

Southern Nevada Fire Code Amendments

Southern Nevada Fire Code Committee

Clark County – Henderson - Las Vegas – North Las Vegas

FINAL CONSENSUS

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International Fire Code

101.2.1

101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

The following appendices are hereby adopted and are a part of this code:

Appendix B – Fire-flow requirements for buildings, as amended

Appendix C – Fire hydrant locations and distribution, as amended

Appendix H – Hazardous materials management plan (HMMP) and hazardous materials inventory statement (HMIS) instructions

Appendix J – Emergency responder radio coverage system, as amended

Appendix K – Proprietary (self) monitoring, as amended

102.7.1

102.7.1 Local codes. The revised locally adopted codes listed below shall replace the listed referenced documents. References contained herein shall refer to the locally adopted codes.

IBC-09 2009 International Building Code

IMC-09 International Mechanical Code is replaced with 2009 Uniform Mechanical Code

IPC-09 International Plumbing Code is replaced with 2009 Uniform Plumbing Code

IRC-09 2009 International Residential Code

104.9

104.9 Alternative materials and methods. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been approved. The *fire code official* is authorized to approve an alternative material or method of construction where the *fire code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purposes intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. The fire code official is authorized to require design submittals to be prepared by, and bear the stamp of, a Nevada registered design professional.

105.1.4

105.1.4 Certificate of Insurance. A valid Certificate of Insurance shall be submitted to, or be on file with, the *fire code official* when applying for a permit to conduct specific operations.

Exception: The requirement for an insurance certificate may be waived by the fire code official's Risk Manager.

105.1.4.1 Certificate Information Required. The certificate shall be issued by an insurance company authorized to conduct business in the State of Nevada, or be named on the list of authorized insurers maintained by the Nevada Department of Business and Industry, Division of Insurance.

The following information shall be provided on the certificate:

1. The contractor shall be named as the insured. If the insurance is provided by an individual, company or partnership other than the contractor, the contractor shall be named as an additional insured.
2. "insert name of jurisdiction it's agents, employees and volunteers" shall be named as both an additional insured and certificate holder
3. General liability limits, including contractual liability, in the minimum amounts specified below of the specific operation being conducted:
 - a. To erect temporary membrane structures, tents, or canopies. See Chapter 24 \$2,000,000.
 - b. To use explosive materials or to conduct pyrotechnic displays. See Chapter 33 \$5,000,000
 - c. To operate a special amusement building. See Chapter 9. \$2,000,000.

105.1.4.2 Additional Insurance. Greater liability insurance amounts may be required in certain cases (such as building implosions) as deemed necessary by the *fire code official*.

105.3.1

105.3.1 Expiration. An operational permit shall remain in effect until reissued, renewed, or revoked or for such a period of time as specified in the permit, not exceeding one year from date of issuance. Construction permits shall automatically become invalid unless the work authorized by such permit is commenced within 180 days after its issuance, or if the work authorized by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced. Before such work recommences, a new permit shall be first obtained and the fee to recommence work, if any, shall be one-half the amount required for a new permit for such work, provided no changes have been made or will be made in the original construction documents for such work, and provided further that such suspension or abandonment has not exceeded one year. Permits are not transferable and any changes in occupancy, operation, tenancy or ownership shall require a new permit to be issued.

105.6.23

105.6.23 Hot work operations. An operational permit is required for hot work including, but not limited to:

1. Public exhibitions and demonstrations where hot work is conducted.
2. Use of portable hot work equipment inside, upon, or within 10 feet of a structure.

Exception: Work that is conducted under a construction permit.

3. Fixed-site hot work equipment such as welding booths.
4. Hot work conducted within a hazardous fire area.
5. Application of roof coverings with the use of an open-flame device.
6. When approved, the *fire code official* shall issue a permit to carry out a Hot Work Program. This program allows approved personnel to regulate their facility's hot work operations. The approved personnel shall be trained in the fire safety aspects denoted in this chapter and shall be responsible for issuing permits requiring compliance with the requirements found in Chapter 26. These permits shall be issued only to their employees or hot work operations under their supervision.

105.6.40

105.6.40 ~~Roof~~ Heliports, Helistops, and Emergency Landing Pads. An operational permit is required for the operation of a ~~rooftop~~ heliport, helistop, and/or emergency landing pad. See Chapter 11 and NFPA 418

105.6.47 thru 105.6.61

105.6.47 Emergency responder radio coverage system. An operational permit is required to operate an emergency responder radio coverage system regulated by Chapter 5 and Appendix J.

105.6.48 Filming. An operational permit is required to film, or broadcast at a public studio, production location, or sound stage. See Section 321.

105.6.49 Fire Pumps. An operational permit is required for facilities that contain a fire pump. See Chapter 9 and NFPA 20

105.6.50 Fire Suppression and Extinguishing Systems. An operational permit is required for facilities that contain a fire suppression or extinguishing system. See Chapter 9

105.6.51 Firewood. An operational permit is required to store firewood in excess of 50 cords. See Chapter 19

105.6.52 Flame effects. An operational permit is required to produce combustion through the use of flammable solids, liquids, or gases to produce thermal, physical, visual, or audible phenomenon for entertainment, exhibition, demonstration or simulation. See NFPA 160

105.6.53 Special Activity. An operational permit is required at locations that operate Christmas trees, pumpkin patch lots, and similar activities. See Section 320.

105.6.54 Mobile fueling site. An operational permit is required to operate each site where mobile fueling takes place. See Chapter 34

105.6.55 Mobile fueling vehicle. An operational permit is required to operate a mobile fueling vehicle. See Chapter 34

105.6.56 Monitoring facilities. An operation permit is required for any facility that remotely monitors electronic signals initiated by fire protection systems such as central or supervising facilities.

105.6.57 Proprietary /self-monitoring. An operational permit is required to operate an onsite proprietary (self) monitoring fire alarm system. See Appendix K.

105.6.58 Smoke Control System. An operational permit is required for facilities that have smoke control systems.

105.6.59 Smoke Removal Systems. An operational permit is required for facilities that have smoke removal systems.

105.6.60 Tire storage An operational permit is required to store tires in excess of 1,000 cubic feet (28.3 m³). See Chapter 25

105.6.61 Wood pallets. An operational permit is required to store or rehabilitate pallets in an area exceeding 500 sq. ft. (46 m²) See Chapter 19.

105.7.1

105.7.1 Automatic fire-extinguishing systems.

A construction permit is required for the following:

1. Installation of or modification to an automatic fire-extinguishing system.
2. Replacement of recalled fire protection components.

Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

105.7.3

105.7.3 Compressed gases. When the compressed gases in use or storage exceed the amounts listed in Table 105.6.8, a construction permit is required to install, repair damage to, abandon, remove, place temporarily out of service or close or substantially modify a *compressed gas system*.

Exceptions:

1. Routine maintenance.
2. For emergency repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

A construction permit is required to install, extend, alter, or modify a medical gas system.

Exception: Level 3 compressed air and/or piped vacuum systems as defined by NFPA 99, *Standard for Health Care Facilities*.

105.7.4

105.7.4 Cryogenic fluids. A construction permit is required for installation of or alteration to ~~outdoor~~ stationary cryogenic fluid storage systems and for fog effect systems that utilize CO² or cryogenic fluids where the system capacity exceeds the amounts listed in Table 105.6.8 or Table 105.6.10. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

105.7.5

105.7.5 Fire alarm and detection systems, ~~and related equipment~~ and dedicated function fire alarm systems (i.e., monitoring). A construction permit is required for the following:

1. ~~Installation of or modification to fire alarm and detection systems and related equipment (including but not limited to: extending; reprogramming; upgrading field programmable EPROM, or altering) to fire alarm and detection systems, related equipment, and dedicated function fire alarm systems.~~
2. Replacement of recalled fire protection components.
3. Control equipment replacement.

Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

105.7.11

105.7.11 ~~Private Fire Hydrants~~ and Associated Supply Piping. A construction permit is required for the installation or modification of ~~private~~ fire hydrants, including temporary hydrants, and the associated supply piping.

105.7.15 thru 105.7.24

105.7.15 Access gates. A construction permit is required for the installation of or modification to each access gate (including both manual and automatic gates) obstructing a fire apparatus access road. See Chapter 5

105.7.16 Emergency responder radio coverage system. A construction permit is required for installation of or modification to emergency responder radio coverage systems and related equipment regulated by Chapter 5 and Appendix J. A construction permit shall be issued prior to commencing the installation.

CD 105.7.17 Fire apparatus access road plan. A construction permit is required for the installation of or modification to a fire apparatus access road required for access to a protected premise. See Chapter 5 and Appendix C

CD 105.7.18 Fire Protection Report. A permit is required for the review and approval of a Fire Protection (Life Safety) Report. See Chapter 9.

CD 105.7.19 Proprietary(self) monitoring facilities. The *Fire code official* is authorized to require a construction permit for the installation of or modification to an onsite proprietary (self) monitoring facility. See Appendix K

105.7.20 Heliports, Helistops, and Emergency Landing pads. A construction permit is required for the installation of or modification to a heliport, helistop, and/or emergency landing pad. See Chapter 3 and NFPA 418

CD 105.7.21 Refrigeration systems. A construction permit is required for installation of a mechanical refrigeration system covered by Section 606.

105.7.22 Smoke Control System. A construction permit is required for the installation of or modification to a smoke control system. See Chapter 9

105.7.23 Smoke Removal System. A construction permit is required for the installation of or modification to a smoke removal system. See Chapter 9

CD 105.7.24 Water tanks A construction permit is required for the installation of or modification to a water tank used for supply of a fire protection system. See Chapter 9 and NFPA 22.

Exception: Permits are not required for installation of tanks controlled by a water purveyor governed by the Nevada Public Service Commission, a State of Nevada charter, or other public franchise.

108

SECTION 108

BOARD OF APPEALS

108.1 Board of appeals, established. In order to hear and decide appeals of orders, decisions or determinations made by the *fire code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The *fire code official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *fire code official*.

