1. The earth or other landscaping material in such areas shall be securely contained and compacted in such a manner as to ensure a stable, continuous surface with a slope not exceeding the slope of the rooftop.
2. Vegetation in such areas shall be limited to grass or other plants that do not exceed 12 inches (305 mm) in height and do not constitute a tripping hazard or pitfall.

504.4.9.3 Maintenance and water supply. Rooftop gardens and landscaping shall be maintained and provided with a water supply in accordance with FC318. Equipment used for the maintenance of rooftop gardens and landscaping shall be stored in accordance with FC318.

504.4.10 Rooftop solar installations. Rooftop solar installations shall be designed, installed, operated and maintained in accordance with FC512.

SECTION FC 505 PREMISES IDENTIFICATION

505.1 Address numbers. Buildings and structures shall have their lawful address numbers, building numbers and/or other approved building identification placed at a location on or near a building that allows such building identification to be plainly discernible from the public street or frontage space. These numbers shall contrast with their background. Address numbers shall be

Arabic numerals or alphabet letters. Numbers shall be a minimum of 4 inches (102 mm) high with a minimum stroke width of ½ inch (12.7 mm). Address numbers shall additionally comply with the requirements of the Building Code, New York City Housing Maintenance Code and the borough president of the borough in which such building is located.

505.1.1 Identification of buildings in developments. Buildings located within outdoor shopping malls, office parks, housing complexes or other developments shall be identified in compliance with the requirements of FC505.1. Where required by the commissioner, approved signage identifying the street address of each building in the development and, in outdoor shopping malls, each tenant space or similar occupancy, and the direction to such building or tenant space, shall be provided. Such signage shall be clearly visible at the intersection of the public street and any fire apparatus access road that provides access to buildings in the development. In any development in which one or more buildings does not have a separate street address, or in any outdoor shopping mall in which one or more tenant spaces or similar occupancies does not have a separate street address, the commissioner may require approved signage indicating the location and direction to each such building or tenant space upon a determination that such signage is necessary to enable firefighting or other emergency response personnel to expeditiously locate such buildings or tenant spaces within the development.

505.2 Street or road signs. Streets and roads within developments shall be identified with approved signs in accordance with the requirements of the New York City Department of Transportation. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by motor vehicles. Signs shall be of an approved size, weather resistant and be maintained until replaced by permanent signs.

505.3 Identification of apartment and guest rooms. The location of, and entrance to, each dwelling unit (guest room or sleeping room) in a Group R-1 building or occupancy, and each dwelling unit in a Group R-2 building or occupancy, shall be identified in accordance with this section and the rules to assist emergency response personnel responding to fires, medical emergencies and other emergencies at the premises.

505.3.1 Apartment and guest room numbers. Each dwelling unit shall be identified on the public corridor side of the door by a room number and/or letter marking or sign conspicuously and durably printed or posted on or adjacent to at least one entrance door.

505.3.2 Public entry and corridor signage. In a Group R-1 or R-2 building or occupancy with more than eight dwelling units on a floor, a sign shall be conspicuously posted in the elevator lobby or other public entry on each floor, and in the public corridor opposite each stairwell entrance, identifying by directional arrows and dwelling unit numbers and/or letters, the direction to each dwelling unit. Such signage need not be provided in the public entry or opposite any stairwell entrance in any building or on any floor where the entrances to dwelling units are located in a single direction from such entry or stairwell entrance.

505.3.3 Existing installations. Existing buildings and occupancies shall comply with the operational requirements for marking and signage set forth in FC 505.3.1 and 505.3.2 within 2 years of the effective date of this section.

505.4 Apartment, guest room and stairwell fire emergency markings. Dwelling units (apartments, guest rooms and sleeping rooms) and stairwell entrances in Group R-1 and Group R-2 buildings and occupancies shall be marked in accordance with this section and the rules to facilitate firefighting and emergency rescue operations at the premises.

505.4.1 Multi-floor dwelling units. The entrance door to a multi-floor dwelling unit in a Group R-1 or Group R-2 building or occupancy shall be identified on the door jamb on the public corridor side of the door by an approved fire emergency marking, not more than 12 inches (305 mm) from the bottom of the door, indicating the dwelling unit number and/or letter. In addition, every door of each such multi-floor dwelling unit that opens to a public corridor or other means of egress shall be identified on the public corridor side of the door by one or more upward or downward-pointing arrows indicating the direction(s) of the other floor(s) to which the multi-floor dwelling unit is connected.

505.4.2 Apartment and sleeping rooms. Except as otherwise provided in FC505.4.1, and except in buildings protected throughout by a sprinkler system, in a Group R-1 or R-2 building or occupancy with more than eight dwelling units on a floor, each dwelling unit shall be identified on the door jamb on the public corridor side of the door by an approved fire emergency marking, not more than 12 inches (305 mm) from the bottom of the door, indicating the dwelling unit number and/or letter.