108.2 Limitations on authority. An application for appeal shall be based on a claim that the intent of this code or the rules legally adopted hereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equivalent method of protection or safety is proposed. The board shall have no authority to waive requirements of this code.

108.3 Qualifications. The board of appeals shall consist of members who are qualified by experience and training to pass on matters pertaining to hazards of fire, explosions, hazardous conditions or fire protection systems and are not employees of the jurisdiction.

111.4

111.4 Failure to comply. Any person who shall continue any work after being served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine as determined by the authority having jurisdiction. ~~of not less than () dollars or more than () dollars.~~

201.3

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the International Building Code, International Fuel Gas Code, International Mechanical Code or International Plumbing Code, or other codes adopted by this jurisdiction, such terms shall have the meanings ascribed to them as in those codes.

202

FALSE ALARM is the activation or reporting of an alarm for which no such alarm condition, fire or emergency actually exists. Additionally, False Alarm is the willful and knowing initiating or transmission of a signal, message or other notification of an event of fire when no such danger exists.

SMOKE CONTROL, DEDICATED SYSTEMS. Dedicated smoke-control systems are intended for the purpose of smoke control only. They are separate systems of air moving and distribution equipment that do not function under normal building operating conditions. Upon activation, these systems operate specifically to perform the smoke-control function.

SMOKE CONTROL, NON-DEDICATED SYSTEMS. Non-dedicated systems are those that share components with some other system(s) such as the building HVAC system. Activation causes the system to change its mode of operation to achieve the smoke-control objectives.

202

Group I-4, day care facilities. This group shall include buildings and structures occupied by persons of any age who receive custodial care for less than 24 hours by individuals other than parents or guardians, relatives by blood, marriage or adoption, and in a place other than the home of the person cared for. A facility such as the above with ~~five~~ six or fewer persons shall be classified as a Group R-3 or shall comply with the *International Residential Code* in accordance with Section 101.2 of the *International Building Code*. Places of worship during religious functions are not included.

Adult care facility. A facility that provides accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services shall be classified as Group I-4.

Exception: Where the occupants are capable of responding to an emergency situation without physical assistance from the staff, the facility shall be classified as Group R-3.

Child care facility. A facility that provides supervision and personal care on less than a 24-hour basis for more than ~~five~~ six children 2½ years of age or less shall be classified as a Group I-4.

Exception: A child day care facility that provides care for more than ~~five~~ six but no more than 100 children 2½ years or less of age, where the rooms in which the children are cared for are located on a *level of exit discharge* serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.

Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the *International Residential Code* in accordance with Section 101.2 of the *International Building Code*. Residential occupancies shall include the following:

R-1 Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including:

Boarding houses (transient)

Hotels (transient)

Motels (transient)

Congregate living facilities (transient) with 10 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

R-2 Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

Apartment houses

Boarding houses (nontransient)

Condominiums (nontransient)

Convents

Dormitories

Fraternities and sororities

Hotels (nontransient)

Live/work units

Monasteries

Motels (nontransient)

Vacation timeshare properties

Congregate living facilities with 16 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

R-3 Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Buildings that do not contain more than two *dwelling units*.

Adult care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.

Child care facilities that provide accommodations for ~~five~~ six or fewer persons of any age for less than 24 hours.

Congregate living facilities with 16 or fewer persons.

Adult care and child care facilities that are within a single-family home are permitted to comply with the *International Residential Code*.

R-4 Residential occupancies shall include buildings arranged for occupancy as residential care/assisted living facilities including more than five but not more than 16 occupants, excluding staff.

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code or shall comply with the International Residential Code, provided the building is protected by an automatic sprinkler system installed in accordance with Section 903.2.8.

The following summarizes how the various Southern Nevada jurisdictions license home day cares:

Clark County

In accordance with Title 6, Chapter 6.16, Section 20 of the Clark County Code, the Clark County Department of Business License categorizes home-based child care facilities for business licensing and regulatory purposes into one of two categories:

(1) A "family child care home" is any family dwelling in which the licensee regularly provides care, without the presence of parents, for one but not more than six children.

(2) A "group child care home" is a facility in which the licensee regularly provides care for at least seven but not more than twelve children. The increase number of children allowed in a group child care home is contingent upon a minimum of two caretakers working at all times. These definitions are similar to the definitions used in NAC/NRS 432A. As such, Clark County is consistent with the Nevada Bureau of Services for Child Care in that a "family home" (State term) or "family child care home" (County term) is licensed for a maximum of six (6) children.

Henderson

According to the Business License Division of the City of Henderson's Finance Department, the City of Henderson has elected to not license child care facilities. In accordance with NRS 432A.131, when a city or county does not establish its own agency for the licensing of child care facilities, then licensing of all such facilities in that city or county is the jurisdiction of the Nevada Bureau of Services for Child Care. Therefore, all home day care facilities in Henderson are licensed by the Nevada Bureau of Services for Child Care and are subject to the requirements of NAC/NRS 432A, which means home day cares in Henderson are licensed for up to six (6) children.

Las Vegas

According to Title 6, Chapter 6.24.005 of the City of Las Vegas Code, the City will no longer license or regulate child care facilities, effective May 9, 2009. As of May 9, 2009, all child care facilities in the City of Las Vegas will be licensed and regulated directly by the Nevada Bureau of Services for Child Care in accordance with NAC/NRS 432A. Therefore, all home day cares in the City of Las Vegas will now be licensed by the State for a maximum of six (6) children.

North Las Vegas

According to Title 5, Chapter 5.14.010 of the City of North Las Vegas' Code, the City limits "family day care homes" to a maximum of four (4) children twelve (12) years of age or younger, and limits "day nurseries" to the care of at least five (5) but not more than ten (10) children under the age of sixteen (16). As such, the City of North Las Vegas has more restrictive limitations on home day cares than the IBC or the Nevada Bureau of Services for Child Care.

Mesquite

According to the City of Mesquite Code, the City will license a childcare facility only after it has obtained the required license from the Nevada Bureau of Services for Child Care. Therefore, all home day cares in the City of Mesquite are licensed for up to six (6) children in accordance with NAC/NRS 432A. [Note: Maria Trujillo from the City of Mesquite indicated that they currently only have one licensed day care provider in the city.]

Boulder City

According to the Boulder City Business Licensing Department, the City of Boulder City does not currently have the regulatory or inspection staff to support oversight of licensing for child care facilities. Therefore, the City of Boulder City has elected to not license child care facilities. In accordance with NRS 432A.131, when a city or county does not establish its own agency for the licensing of child care facilities, then licensing of all such facilities in that city or county is the jurisdiction of the Nevada Bureau of Services for Child Care. Therefore, all home day care facilities in Boulder City are licensed by the Nevada Bureau of Services for Child Care and are subject to the requirements of NAC/NRS 432A, which means home day cares in Boulder City are licensed for up to six (6) children in accordance with NAC/NRS 432A.

Pahrump

According to the City of Pahrump's web-site, the City will license a childcare facility only after it has obtained the required license from the Nevada Bureau of Services for Child Care. Therefore, all home day cares in the City of Pahrump are licensed for up to six (6) children in accordance with NAC/NRS 432A.

Summary

This proposal will benefit the jurisdictions in Southern Nevada by eliminating a conflict between the NAC/NRS and the 2009 IBC. If approved, this proposal would allow home day cares that provide care for a maximum of six (6) children to have a business license issued by the State and/or the local jurisdiction without requiring the caretaker's home to comply with the 2009 IBC, whether as a Group I-4 or R-3 occupancy. Instead, the caretaker's home would be permitted to comply with the 2009 IRC.

Please note that this proposal only addresses home day cares that provide service for a maximum of six (6) children. Those home day cares that provide care for more than six children would still be required to comply with the IBC requirements for a Group I-4 occupancy.

307.4.1

307.4.1 Bonfires. ~~A bonfire shall not be conducted within 50 feet (15240 mm) of a structure or combustible material unless the fire is contained in a barbecue pit. Conditions which could cause a fire to spread within 50 feet (15240) of a structure shall be eliminated prior to ignition.~~

Bonfires are prohibited.

307.4.4

307.4.4 Commercial Barbecue. Barbecue pits used for commercial cooking operations in buildings shall be constructed as commercial food heat-processing equipment in accordance with the Mechanical Code. See also Section 904. Barbecue pits in outdoor locations shall be constructed of concrete or approved noncombustible materials and shall not be located within 10 feet (3048 mm) of combustible walls or roofs or other combustible material.

311.2.2

311.2.2 Fire protection. ~~Fire alarm, s~~ Sprinkler and standpipe systems, including monitoring, shall be maintained in an operable condition at all times. The following exceptions may be used after obtaining approval from the fire code official.

Exceptions:

1. When the premises have been cleared of all combustible materials and debris and in the opinion of the *fire code official*, the type of construction, fire separation distance and security of the premises do not create a fire hazard.
2. Where the buildings will not be heated and fire protection systems will be exposed to freezing temperatures, fire alarm and sprinkler systems are permitted to be placed out of service and standpipes and permitted to be maintained as dry systems (without an automatic water supply) provided the buildings has no contents or storage, and windows, doors and other openings are secured to prohibit entry by unauthorized persons.

314.3

314.3 Highly combustible goods. The display of highly combustible goods, including but not limited to fireworks, flammable or combustible liquids, liquefied flammable gases, oxidizing materials, pryroxylin, plastics and

agricultural goods in main exit access aisles, corridors covered malls, or within 5 feet (1524 mm) of entrances to exits and exterior exit doors is prohibited ~~when a fire involving such goods would rapidly prevent or obstruct egress.~~

318.1

SECTION 318

EXHIBITIONS AND TRADE SHOWS

318.1 General. Indoor Exposition and Trade Show Facilities are addressed in this section. These include, but are not limited to exhibition halls, convention general sessions, association meetings, product convention showrooms; trade shows with or without booths, and political conventions that constitute temporary assembly uses. An operational permit shall be obtained in accordance with Section 105.6.

318.2

318.2 Exhibits (Booths). Exhibits (booths) shall comply with 318.2.1 through 318.2.5.

318.2.1 Automatic Sprinklers

318.2.1.1 Single-level exhibit booths exceeding 1,000 sq. ft. (93 sq. m.) and covered with a ceiling shall be protected by automatic fire sprinklers installed within the booth.

318.2.1.2 Each level of multi-level exhibit booths shall be protected by an automatic fire sprinkler system installed within the booth where the accessible floor area of the upper walking level(s) is greater than 300 sq ft. (27.9 sq. m).

318.2.1.3 The water supply and piping for the fire sprinkler protection for exhibit booths shall be an approved temporary means provided by an existing standpipe system or an existing fire sprinkler system.

318.2.1.4 Hydraulic calculations shall be provided to the Authority Having Jurisdiction when the sprinklers required by Section 318.2.1.1 and 318.2.1.2 are supplied by the standpipe system or in a hydraulically most remote location as defined by the currently adopted edition of Standard for the Installation of Sprinklers, NFPA 13.

318.2.2 Horizontal Separation between Booths. A single exhibit (booth) or group of exhibits (booths) that do not require fire sprinklers shall be separated by a distance of not less than 8 ft. (2.4 m) where the aggregate ceiling exceeds 1000 sq. ft. (93 sq. m.).

318.2.3 Travel Distance within Booths. The travel distance within the exhibit booth or exhibit enclosure to an exit access aisle shall not exceed 50 ft. (15 m).

318.2.4 Means of Egress from Booths. The upper deck of multi-level exhibit booths exceeding 300 sq. ft. (28 sq. m.) shall have not less than two remote means of egress.

318.2.5 Construction Materials. Exhibit booths shall be constructed using any of the following:

_____ (1) Noncombustible materials

_____ (2) Wood exceeding ¼ in. (6.3 mm) nominal thickness

_____ (3) Wood that is pressure-treated, fire-retardant wood meeting the requirements of NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials*.

- _____ (4) Flame-retardant materials complying with NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*
- _____ (5) Textile wall coverings, such as carpeting and similar products used in wall or ceiling finishes complying with Section 803.5.1 of the IFC.
- _____ (6) Plastics limited to a Class A flame spread index.
- _____ (7) Foamed plastics and materials containing foamed plastics complying with Section 807.4.2.1 of the IFC.
- _____ (8) Cardboard, honeycombed paper, and other combustible materials having a heat release rate for any single fuel package that does not exceed 150 kW where tested in accordance with UL 1975, *Standard for Fire Tests for Foamed Plastics Used for Decorative Purposes*.
- _____ (9) Alternate materials as approved by the fire code official.

318.3

318.3 Decorative Curtains, and Textiles

318.3.1 Curtains, drapes, and textiles used in temporary exhibitions and trade shows shall comply with Section 318, and shall not be required to comply with Section 807. Curtains, drapes and textiles shall comply with Standard Method of Fire Tests for Flame Propagation of Textiles and Films, NFPA 701, Test Method 2. Compliance shall be indicated by a tag affixed to each curtain, drape, or textile. The tag shall be affixed by the owner of the material after gaining assurance that the material is inherently flame retardant, provided with current flame retardant treatment, or otherwise is compliant with NFPA 701. The tag shall indicate the name of the owner of the material and a statement indicating compliance with the Fire Code. The fire code official is authorized to conduct field test in accordance with the current edition of NFPA 705, *Recommended Practice for a Field Flame Test of Textiles and Films*, on any curtain, drape or textile installed.

318.3.2 Curtains, drapes and textiles shall comply with Standard Method of Fire Tests for Flame Propagation of Textiles and Films, NFPA 701, Test Method 2.

Exception: Free-standing partitions situated in a manner to permit the minimum required egress width to one or both sides of the partition shall be permitted. The paths of egress provided around the partition shall be marked by exit signs complying with Chapter 10.

318.3.3 Curtains, drapes or textiles shall not be installed to cover exit signs, means of egress components, sprinklers, strobes, horn-strobes, standpipe outlets, hose cabinets, fire extinguishers, or any other fire protection equipment.

318.3.4 Ceiling suspended curtains drapes and textiles in exhibition spaces are to have a minimum of 18 inches of clear space between the top of the material and the sprinkler deflector.

Exception: Clearance between the ceiling and the top of the curtain, drape or textile is not required when the curtain, drape, or textile is within 6 inches of a full-height wall.

318.3.5 The amount of temporary ceiling hung curtains, drapes or textiles in exhibition spaces equipped throughout with automatic sprinklers shall not be limited and shall comply with 318.3.1 through 318.3.3.

318.4

318.4 Demonstration cooking and food warming in exhibition spaces shall comply with the following:

1. All cooking appliances shall be listed or approved by a nationally recognized testing agency.
2. All cooking equipment is to be operated according to the manufacturers' recommendations and operating instructions. Equipment recommended for outdoor use shall not be used indoors.
3. All cooking equipment (deep fat fryers and woks) operations using combustible oils shall meet all of the following criteria:
 - a. Metal lids sized to cover the horizontal cooking surface are to be provided.
 - b. The cooking surface is limited to 288 sq in (two sq ft).
 - c. Cooking equipment exceeding 288 sq in aggregate surface area shall be provided with an automatic extinguishing system installed according to NFPA 17A.
 - d. Cooking equipment exceeding 288 sq in shall be provided with a mechanical exhaust system in accordance with the mechanical code.
 - e. The fryer is to be separated from all other equipment by a distance not less than 24 in.
 - f. These cooking displays must be separated from all other combustibles by a distance not less than 10 ft.
 - g. The volume of cooking oil per appliance is not to exceed 3 gal.
 - h. The volume of cooking oil per booth is not to exceed 8 gal.
 - i. Deep fat fryers shall be electrically powered and have a shut-off switch.
4. Class-K fire extinguishers shall be provided within 30-ft of each cooking operation in accordance with 904.11.5.
5. Solid fuel cooking equipment shall be protected in accordance with the mechanical code.
6. LP-gas used for displays and demonstrations shall be in accordance with section 3803.2.1.5.

318.5

318.5 Plans. Plans for the exhibition or trade show shall be submitted to the authority having jurisdiction for approval, along with application for an operational permit, prior to setting up any exhibit. The plans shall show all pertinent details of the proposed exposition which shall include the following as applicable:

1. Overall floor plan (either drawn to scale or dimensioned properly)
2. Egress analysis showing conformance with chapter 10 of the IFC
3. Seating arrangements and/or table and chair configurations
4. Locations of all exhibits (booths, aisles and exits)
5. Locations of temporary walls, partitions, or curtains
6. Lobby and registration area usage
7. Location of temporary platforms (along with any intended use beneath the platform)
8. Location of fire protection equipment (e.g. extinguishers, fire alarm devices, hose cabinets, etc.)
9. Temporary fire protection equipment to be installed (note: This requires a separate installation permit)
10. Copy of excerpt from show management information guide serving notice that all exhibits shall comply with applicable codes and shall have all necessary Fire Code permits.

319

SECTION 319

WOOD AND PLASTIC PALLET STORAGE AND REHABILITATION

Section 319: Wood and Plastic Pallet Storage and Rehabilitation

319.1 General. New and existing facilities with either storage or rehabilitation of pallets shall be in accordance with Sections 319.1 thru 319.6.3 and Section 1903.

319.2 Permits. An operational permit is required for new and existing facilities which store more than fifty (50) idle pallets on site, either inside or outside of a building. For a commercial pallet yard, a site plan demonstrating compliance with Section 319 shall be submitted for review and approval prior to issuance of the operational permit.

319.3 Fire Flow. The minimum required fire flow in pallet storage yards shall not be less than 2,000 gpm (7571 L/m). For storage yards with stable piles greater than 6,200 sq. ft. (576 m²) the required fire flow will follow the requirements of Appendix B, Table B105.1 for Type V-B construction. Pallet storage yards shall not exceed the available fire hydrant flow and spacing.

319.4 Fire Hydrants. Fire hydrants required for fire flow purposes for pallet storage array(s) shall be provided within three hundred (300) feet (152.4m) of hose lay to all pallets.

319.5 Fire Department Access. Fire apparatus access roads in accordance with Section 503 shall be located within one hundred fifty (150) feet (45,720mm) of all portions of the pallet storage array(s). Permanent delineation of on-site fire apparatus access roads shall be provided as required by the *fire code official*.

319.6 Idle Pallet Storage

319.6.1 Exterior storage and storage arrays at commercial pallet yards. Exterior pallet storage arrays shall comply with all of the following:

1. Stacks shall not exceed a height of fifteen (15) ft. (4.57 m) or any height restriction set by other ordinances of the jurisdiction, whichever is lower.
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.
3. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage.
4. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.
5. Stacks shall be arranged to form stable piles.
6. Piles shall not contain more than six thousand (6,000) cu. ft. (170 m³) of pallets.
7. Piles shall be separated by a minimum distance of eight (8) ft. (2.44 m).
8. Piles shall be arranged in a grid system to form pallet storage arrays with a maximum dimension of fifty (50) ft. by fifty (50) ft. (15.25 m by 15.25 m).
9. Pallet storage arrays shall be separated by a minimum distance of twenty four (24) ft. (7.32 m).

319.6.2 Exterior storage at other occupancies (not a commercial pallet yard). Exterior pallet storage (for up to a maximum of 200 pallets) shall comply with all of the following:

1. Stacks shall not exceed a height of fifteen (15) ft. (4.57 m) or any height restriction set by other ordinances of the jurisdiction, whichever is lower.
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.

3. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage.
4. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure. In order for stacks to be closer than fifteen (15) ft. to an on-site structure, they shall maintain minimum clearances based on the quantity of pallets and the level of protection provided by the building construction as follows:
 - a. 50 pallets or less adjacent to a masonry building with no openings within twenty (20) ft. (6 m) of the pallets, or a masonry building with protected openings and outside automatic sprinklers is zero (0) ft. (0 m).
 - b. 51 to 200 pallets adjacent to a masonry building with no openings within twenty (20) ft. (6 m) of the pallets, or a masonry building with protected openings and outside automatic sprinklers is eight (8) ft. (2.44 m).
 - c. 50 pallets or less adjacent to a fully sprinklered wood or metal building is eight (8) ft. (2.44 m).
 - d. 51 to 200 pallets adjacent to a fully sprinklered wood or metal building with outside automatic sprinklers is eight (8) ft. (2.44 m).
5. Stacks located less than fifteen (15) ft. (4.57 m) from an exterior building wall shall not exceed a height equal to thirty (30) inches below the roof line elevation, or fifteen (15) ft. (4.57 m), or any height restriction set by other ordinances of the jurisdiction, whichever is lower.
6. Stacks shall be arranged to form stable piles.

319.6.3 Interior storage. Interior storage of more than 12 pallets shall be in accordance with NFPA 13 Section 12.12, Protection of Idle Pallets and IFC Chapter 23, High-Piled Combustible Storage.

320

SECTION 320

SPECIAL ACTIVITY LOTS

320.1 General. Special activity lots, including Christmas tree lots, pumpkin patches, hay ride lots, and other similar lots, shall comply with this section.

320.2 Permit required. An operational permit shall be obtained prior to commencing special activity lot operations. See Chapter 1.

320.3 Other required permits. Other activities that support the special activity lot, such as a tent, a fuel tank for generators, an amusement building, or any other associated activity, shall have separate permits prior to commencing those other activities. See Chapter 1.

320.4 Arrangement of combustibles. Combustibles, such as Christmas trees, hay bales, and other combustible materials associated with the special activity, shall be arranged on the lot in a manner to mitigate the impact of fire, and shall be arranged in accordance with this section

320.4.1 Access from fire apparatus access roads. Fire apparatus access roads shall be provided within 150 feet of all portions of the special activity lot, as measured along normal paths of travel.

320.4.2 Clearance from fire apparatus access roads. All combustible materials shall be a minimum of ten (10) feet away from fire apparatus access roads.

320.4.3 Clearance from property lines upon which buildings may be built. All combustible materials shall be a minimum of twenty (20) feet from property lines for property where buildings are or are permitted to be built.

320.4.4 Clearance from fuel dispensers. All combustible materials shall be a minimum of 50 feet away from any fuel dispenser.

320.4.5 Clearance from buildings, building exits, and building exit discharges to the public way. All combustible materials shall be a minimum of ten (10) feet from any building, building exit, and the path of discharge between the building exit and the public way.

320.4.6 Aisles between materials. Aisles having a minimum width of five (5) feet shall be provided between areas containing materials. Sufficient aisles shall be provided such that the area of material storage does not exceed 150 feet in length and 50 feet in width.

320.5 Wiring and lighting. All wiring and lighting shall be listed for outside use, be of proper size and type, and be protected against physical damage. Electrical extension cords with multiple electrical outlets cannot be used unless specifically listed for outdoor use.

320.6 Fire Protection. Fire protection features, such as fire extinguishers and water supply, shall be provided for special activity lots as required by this section.

320.6.1 Fire extinguisher. A minimum two 2 ½ gallon water-type fire extinguisher shall be provided at an approved location for protection against incipient fires.

320.6.2 Water supply. The special activity lot shall be located within 300 feet of a fire hydrant.

320.6.3 Smoking prohibited. Smoking is prohibited on special activity lots. "NO SMOKING" signs with 2-inch high letters on a contrasting background shall be posted at entrances to the special activity lot and to each aisle.

320.6.4 Open burning prohibited. Open burning, such as a campfire, is prohibited on special activity lots.

320.7 Egress. Egress shall be provided as required by this code.

SECTION 321

MOTION PICTURE AND TELEVISION PRODUCTION STUDIO, SOUND STAGES, PRODUCTION FACILITIES, AND PRODUCTION LOCATIONS

321.1 General. The design, construction, operation, and maintenance of permanent and temporary soundstages, production facilities, as well as use of production locations, used in motion picture and television industry productions shall comply with NFPA 140 – *Motion Picture and Television Production Studio, Sound Stages, Production Facilities, and Production Locations*, and this section.

321.2 Permits. Permits shall be required as specified in this section and shall comply with Section 105.

EXCEPTIONS:

1. Minor production location operations when approved by the fire code official.
2. The filming or live broadcasts of news or sporting events.

321.2.1 Construction Permits. A construction permit shall be obtained prior to commencement of construction.

321.2.2 Operational Permits. An operational permit is required to operate a motion picture and television production studio, sound stage, production facility, or production location.

321.3 Other Permits. A separate permit(s) in accordance with Section 105 shall be obtained in conjunction with an operational permit.

321.4 Housekeeping. All Studios, Sound Stages, Production Facilities and Locations shall maintain proper housekeeping in accordance with this code.

321.5 Fire Department Standby. At the discretion of the *fire code official*, due to the use of pyrotechnics or other hazards, fire department personnel and apparatus may be required to standby. Fees associated with fire department standby shall be the responsibility of the applicant. The *fire code official* may require fees to be placed in escrow.

321.6 Temporary Production Locations

321.6.1 General. Production Locations shall meet the requirements of this code except as otherwise specified in this section.

321.6.2 Interior Sets or Stages. Interior sets or stages are only permitted to be constructed in sprinklered buildings.

321.6.3 Sprinkler Obstructions. Where Interior sets and stages cause sprinkler obstructions exceeding 600 ft² (557m²) in area, such obstructions shall be protected in accordance with NFPA 13.

EXCEPTIONS:

1. Where the building is protected with a sprinkler system meeting the design criteria for Extra Hazard, Group 2, obstructions shall not be required to be protected.
2. Where the building is protected by an automatic sprinkler system failing to meet the minimum sprinkler design requirements of NFPA 140, obstructions shall be protected by heat detectors installed in accordance with requirements of this section.

321.7 Electrical. The existing building's electrical system shall not be used to supplement lighting and power systems used by the production company unless specifically approved and permitted by the *code official*.

321.7.1 Electrical power connections made to the site electrical service shall be made by a licensed electrician under an electrical permit.

321.7.2 Portable power cables shall be positioned to not obstruct egress.

321.7.3 Auxiliary power cables supplied from mobile generators or adjacent buildings shall not be permitted to be routed through fire-rated windows and doors.

321.8 Structural Loading. Sets, scenery, rigging, and other equipment shall not impact the structural integrity of existing buildings. Additional loads applied to the building shall require approval from the *code official*. At the request of the *code official*, an engineering analysis from a licensed structural engineer shall be provided.

321.9 Fire Department Access. Fire department access shall be maintained at all times in accordance with the fire code.

321.10 Heat Detectors. Where heat detectors are installed to mitigate sprinkler obstructions, the heat detector system shall be installed in accordance with this code except as otherwise specified in this section.

321.10.1 Fire Alarm Panels. Fire Alarm panels shall be utilized in accordance with their listing. Panels may be temporarily supported by sets, platforms, or pedestals, for temporary sets which will be erected for less than 180 days.

321.10.2 Notification. The fire alarm panel shall be connected to an approved listed central, proprietary, or remote station service, and a local alarm which will give an audible signal to a constantly attended location such as a security post.

321.10.3 Heat Detectors. Heat detectors required by this section shall be defined as a portable system as it is intended to be reinstalled when platforms or sets are changed, and after filming has been completed for the day. Heat detectors shall be secured to standard outlet boxes, which may be temporarily supported by sets, platforms, or pedestals.

321.10.4 Wiring. Wiring for temporary (less than 180 days) or portable fire alarm systems do not have to meet the requirements of NEC 300-1 as revised locally.

401.3.2

401.3.2 Alarm activations. Upon activation of a ~~fire alarm~~ water flow signal, employees or staff shall immediately notify the fire department.

Exception: For approved proprietary supervising station systems (self-monitoring systems), the fire department shall be notified as required by the *fire code official*.

401.9

401.9 Fines for false alarms and nuisance alarms. The *fire code official* is authorized to levy fines to the installer, maintenance company, owner or occupant of a building as follows. In the case of any two false or nuisance alarms, or combination thereof, within a consecutive thirty day period, the *fire code official* may issue warning notices to the owners or occupants of the building and to the alarm business or businesses responsible for the service, maintenance and monitoring of the system. This notice shall indicate that any additional false or nuisance alarms within a thirty day period will be subject to the penalties prescribed in this code.

503.1.1

503.1.1 Buildings and facilities. Approved fire apparatus roads shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet (45 720 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility.

Exception: The *fire code official* is authorized to increase the dimension of 150 feet (45 720 mm) where:

1. The building, except for a Group H and/or high-pile storage occupancy, is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2, or **903.3.1.3**.
2. Where the building is protected with an approved *automatic sprinkler system* in accordance with minimum requirements, the fire apparatus roads shall extend to within 250 feet (76 420 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building. **For R-3 occupancies see Section 903.2.8.2.3.**
3. Where the building is protected with an approved **upgraded** automatic sprinkler system in accordance with the minimum requirements for the upgraded sprinkler system design, the fire apparatus roads shall extend to within 350 feet (106 680 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building. For the purposes of this section, an upgraded sprinkler system shall be in accordance with the following table:

<u>Minimum Code-Required System</u>	<u>Upgraded System for 350 feet from fire apparatus lanes</u>
<u>NFPA 13D</u>	<u>NFPA 13R (See Section 903.2.8.2.3)</u>
<u>NFPA 13R (Group R-1, R-2 Occupancies)</u>	<u>NFPA 13, Light Hazard</u>
<u>NFPA 13, Light Hazard</u>	<u>NFPA 13, Ordinary Hazard Group 1, with quick-response sprinklers</u>
<u>NFPA 13, Ordinary Hazard Group 1</u>	<u>NFPA 13, Ordinary Hazard Group 2</u>
<u>NFPA 13, Ordinary Hazard Group 2</u>	<u>NFPA 13, Extra Hazard Group 1</u>
<u>NFPA 13, Extra Hazard Group 1</u>	<u>NFPA 13, Extra Hazard Group 2</u>
<u>NFPA 13, Extra Hazard Group 2</u>	<u>As approved by the <i>fire code official</i></u>

4. Fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, shall be provided an approved automatic sprinkler system in addition to approved alternatives such as standpipes or secondary water supplies, and an approved alternative means of fire protection is provided.
5. The following structures are not required to meet the requirements of 503.1.1
 - 5.1 Detached gazebos and rotundas for residential and public uses.
 - 5.2 Independent buildings such as restrooms or snack shops 400 square feet or less that are associated with golf courses, parks and similar uses.
 - 5.3 Detached equipment or storage buildings for commercial use not exceeding 400 square feet. (37m²)
6. ~~There are not more than two Group R-3 or Group U occupancies or single family dwellings built under the IRC.~~

503.2.1

Section 503.2.1 Dimensions

503.2.1 Dimensions. Fire apparatus access roads Serving Commercial developments and R-1 or R-2 occupancies shall have an unobstructed width of not less than 24 20 feet (7315 mm) (6096 mm), exclusive of shoulders, except for approved access security gates in accordance with Section 503.6, and an unobstructed vertical clearance of not less than 13 feet 6 inches (4115 mm). In locations where on-street parallel parking is utilized, such parking shall be not less than 8 ft wide.