505.4.3 Stairwell signage. Except in buildings protected throughout by a sprinkler system, each stairwell door in a building or occupancy subject to compliance with the requirements of FC505.4.1 or FC505.4.2 shall be identified as a stairwell door on the door jamb on the public corridor side of the door with an approved marking or sign not more than 12 inches (305 mm) from the bottom of the door, unless such stairwell entrance has been marked in compliance with Section 1026.11 of the Building Code.

505.4.4 Design and materials. The fire emergency markings for dwelling unit entrance doors shall be of photoluminescent, retroreflective or other approved material, durable, water-resistant and securely affixed and shall use Arabic numerals and/or English alphabet letters. The fire emergency marking on multi-floor dwelling units shall be a minimum of 3 inches (76 mm) high and 1½ inches (38 mm) wide with a stroke width of ½ inch (12.7 mm) and the fire emergency markings required by FC 505.4.2 and 505.4.3 shall be in accordance with the rules. Any approved fire emergency marking may be used provided that the same type of marking is consistently used throughout the building. Photoluminescent markings and signs shall comply with the Building Code requirements for photoluminescent exit path markings.

505.4.5 Existing installations. Existing buildings and occupancies shall comply with the operational requirements for marking and signage set forth in FC505.4.1 within 2 years of the effective date of this section, and with the operational requirements for marking and signage as set forth in FC 505.4.2 and 505.4.3 within 3 years of the effective date of this section.

505.5 Covered mall exterior door signage. Each exterior door that provides access directly to a tenant space in a covered mall or to a corridor serving as an exit passageway from one or more

such tenant spaces shall be provided with signage or markings identifying the business occupying such space or spaces. Such identification shall be durably and conspicuously posted or marked on or adjacent to the outdoor side of the exterior door such that the business name is readily discernible from nearby parking lot lanes.

SECTION FC 506 KEYS AND KEY ACCESS

506.1 General. This section shall govern the use and possession of keys required for firefighter service elevator operation, key boxes, gates and barriers, and other locked areas, boxes or cabinets to which the department requires access for firefighting operations.

506.2 Citywide-standard keys. Citywide-standard keys shall be used to operate firefighter service elevators, and to provide access to key boxes, gates and barriers, and other locked areas, boxes or cabinets to which the department requires access for firefighting operations, in accordance with this section.

506.2.1 Elevator keys. Firefighter service elevator key switches shall be operable by a citywide standard key.

506.2.2 Key boxes. Where access to or within a building, structure or premises is restricted because of locked doors or other building openings, or where immediate access would be needed for lifesaving or firefighting purposes in the event of a fire or other emergency, the department may require that keys be kept in a key box installed in an approved location. The owner shall ensure that the key kept in the lock box is replaced whenever a lock securing the area, box or cabinet is changed or rekeyed.

506.2.3 Gates and barriers. Wherever a gate or similar barrier obstructs fire department access or fire apparatus access to a premises, and a lock is installed on such gate or barrier, the lock shall be of an approved type and operable by a citywide standard key.

506.2.4 First responder box. The department may require that a locked box operable by a citywide standard key be provided in a designated area in a building, structure or premises to store plans, building information cards or other materials that will assist firefighting personnel responding to a fire or other emergency at the premises.

506.3 Access to citywide standard keys. It shall be unlawful to possess a citywide standard key except for persons authorized to possess such key in connection with the following purposes:

1. Owners of buildings equipped with firefighter service elevators, or their authorized representatives, including FLS directors and FEP coordinators.
2. Elevator contractors.
3. Elevator inspectors of the Department of Buildings.

4. Persons authorized to conduct testing and other maintenance or servicing of fire alarm systems.
5. Authorized department personnel.
6. New York City police officers and other approved law enforcement personnel.
7. Building owners required to have key boxes, locked boxes or locked gates or barriers pursuant to this code, or their authorized representatives.
8. Building owners with locked gates and barriers that block required fire department and fire apparatus access.
9. Locksmiths or other authorized key suppliers when in connection with their lawful business operations.

506.4 Access to fire department standard keys. It shall be unlawful to possess a fire department standard key, except for authorized department personnel and other approved persons.

SECTION FC 507 RESERVED

SECTION FC 508 FIRE PROTECTION WATER SUPPLIES

508.1 Required water supply. For premises requiring the installation of private fire hydrant systems or yard hydrant systems, an approved water supply capable of supplying the required design capacity for fire protection shall be provided.

508.2 Type of water supply. A water supply shall consist of pressure tanks, gravity tanks, water mains or other approved fixed systems capable of providing the required design capacity.

508.2.1 Private fire service mains. Private fire service mains and appurtenances shall be installed in accordance with NFPA 24 and the requirements of the New York City Department of Environmental Protection.