503.2.1.1 Residential. R-3 type occupancies street width can be reduced to 24 ft (7.32m) wide if all buildings fronting the street are provided with an automatic sprinkler system installed in accordance with Section 903.2.8.2.3

Section 503.2.3 Surface

503.2.3 Surface. (CM) Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus, with a minimum vehicle load of 18,000 20,000 pounds per axle, and shall be surfaced and paved so as to provide all-weather driving capabilities.

Exception: Temporary access roads serving only buildings under construction shall not be required to be paved, but shall comply with all other requirements of Section 503.2.3.

503.2.4

503.2.4 Turning radius. The required turning radius of a fire apparatus access road shall ~~be determined by the fire code official.~~ be no less than 28 feet inside turning radius and 52 feet outside turning radius.

503.2.7

503.2.7 Grade. The grade of the fire apparatus access road shall not exceed 12 percent ~~be within the limits established by the fire code official based on the fire department's apparatus.~~

503.2.8

503.2.8 Angles of approach and departure. The angles of approach and departure for fire apparatus access roads shall be a maximum of 6 percent grade for 25 feet (7.6 m) of approach/departure, ~~within the limits established by the fire code official based on the fire department's apparatus.~~

503.3

Section 503.3 Marking

503.3 Marking. ~~Where required by the fire code official, approved signs or other approved notices or markings that include the words NO PARKING — FIRE LANE shall be provided for fire apparatus access roads to identify such roads or prohibit the obstruction thereof. The means by which fire lanes are designated shall be maintained in a clean and legible condition at all times and be replaced or repaired when necessary to provide adequate visibility.~~

Fire apparatus access roads shall be marked where required to prohibit parking and other obstructions. Marking shall consist of painting the curb, or the side of the street, where no curb is present, with a suitable coat of industrial red enamel along the entire length of road where parking is prohibited. Each section of curb that is painted red shall also be marked by signage stating “NO PARKING FIRE LANE”. Signs are to be installed no higher than 10 feet or less than 6 feet from the surface of the roadway. Signs shall be located at each end of painted curb, and additionally in between so that the maximum separation between signs is 100 feet, as measured along the centerline of the fire apparatus access road. See type “A” sign Appendix M.

In lieu of providing multiple signs for access roads serving only R-3 type occupancies A minimum of one (1) sign is provided at every entrance stating “ON-STREET PARKING IN MARKED FIRE LANES PROHIBITED”, See type “B” sign Appendix M. Required fire lanes shall be marked by painting the words “NO PARKING FIRE LANE”, over the face of the red-painted curbs. The words on the curbs shall be painted in white letters not less than 4 inches in height with a brush stroke of not less than ¾ inch. The maximum separation between words shall be 50 feet, as measured along the centerline of the fire apparatus access lane. See Type “C” sign Appendix M.

503.4.1

503.4.1 Speed bumps and speed humps. Speed bumps and/or speed humps shall not be permitted within the required width of fire apparatus access roads.

Exception: Speed humps are allowed on private fire apparatus access roads serving commercial and industrial buildings when approved by the fire code official. The location(s), the number permitted, and the design of the speed hump(s) shall meet the approval of the fire code official.

The fire code official is authorized to require the removal from any private property of any existing traffic management or calming device, including speed bumps, that do not meet the applicable criteria, and has been determined by the fire code official to unnecessarily hinder emergency apparatus response.

503.6

503.6 Security Access Gates. The installation of security access gates across a fire apparatus access road shall be approved by the fire chief code official. Where security access gates are installed, they shall have an approved means of emergency operation. The security access gates and the emergency operation shall be maintained

operational at all times. The minimum clear opening width shall be 20 feet. ~~Electric gate operations, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed, and installed to comply with the requirements of ASTM F 2200.~~

503.6.1 Permit. A Fire Department installation permit is required to install a gate that obstructs a fire apparatus access road. A separate permit is required for each gated entrance.

503.6.2 General. Fire apparatus access roads that are secured by gates shall comply with the specifications of the Fire Department.

503.6.3 Electronically controlled gates. Electronically controlled gates shall be provided with an approved vehicle detector/receiver system in accordance with the rules and regulations specified by the Fire Department. Access gates shall be maintained operational at all times. When electronically controlled gates are out of service, they shall be secured in the open position until repairs are complete. Repairs shall be in accordance with original specifications.

Exception: When approved by the *fire code official*, electronically controlled gates that are manned on a 24-hour basis.

When required by the *fire code official*, the installing contractor or the owner of the property shall provide the Fire Department transmitter(s) or approved alternative without cost to the Fire Department.

The *fire code official* may provide transmitter(s), at no cost to the Fire Department, to local law enforcement agencies and/or an ambulance service for use in emergencies.

503.6.4 Existing facilities. All existing facilities with gates installed across access roads shall comply with Fire department guidelines. Non-complying gates shall be secured in the open position in a manner approved by the Fire Department.

Exception: Gates securing sensitive facilities operated by a public utility governed by the Nevada Public Service Commission, a State of Nevada charter, or other public franchise, shall not be required to be secured in the open position.

503.6.5 Plans and Specification. Three sets of plans and specifications for fire apparatus access road gates shall be submitted for review and approval prior to construction. Included in the submittal shall be the following information:

1. Site plan with north arrow, roadway and gate dimensions
2. Location of underground roadway detector loop, and green marker, if applicable
3. Manufacturers' specification sheets detailing the voltage, current, radio frequency, power cable and coding for the proposed system, if applicable
4. Contractor's statement of compatibility with existing installations
5. Detailed vicinity map.

503.6.6 Operational testing. An operational test shall be requested by the installing contractor and shall be conducted prior to placing the system into operation to establish that the final installation complies with this code, the specified design, and is functioning properly.

505.1

505.1 Address Numbers. New and existing buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting

the property. These numbers shall contrast with their background. Address numbers shall be Arabic numerals or alphabet letters. ~~Numbers shall be a minimum of 4 inches (1002mm) high with a minimum stroke width of 0.5 inch (12.7mm)~~ Address identification shall be in compliance with the requirements of the fire code official and the ordinances of the jurisdiction. Where access is by means of a private road and the building cannot be viewed from the *public way*, a monument, pole, or other sign or means shall be used to identify the structure.

505.3

505.3 Directory required. When multiple R-2 occupancy buildings are contained in a subdivision and where not all buildings have public street frontage, an approved permanent directory shall be provided at each entrance to the development from surrounding public streets.

507.1

507.1 Required water supply. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction. The design and installation of both public and private fire hydrants shall be in accordance with this section, Appendix B, Appendix C, NFPA 24 (for private systems) and the Uniform Design And Construction Standards for Potable Water Systems (UDACS)(for public systems). Unless otherwise approved by the fire code official, effluent reuse water is not an approved water supply

507.5.7

507.5.7 Painting and Markings. Hydrants and curbs shall be painted, and hydrant locations shall be marked, in accordance with this section.

507.5.7.1 Hydrant Painting. On-site private fire hydrants shall be painted with a suitable prime coat and not less than 2 coats of exterior industrial grade enamel, safety red in color.

507.5.7.2 Curb and Roadside Painting. The curb, or roadside where no curb is present, adjacent to a fire hydrant shall be painted to restrict parked cars from obstructing access to the fire hydrants. A coat of exterior industrial grade enamel, safety red in color, shall be applied for a minimum of 30 feet, 15 feet to each side of the hydrant, unless the curb or roadside is interrupted by a driveway, at which point the paint shall end at the driveway.

507.5.7.3 Lane Marking. Hydrant locations shall be marked by means of a blue colored reflective marker in the fire access lane. The marker shall be located in the center of a drive lane where parking is not anticipated, nearest to the hydrant.

Justification: This amendment is established to address committee concerns. The purpose of this amendment is to define paint and marking requirements for private on-site fire hydrants.

508.1.3

508.1.3 Size. The fire command center shall be a minimum of 0.015 percent of the total building area of the facility served or 200 square feet (19m²) in area, whichever is greater, with a minimum dimension of 0.7 times the square root of the room area, or 10 feet (3048 mm), whichever is greater

508.1.5

508.1.5 Required features. The *fire command* center shall comply with NFPA 72 and shall contain the following features:

1. The emergency voice/alarm communication control unit.
2. The fire department communication system.
3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicator and controls for air distribution systems, including smoke removal systems where required by Section 403.4.6.
6. The fire-fighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking stairway doors simultaneously.
8. Sprinkler valve and waterflow detector display panels.
9. Emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. ~~Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, fire fighting equipment and fire department access and the location of fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions.~~ Current, approved building plans including the Master Egress Plans, approved fire protection system shop drawings, approved Smoke Control Diagrams, the approved Fire Protection Report, fire/emergency preplans for the facility and manufacturers' operation manuals for all fire protection and life safety systems.
13. A new ~~W~~work table with a minimum size of three (3) feet by seven (7) feet capable of holding plans in an open position.
14. Generator supervision devices, manual start and transfer features.
15. Public address system, where specifically required by other sections of this code.
16. Elevator fire recall switch in accordance with ASME A17.1.
17. Elevator emergency or standby power selector switch(es), where emergency or standby power is provided.
18. An approved white board with a minimum size of three (3) feet by four (4) feet capable of easy erasure, with a marking device and an eraser attached.
19. Separate shunt trip switches for normal and emergency power.