508.2.2 Water tanks. Water tanks for private hydrant systems and yard hydrant systems shall be installed in accordance with NFPA 22.

508.2.3 Yard hydrant systems. Outdoor amusement parks, bulk plants or terminals, lumber yards, trailer camps, industrial parks, and similar occupancies shall be provided with a yard hydrant system installed in compliance with the requirements of the construction codes, including the Building Code, this section and FC914. Yard hydrants shall be installed such that the entire area may be reached by 250 feet (76.2 m) of hose from a yard hydrant or a street hydrant supplied from a direct connection to a city water main or other approved water supply.

508.3 Design capacity. The design capacity of the water supply shall be determined by an approved method.

508.4 Water supply test. Upon completion of the installation of a private fire hydrant system and yard hydrant system, a flow test shall be conducted to verify that the system provides the minimum design capacity required by FC508.3. Certification of the water supply test shall be submitted to the commissioner by a registered design professional.

508.5 Private fire hydrant systems. Private fire hydrant systems shall comply with the requirements of FC 508.5.1 through 508.5.6.

508.5.1 Where required. Where the front entrance of a building is more than 250 feet (76.2 m) from a hydrant on a public street, as measured by an approved route, private fire hydrants and mains shall be provided as required by the commissioner.

508.5.2 Inspection, testing and maintenance. Private fire hydrant systems shall be subject to periodic tests as required by the commissioner. Private fire hydrant systems shall be maintained in good working order at all times and shall be repaired when defective. Additions, repairs, alterations and servicing shall comply with approved standards.

508.5.2.1 Department flow tests. The department may periodically inspect and test private fire hydrant systems, at the risk of the owner, for proper operation and unobstructed flow of such hydrant system.

508.5.3 Private fire service mains and water tanks. Private fire service mains and water tanks shall be periodically inspected, tested and maintained in accordance with NFPA 25 at the following intervals:

1. Private fire hydrants (all types): Inspection annually and after each operation; flow test and maintenance annually.
2. Fire service main piping: Inspection of exposed, annually; flow test every 5 years.
3. Fire service main piping strainers: Inspection and maintenance after each use.

508.5.4 Obstructions. Posts, fences, vegetation, rubbish containers, vehicles and other items shall not be installed, planted, placed, parked or stored near fire hydrants, fire department connections or fire protection system control valves in a manner that would obscure the location of such fire hydrants, connections or valves, or that would hinder immediate access thereto by firefighting personnel.

508.5.5 Clear space around hydrants. A 3-foot (914 mm) radius clear space shall be maintained around the circumference of fire hydrants to allow unobstructed operation of the hydrant operating nut, except as otherwise required or approved.

508.5.6 Physical protection. Where fire hydrants are subject to impact by motor vehicles, posts that comply with the requirements of the New York City Department of Environmental Protection shall be installed. Notwithstanding the requirements of FC508.5.5, these posts may be installed no less than 2 feet (610 mm) from the hydrant if they do not obstruct the use of a 24-inch (610-mm) wrench on the hydrant operating nut.

SECTION FC 509 RESERVED

SECTION FC 510 FIRE PROTECTION AND UTILITY EQUIPMENT IDENTIFICATION AND ACCESS

510.1 Identification. Fire protection equipment shall be identified in an approved manner. Rooms containing controls for ventilation systems, sprinkler risers and valves, or other fire detection, extinguishing or control elements shall be identified for the use of the department. Approved signs required to identify fire protection equipment and equipment location, shall be constructed of durable materials, permanently installed and conspicuously posted.

510.2 Safe access. Fire protection devices, equipment and systems, including fire detection systems and fire extinguishing systems, shall be readily accessible for inspection, operation and maintenance. Combustible materials, combustible waste and other items shall not be placed or stored in a manner that would obstruct or impede access to such equipment. Sprinkler and standpipe system control valves located at a height of 7 feet (2134 mm) or more above the floor shall be provided with fixed ladders, chains and wheels, or other approved means to provide ready access.

510.3 Natural gas shutoff tools. Natural gas utilities shall provide the department with suitable tools for the operation of outdoor gas service line valves for a building or structure or other outdoor emergency shutoff device or equipment. The number of such tools required to supply the department's needs shall be determined by the commissioner.

510.4 Utility identification. Where required by the department, water, natural gas, electric or other utility service shutoff valves and disconnect switches to a building, structure, premises, device, equipment or system shall be provided with a durable and conspicuous marking that identifies the building, structure, premises, device, equipment or system such shutoff valve or disconnect switch serves.

SECTION FC 511 IN-BUILDING AUXILIARY RADIO COMMUNICATION SYSTEMS

511.1 General. The design, installation, operation and maintenance of in-building auxiliary radio communication systems dedicated for fire department use, whether required by the Building Code or installed voluntarily, shall comply with this section and the rules.