510

SECTION 510

EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

510.1 Emergency responder radio coverage in buildings. All buildings shall have *approved* radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communications systems of the jurisdiction at the exterior of the building. System design shall be in accordance with this section and Appendix J. This section shall not require improvement of the existing public safety communication systems outside the building.

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 in lieu of an approved radio coverage system.~~

~~1. 2- Where it is determined by the fire code official that the radio coverage system is not needed.~~

~~2. Group R-3 Occupancies and single-family dwellings built under the IRC.~~

510.1.1 Permits. Permits shall be required as set forth in Section 105.6 and 105.7.

510.1.2 Emergency responder radio coverage system in new buildings. An emergency responder radio coverage system shall be provided throughout buildings when any of the following apply:

1. **High-rise buildings.** Buildings with a floor used for human occupancy located more than 55 feet above the lowest level of fire department vehicle access.
2. **Underground and below grade buildings.** Buildings having a floor level below the finished floor of the lowest level of exit discharge of any level.

The fire code official is authorized to require a technical opinion and report, in accordance with Section 104.7.2, for buildings whose design, due to size, construction type, or other factors, could impede radio coverage as required by Section 510.2. The report shall make a recommendation regarding the need for an emergency responder radio coverage system.

510.2 Radio signal strength. The building shall be considered to have acceptable emergency responder radio coverage when signal strength measurements in 95 percent of all areas on each floor of the building and in 100 percent of critical areas, such as the emergency command center(s), the fire pump room(s), exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, mechanical penthouses, elevator machine rooms, and other areas deemed critical by the fire code official, meet the signal strength requirements of Sections 510.2.1 and 510.2.2.

510.2.1 Minimum signal strength into the building. A minimum signal strength of -95 dBm with a DAQ of 3.5 or better, from the emergency responder site for the radio associated to that radio system shall be receivable within the building.

510.2.2 Minimum signal strength out of the building. A minimum signal strength of -100 dBm with a DAQ of 3.5 or better shall be received by the agency's emergency responder's radio system when transmitted from an approved portable radio with a maximum of 3 watts of strength within the building.

510.3 Emergency responder radio coverage in existing buildings. Existing buildings that do not have approved radio coverage for emergency responders within the building shall be equipped with such coverage as required by this section and Appendix J according to one of the following:

1. ~~Wherever existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1.~~
2. ~~Within a time frame established by the adopting authority.~~

~~Exception: Where a building is provided with an existing wired communication system that can be expanded to cover areas lacking radio coverage in accordance with Section 510.2~~

603.1.4 The grade of fuel oil used in a burner shall be that for which the burner is approved and as stipulated by the burner manufacturer. Oil containing gasoline shall not be used. Waste crankcase oil shall be an acceptable fuel in Group F, M and S occupancies, when utilized in equipment listed for use with waste oil and when such equipment is installed in accordance with the manufacturer's instructions and the terms of its listing. For the purposes of this section, the definition of Fuel Oil does not include fuels such as diesel that are intended for use in reciprocating internal combustion engines.

606.1

606.1 Scope. Refrigeration systems shall be installed in accordance with the ~~International~~ Uniform Mechanical Code. Systems where the potential concentration of refrigerant/room volume exceeds the factors listed in Table 11-1 of the Uniform Mechanical Code shall be in accordance with this section.

606.5

606.5 Access. Refrigeration systems having a refrigerant circuit containing more than ~~220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group of refrigerant~~ the allowable quantity of refrigerant as stated in Table 11-1 of the Uniform Mechanical Code shall be accessible to the fire department at all times as required by the fire code official.

606.6

606.6 Testing of Equipment. Refrigeration equipment and systems having a refrigerant circuit containing more than ~~220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group of refrigerant~~ the allowable quantity of refrigerant as stated in Table 11-1 of the Uniform Mechanical Code shall be subject to periodic testing in accordance with section 606.6.1. A written record of required testing shall be maintained on the premises. Tests of emergency devices or systems required by this chapter shall be conducted by persons trained and qualified in refrigeration systems.

606.7

606.7 Emergency Signs. Refrigeration units or systems having a refrigerant circuit containing more than ~~220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group of refrigerant~~ the allowable quantity of refrigerant as stated in Table 11-1 of the Uniform Mechanical Code shall be provided with *approved* emergency signs, charts, and labels in accordance with NFPA 704. Hazard signs shall be in accordance with the *International Mechanical Code* for the classification of refrigerants listed herein.

606.11

606.11 Storage, use and handling. Flammable and combustible materials shall not be stored in machinery rooms for refrigeration systems having a refrigerant circuit containing more than ~~220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group of refrigerant~~ the allowable quantity of refrigerant as stated in Table 11-1 of the

Uniform Mechanical Code. Storage use or handling of extra refrigerant of refrigerant oils shall be as required by Chapters 27, 30, 32 and 34.

Exception: This provision shall not apply to spare parts, tools and incidental materials necessary for the safe and proper operation and maintenance of the system.

607.1

607.1 Emergency operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more shall comply with the requirements in Chapter 46. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1. No building security, access control or similar system, shall disable or override any new or existing Phase II emergency operations, preventing access to all levels.

607.4

607.4 Elevator Keys. Keys for the elevator car doors and fire-fighter service keys shall be kept in an *approved* location for immediate use by the fire department.

607.4.1 All new and existing elevator car and panel key switches for elevators serving floors 8 and more stories above grade that are equipped with phase II operation are to be a standard 3502 elevator key, as required by the fire code official.

609.3.5

609.3.5 Access Panel Coordination. Ducts shall be provided with access panels to facilitate cleaning of automatic sprinklers, installed within the duct. Access panels shall be in accordance with the Uniform Mechanical Code.

609.3.6

609.3.6 Automatic Sprinkler Location. When automatic sprinkler protection is required, automatic sprinkler head locations shall be coordinated with access panels required by the *Uniform Mechanical Code* such that automatic sprinkler heads are within 3 feet of an access panel.

806.1.1

806.1.1 Restricted occupancies. Natural cut trees shall be prohibited in Group A, B, E, F, H, I-1, I-2, I-3, I-4, M, R-1, R-2, and R-4, and S occupancies.

Exceptions:

1. ~~Tress located in areas protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 shall not be prohibited in Group A,E,M, R 1, and R 2.~~
2. ~~Trees shall be allowed within dwelling units in Group R-2 occupancies.~~

807.4.1

807.4.1 General. All of the following requirements shall apply to all Group A and E occupancies and Group I-4 day care facilities regulated by Sections 807.4.2 through 807.4.4:

1. Explosive or highly flammable materials. Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. Fire-retardant coatings. Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. Obstruction. Furnishings, draperies, hanging fabrics or other objects shall not be placed to obstruct exits, access thereto, egress therefrom or visibility thereof, and shall not obstruct fire protection and fire alarm devices and equipment, and shall not restrict the proper operation of such devices.

901.2.2

901.2.2 Fire Protection Reports. All high-rise, covered mall, and atrium buildings, in addition to other complex or major facilities as determined by the *fire code official*, shall have a Fire Protection Report submitted and approved prior to construction, demolition, or significant work stoppage. Fire protection reports shall be prepared by an architect or professional engineer working in their area of expertise.

901.2.2.1 Building Fire Protection Reports. Building fire protection reports shall describe the building uses, construction and life safety features of the entire building.

901.2.2.2 Tenant Improvement and Remodel Fire Protection Reports. A Fire Protection Report shall be submitted when any one of the following occurs within a building that would normally require or has a previously approved Fire Protection Report.

1. The area of remodel occurs over a floor area exceeding 20,000 square feet.
2. The area of remodel is an assembly occupancy with an occupant load that exceeds 1,000 persons.
3. The area of remodel occurs within spaces dedicated to or affecting emergency personnel response areas, such as exit enclosures, elevators, elevator lobbies, fire command centers, secondary response points, fire riser rooms, and the fire pump room.
4. The remodel area requires specific engineered fire suppression and/or alarm systems that will require an alternate means of system design that is not supported by adopted NFPA codes.
5. The remodel area includes clean agent suppression systems, new or existing.
6. The remodel includes kitchen exhaust systems that are used for smoke control and thereby requiring coordination of exhaust fan functioning.
7. The remodel area contains hazardous materials storage and/or use areas.
8. The remodel area includes high-piled storage.
9. The remodel area includes delayed egress systems that require interconnection with fire protection systems.
10. The remodel area modifies an existing smoke control system.

901.2.2.3 Alternate materials and methods report. An Alternate Materials and Methods Request shall be submitted when any of the following items are involved.

1. All instances where active fire protection features are offered as a mitigation in support of an alternative solution.
2. All requests relating to or referencing the International Fire Code or NFPA codes adopted within the International Fire Code.
3. All requests that involve alternate installation requirements of any active fire protection system governed by either the International Fire Code or Chapter 9 of the International Building Code, such as: automatic sprinkler systems, alternative automatic fire extinguishing systems, standpipe systems, fire alarm and detection systems, emergency alarm systems, fire department connections and smoke control graphic annunciator panels. Additionally, requests involving the modification of the following

items shall be submitted to the *fire code official*: smoke and heat vents, fire command centers, thin combustible ceilings, hazardous materials, and alternate hardware when it may affect entry into a building by emergency responders.