511.2 Design and installation. In-building auxiliary radio communication systems for fire department use shall be designed and installed in accordance with the construction codes, including the Building Code, and the Electrical Code.

511.2.1 Installer qualifications. In-building auxiliary radio communication systems for fire department use shall be installed by a master electrician licensed by the Department of Buildings and such other qualifications as may be prescribed by rule.

511.2.2 Installation acceptance. In-building auxiliary radio communication systems for fire department use shall be tested for department acceptance in compliance with the requirements of this section and the rules.

511.2.2.1 Commissioning test. Upon completion of installation of an in-building auxiliary radio communication system for fire department use, a commissioning test shall be conducted in accordance with Annex O of NFPA 1 by a person holding a Federal Communication Commission general radio telephone operator license and such other qualifications as may be prescribed by rule.

511.2.2.2 Department acceptance test. Upon successful completion of the commissioning test, the owner shall submit to the department a detailed report of the results of the commissioning test and request a department acceptance test. The department acceptance test shall serve to demonstrate the system is functioning satisfactorily and is ready for department use. The in-building auxiliary radio communication system shall be demonstrated in the presence of a department representative by a representative of the owner. Upon satisfactory completion of the department acceptance test, the department shall issue a permit for such system.

511.3 Operation and maintenance. The operation and maintenance of in-building auxiliary radio communication systems for fire department use shall be in accordance with this section and the rules.

511.3.1 General. In-building auxiliary radio communication systems for fire department use shall be maintained in good working order.

511.3.2 Out-of-service systems. The department shall be notified immediately if an in-building auxiliary radio communication system for fire department use, or part thereof, is out of service. A tag identifying the system as out of service shall be placed on the fire command center or other approved location when the system is out of service.

SECTION FC 512 ROOFTOP SOLAR PANEL INSTALLATIONS

512.1 General. The design, installation, operation and maintenance of solar panel systems, including photovoltaic and thermal systems, on the rooftops of buildings and structures, shall be in accordance with this section, the Electrical Code and the construction codes, including the Building Code, Mechanical Code and Plumbing Code.

512.2 Flat-roofed buildings and structures 100 feet or less in height. Solar panel installations shall not obstruct any rooftop area access to which is required pursuant to FC504.4, except that solar panel installations may obstruct the clear path required by FC504.4.4 as follows:

1. if the installation is provided with a hinged mechanism or other device for which a certificate of approval has been issued that enables the installation to be safely swung, slid, lifted, collapsed or otherwise moved out of the clear path, and that is designed to allow for operation by one person, without the use of a tool; or
2. on any building with a rooftop width or depth of 25 feet (7620 mm) or less, where the design of a solar panel installation necessitates coverage of all or substantially all of the rooftop across the full width or length thereof, the commissioner may authorize permanent obstructions that encroach upon and thereby reduce the clear path width within such area when necessary to accommodate the presence of hatches; scuttles and skylights; bulkheads; attic ventilators; chimneys and plumbing vents; and heating, ventilation and air conditioning equipment or other rooftop building service equipment.

512.3 Pitched-roofed buildings and structures 100 feet or less in height. Solar panel installations shall be designed, installed, operated and maintained in accordance with this section on rooftops of buildings and structures 100 feet (30 480 mm) or less in height with a slope exceeding 20 degrees, except detached Group U buildings and structures.

512.3.1 Hip roofs. Solar panel installations shall provide a 3 foot (914 mm) wide clear access area along the ridge on each roof slope upon which solar panels are installed.

512.3.2 Ventilation. Solar panels shall not be installed closer than 3 feet (914 mm) to the ridge line.

512.4 Photovoltaic solar panel installations. Photovoltaic solar panel installations shall be designed, installed, operated and maintained in compliance with the requirements of this section.

512.4.1 Location of photovoltaic solar panel installations on pitched roofs. Direct current conduit, wiring systems, and raceways for photovoltaic circuits installed on pitched roofs subject to the requirements of FC512.3 shall be located along hips and valleys, away from the ridge, and on outside walls, to maximize ventilation opportunities. Conduit runs between sub-arrays and to direct current combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the direct current combiner box, except as necessary to minimize the tripping hazard. The direct current combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays.

512.4.2 Photovoltaic solar panel installation markings. Indoor and outdoor direct current conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes, and main service and other disconnects shall have durable, retroreflective and, if outdoors, weatherproof, markings, in white capital letters with a height of not less than 3/8 inch (9.5 mm) on a red background, reading "WARNING: PHOTOVOLTAIC POWER SOURCE." Continuous installations, including conduit, raceways, enclosures and cable assemblies, shall

be marked every 10 feet (3048 mm), within 1 foot (305 mm) of all turns or bends, and within 1 foot (305 mm) above and below all penetrations of roof or ceiling assemblies and all walls.