901.2.2.4 Temporary Certificate of Occupancy (TCO) Fire Protection Report. When a temporary certificate of occupancy (TCO) is requested in a building that required a fire protection report prior to construction, the *fire code official* is authorized to require a fire protection report describing the uses to be occupied, the completed construction features, and the status of life safety systems, be submitted and approved prior to approval of the TCO request.

901.2.3

901.2.3 Plans Complete plans and specification for fire protection systems shall be submitted to the *Fire code official* for review and be approved prior to system installation. Approved plans shall be kept readily available on the job site.

The licensee (contractors Master or Qualified Employee) information shall be on submittals as per Nevada Administrative Code, Nevada Revised Statutes, and the Nevada Blue Book.

A designer of fire sprinkler and alarm systems shall hold a minimum Level II certification in their respective discipline from the National Institute for Certification in Engineering Technologies (NICET) or an equivalent certification (e.g., plans and calculations prepared by a Nevada Registered Professional Engineer working in their area of expertise). On and after July 1, 2012, a designer of fire sprinkler and alarm systems shall hold a minimum Level III certification in their respective discipline from NICET or an equivalent certification.

Starting on January 1, 2012, a designer of special hazard suppression systems shall hold a minimum Level II certification from NICET in that discipline, or an equivalent certification. On and after July 1, 2017, a designer of special hazard fire protection systems shall hold a minimum Level III certification from NICET in that discipline, or an equivalent certification

Submittals shall include the designer's printed name, certificate number, and wet signature on each plan sheet, and on the cover of each calculation and specification submittal book.

901.6

901.6 Inspection, testing and maintenance. *Fire protection systems* including fire detection, alarm and extinguishing systems shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. Non-required *fire protection systems*, and equipment shall be inspected, tested and maintained or decommissioned ~~removed~~. *Fire protection systems* installed as a required system under a previously adopted code shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. Decommissioning non-required *fire protection systems* and *fire protection systems* installed as a required system under a previously adopted code requires the *approval* of the *fire code official*. When required, a decommissioning report and/or plans prepared by an *approved design professional* shall be submitted to the *fire code official*.

901.6.2

901.6.2 Records. Records of all system inspections, tests and maintenance required by the referenced standards shall be maintained on the premises for a minimum of three years and shall be copied to the *fire code official* upon request.

All fire protection systems and equipment shall be tested and inspected in accordance with nationally recognized standards and the State of Nevada Fire Marshals' Regulations. The contractor shall also provide proof of a license to do business within the fire code official's area. A maintenance contract from a licensed company is required. A copy of the maintenance contract shall be provided at time of final inspection.

Inspection reports shall be kept on-site and shall be readily available to the inspection authority. A copy of said inspection shall be mailed within 48 hours, to the fire code official only when the owner or occupant has been notified of a discrepancy(s) and fails to correct the discrepancy(s) within 30 days. Where systems are out of service due to the discrepancy(s), compliance with Section 901.7 is required.

Prior to service or testing of any equipment, the Fire Dispatch Center shall be notified by the contractor of the location of the test and the approximate time that the equipment will be inoperable. Upon the completion of the test and inspection, the Fire Dispatch Center shall be notified that the system is operable.

In the event a service/maintenance contract is canceled or not renewed, the fire code official shall be notified by the licensed company within 24 hours.

901.6.3

901.6.3 Authority to Audit. The *fire code official* is authorized to audit inspection, testing, and maintenance (ITM) activities as referenced in Table 901.6.1 and assess fees to cover the cost of the audit. Auditing shall be permitted to include, but is not limited to, witnessing of ITM activities, and re-inspection of systems after ITM activities have been completed.

901.9

901.9 Recall of fire protection components.

Any *fire protection system* component regulated by this code that is the subject of a voluntary or mandatory recall under federal law shall be replaced with *approved, listed* components in compliance with the referenced standards of this code. ~~The *fire code official* shall be notified in writing by the building owner when the recalled component parts have been replaced.~~ A construction permit shall be obtained for the replacement of all recalled components.

903.1.1

903.1.1 Alternative protection. ~~Alternative automatic fire extinguishing systems complying with Section 904 shall be permitted in lieu of automatic sprinkler protection where recognized by the applicable standard and approved by the *fire code official*.~~

903.2

Section 903.2 Where Required

903.2 Where required. Approved automatic sprinkler systems in new buildings and structures shall be provided throughout all buildings, regardless of occupancy type, including buildings built under the IRC, exceeding 5,000 sq ft (464 m²) in building area, and ~~additionally~~ in locations described in Section 903.2.1 through 903.2.12, and in accordance with the following:

~~**Exception:** Spaces or area in telecommunications buildings used exclusively for telecommunication equipment, associated electrical power distribution equipment, batteries and standby engines, provided 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 1-hour fire barriers constructed in accordance with section 707 of the *International Building Code* or not less than 2-hour horizontal assemblies constructed in accordance with Section 712 of the *International Building Code*, or both.~~

1. All new buildings and structures greater than 5,000 sq ft (464 m²) in building area; or is more than two stories in height, including any height added by usable floor space.

Exceptions:

1. R-3 Occupancies (See 903.2.8)
 2. Open parking garages for vehicle storage only, with no other occupancy above any part of the open parking garage structure are not required to be protected with automatic sprinklers.
 3. Buildings, structures, or service equipment and installations directly used in utility generation or distribution which are installed on properly recorded easements belonging to water, gas, power, telephone, or other utility companies that are preemptively regulated by the Nevada Public Service Commission, a State of Nevada charter, or other public franchise. This Exception does not apply to non-exempted buildings or structures containing occupiable spaces such as offices, meeting rooms, service counters, public restrooms, or other normally occupied space.
2. For new construction expanding existing buildings, where an addition to any existing non-sprinklered building or structure expands the total area to greater than 5,000 square feet (464 m²), the entire building, including the existing portions, shall be provided with fire sprinklers.

Exceptions:

1. Group R-3 occupancies and single-family dwellings built under the IRC with fire flow in accordance with Appendix B.
 2. Where the area of the addition does not exceed 25% of the original building area at the time of construction and the area of addition does not exceed 5,000 square feet (464 m²).
3. Existing buildings that are greater than 10,000 square feet in total area, that contain a fire area greater than 5,000 square feet that is not separated by a 1-hr fire barrier, shall require the installation of an automatic fire sprinkler system within the entire building when any of the following conditions occur:
 - A. Change in Occupancy that increases the hazard. For the purpose of this section, B and M type Occupancies shall be considered the same occupancy hazard.
 - B. Tenant Improvement work that removes tenant demising walls which results in a tenant space that is larger than 5,000 sq ft.

If any fire area in a building or structure is provided with fire sprinklers, whether required or not, all fire areas in the building or structure shall be provided with fire sprinklers.

Exceptions:

1. Where a building is subdivided into separate buildings, each having a total building area of less than 5,000 sq ft (464 m²), by 4-hour rated fire walls with no openings constructed in accordance with the IBC.
2. Special hazard areas that require sprinklers for certain uses, such as medical gas rooms, may be fire sprinklered without requiring additional fire sprinklers, when approved by the code official.

903.2.3

903.2.3 Group E. An automatic sprinkler system shall be provided for Group E occupancies where one of the following conditions exists: as follows:

1. Throughout all The Group E fire areas have an occupant load of 50 or more. greater than 12,000 square feet (1115m²) in area.
2. Throughout every portion of educational buildings Any portion of the Group E fire areas is below the lowest level of exit discharge. serving that portion of the building.

Exception: An automatic sprinkler system is not required in any area below the lowest level of exit discharge serving that area where every classroom throughout the building has at least one exterior exit door at ground level.

3. Rooms used for kindergarten, first or second-grade pupils or for child care purposes, are located above or below the first story.
4. Daycare facilities where there is occupancy from 12:00 AM - 6:00 AM.

903.2.8

903.2.8 Group R. An automatic sprinkler system installed in accordance with Section 903.3 shall be provided through-out all buildings with a Group R fire area. In accordance with 903.2.8.1 through 903.2.8.2.

When required by Nevada Administrative Code Section 449.211, residential facilities for groups shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.2 (NFPA 13-R).

903.2.8.1 Group R-1 and R-2 (CM) An automatic sprinkler system shall be provided for all Group R-1 and R-2 occupancies in accordance with section 903.3

903.2.8.2 Group R-3. An automatic sprinkler system shall be provided for Group R-3 occupancies when one of the following conditions exists:

903.2.8.2.1 International Building Code. Buildings constructed under the International Building Code shall be protected throughout by an automatic sprinkler system in accordance with NFPA 13, 13R, or 13D, as permitted by the International Building Code. The automatic sprinkler system shall also meet the requirements of section 903.2.8.2.3

903.2.8.2.2 International Residential Code. Buildings constructed under the International Residential Code shall be protected throughout by an automatic sprinkler system when required by the International Residential Code or any of the following conditions exist:

1. Where required by Sections 503 or 507 of this code, automatic fire sprinklers shall be installed in accordance with section 903.2.8.2.3
2. When the total area of the building exceeds 10,000 ft² (929 m²), or is more than two stories in height including any height added by usable floor space, an automatic sprinkler system meeting the minimum requirements of NFPA 13D and Section 903.2.8.2.3 shall be installed.

903.2.8.2.3 Mitigation Matrix. (CM) When an automatic sprinkler system is being installed, or the type of system is upgraded to mitigate the minimum requirements for fire department access or water supply as required by Sections 503 or 507, the automatic sprinkler system design requirements in Table 903.2.8.2.3 shall apply.

Table 903.2.8.2.3
Mitigation Matrix for Group R-3 Occupancies.⁴

<i>Building Area Size Range</i> ⁶	<i>Mitigation Residential System Type</i> ^{1,3}	<i>Separate Sprinkler Lead-in Required</i> ⁵	<i>Minimum Underground Pipe Size</i> ⁵	<i>Minimum Water Meter Size</i> ⁵	<i>Sprinklers Required In Areas Subject To Freezing.</i>
< 3,600 sq.ft.	Standard NFPA 13D ²	No	1"	3/4"	No
≥ 3,600 sq.ft. and < 10,000 sq.ft.	Enhanced NFPA 13D ^{1,2}	No	1"	3/4"	No
≥ 10,000 sq.ft. and < 15,000 sq.ft.	Enhanced NFPA 13R ¹	Yes	N/A	N/A	Yes
≥ 15,000 sq.ft.	Modified NFPA 13 ¹	Yes	N/A	N/A	Yes

N/A = Not Applicable

- ¹ This mitigation constitutes a building "completely protected with an approved fire sprinkler system".
- ² Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
- ³ Free-standing detached buildings with one or more sleeping rooms shall be protected by an Enhanced NFPA 13D system.
- ⁴ Excluding occupancies used as Group Care Homes.
- ⁵ U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
- ⁶ Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte-cocheres.

903.2.9

903.2.9 Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 2,500 square feet (1115 m²).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 fire area used for the storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m²).
5. A Group S-1 fire area used for self-storage where the fire area exceeds 2,500 square feet (279 m²).

903.2.11.5

903.2.11.5 Commercial cooking operations. An automatic sprinkler system shall be installed in a commercial kitchen exhaust hood and duct system where an automatic sprinkler system is used to comply with Section 904, and for the entire length of duct when the duct length exceeds 75 feet.

903.2.11.7

903.2.11.7. Protection of available storage height. In Group S-1 and all other storage areas the fire sprinkler system shall be designed to protect storage up to the maximum available storage height. The minimum sprinkler density shall be equivalent to that required for a Class IV commodity pursuant to NFPA 13.

903.3.1.1.1

903.3.1.1.1 Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, or fire-resistance rated construction, or contains electrical equipment.

1. Any room where the application of water, or flame and water, constitutes a serious life or fire hazard.
2. Any room or space where sprinklers are considered undesirable because of the nature of the contents, when *approved by the fire code official.*
- ~~3. Generator and transformer rooms separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a fire resistance rating of not less than 2 hours~~
- ~~4. Rooms or areas that are of noncombustible construction with wholly noncombustible contents.~~
3. Fire service access elevator machine rooms and machinery spaces.

903.3.1.2

903.3.1.2 NFPA 13R sprinkler systems. Where allowed in buildings of Group R, up to and including two ~~four~~ stories in height, automatic sprinkler systems shall be installed in accordance with NFPA 13 or NFPA 13R.

903.3.1.3

903.3.1.3 NFPA 13D sprinkler systems. Where allowed, automatic sprinkler systems installed in one- and two-family dwellings and townhouses shall be installed throughout in accordance with NFPA 13, NFPA 13R, or NFPA 13D.

903.3.8

~~903.3.8 Antifreeze systems and systems with chemical additives.~~ CD Antifreeze systems and systems with chemical additives shall require written approval from the water purveyor prior to system installation.

903.3.5.2

903.3.5.2 Secondary water supply. A dedicated secondary on-site water supply equal to the hydraulically calculated sprinkler demand, including a 100 gpm inside the hose stream requirement, but not less than 15,000 usable gallons, shall be provided for high-rise buildings in ~~Seismic Design Category C, D, E, or F as determined by the International Building Code.~~ The secondary water supply shall have a duration of not less than 30 minutes. ~~as determined by the occupancy hazard classification in accordance with NFPA 13.~~

Exception: Existing buildings.

903.4

903.4 Sprinkler system supervision and alarms. All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit.

Exceptions:

1. Automatic sprinklers systems protecting one- and two-family dwellings
2. Limited area systems serving fewer than 20 sprinklers.
- ~~3. Automatic sprinklers systems installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the automatic sprinkler system, and a separate shutoff valve for the automatic sprinkler system is not provided.~~
4. Jockey pump control valves that are sealed or locked in the open position.
- ~~5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.~~
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.

903.4.1

903.4.1 Monitoring. Alarm, supervisory, and trouble signals shall be distinctly different and shall be automatically transmitted to an approved supervising station or, when approved by the *fire code official*, shall sound an audible signal at a constantly attended location.

Exceptions:

1. Underground key or hub valves in roadway boxes ~~provided by the municipality or public utility~~ are not required to be monitored.
2. Backflow prevention devices test valves located in limited area sprinkler system supply piping shall be locked in the open position. In occupancies required to be equipped with a fire alarm system, the backflow preventer valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72 ~~and separately annunciated. located at the municipal water supply connection are not required to be~~

monitored when either locked in the open position, or are located within an underground vault or an approved insulated enclosure.

Systems that are not electrically monitored shall have an approved identification sign below each outside horn and strobe which reads "WHEN ALARM SOUNDS – CALL 9-1-1". This sign shall be of durable material with permanent lettering having a 2-inch minimum height with ½ inch stroke on a contrasting background.

Multi-story facilities shall provide zone annunciation on a floor-by-floor basis.

In occupancies provided with a supervised sprinkler system, the following three distinctly different signals shall be transmitted to an approved supervising station:

1. Water Flow Alarm
2. Supervisory
3. System Trouble

The supervising station shall only retransmit Water Flow Alarm signals to the Fire Department.

903.4.2

903.4.2 Alarms Audible and Visual Notification appliances. *Approved* audible and visual notification appliances shall be connected to every *automatic sprinkler system*. Such sprinkler water-flow alarm notification appliances shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Exterior audible and visual Alarm notification appliances shall be provided on the exterior of the building above the Fire Department Connection in an approved location. One interior audible and visual notification appliance shall be provided in a normally occupied location. In multiple-tenant facilities, an interior audible and visual notification appliance shall be provided in each tenant space in a normally occupied location. Where a fire alarm system is installed, actuation of the *automatic sprinkler system* shall actuate the building fire alarm system.

903.4.3

903.4.3 Floor control valves. Approved supervised indicating control valves shall be provide at the point of connection to the riser on each floor ~~in high rise buildings~~ in multi-story facilities.

904.2

904.2 Where required. Automatic fire-extinguishing systems ~~installed as an alternative to the required automatic sprinkler systems of Section 903~~ shall be approved by the *fire code official*. Automatic fire-extinguishing systems shall not be considered ~~alternatives~~ an alternative to the required automatic sprinkler systems of Section 903 for the purpose of exceptions or reductions allowed by other requirements of this code.

904.11.6.2

904.11.6.2 Extinguishing system service. Automatic fire-extinguishing systems shall be serviced at least every 6 months and after activation of the system. Inspection shall be ~~by qualified individuals, and a certificate of inspection shall be forwarded to the fire code official upon completion.~~ conducted by personnel licensed by the State of Nevada Fire Marshal's Office and a certificate of inspection shall be kept on site and shall be readily available to the fire code official.

905.3.1

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

Exceptions:

- ~~1. Class I standpipes are allowed in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2~~
- ~~2. Class I manual standpipes are allowed in open parking garages where the highest floor is located not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access~~
- ~~3. Class I manual dry standpipes are allowed in open parking garages that are subject to freezing temperatures, provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5.~~
- ~~4. Class I standpipes are allowed in basements equipped throughout with an automatic sprinkler system.~~
5. In determining the lowest level of fire department vehicle access, it shall not be required to consider:
 - 5.1 Recessed loading docks for four vehicles or less, and
 - 5.2 Conditions where topography makes access from the fire department vehicle to the building impractical or impossible.

905.3.2

905.3.2 Group A. Class I automatic wet standpipes shall be provided in nonsprinklered Group A buildings having an occupant load exceeding 1,000 persons.

Exception:

1. Open-air seating spaces without enclosed spaces.
2. Class I automatic dry and semiautomatic dry standpipes or manual wet standpipes are allowed in buildings where the highest floor surface used for human occupancy is 55 feet (16 764 mm) ~~75 feet (22 860 mm)~~ or less above the lowest level of fire department vehicle access.

905.3.8

905.3.8 Building area. When required by the fire code official, buildings in excess of 10,000 square feet (929 m²) in area per level, shall be equipped with a Class I standpipe system where any portion of the building's interior area is more than 200 feet (60,960 mm) measured vertically and horizontally from the nearest point of fire department apparatus access.

905.4

905.4 Location of Class I standpipe hose connections. Class I standpipe hose connection shall be provided in all of the following locations:

1. In every required stairway, a hose connection shall be provided for each floor level above or below grade. Hose connections shall be located ~~at an intermediate floor level landing between floors, unless otherwise approved by the fire code official.~~ on the floor landing, as approved by the authority having jurisdiction.

2. On each side of the wall adjacent to the exit opening of a horizontal exit
Exception: Where floor areas adjacent to a horizontal exit are reachable from exit stairway hose connections by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the horizontal exit.
3. In every exit passageway, at the entrance from the exit passageway to other areas of a building.
Exception: Where floor areas adjacent to an exit passageway are reachable from exit stairway hose connections by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the exit passageway to other areas of the building.
4. In covered mall buildings, adjacent to each exterior public entrance to the mall and adjacent to each entrance from an exit passageway or exit corridor to the mall.
5. Where the roof has a slope less than four units vertical in 12 units horizontal (33.3-percent slope), each standpipe shall be provided with a hose connection located either on the roof or at the highest landing of a stairway with stair access to the roof. An additional hose connection shall be provided at the top of the most hydraulically remote standpipe for testing purposes.
6. Throughout the entire building so that all portions of each floor level are provided with hose valve coverage utilizing 100 feet (30 480 mm) of hose and 30-foot (9144 mm) stream from any hose connection located on that floor or intermediate landing. The length of hose shall be along normal walking routes, and the stream shall not be expected to penetrate walls or windows. ~~Where the most remote portion of a nonsprinklered floor or story is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or story is more than 200 feet (60 960 mm) from a hose connection, the fire code official is authorized to require that additional hose connections be provided in approved locations.~~

905.4.1

905.4.1 Protection. Risers and laterals of Class I standpipe systems not located within an enclosed stairway or pressurized enclosure shall be protected by a degree of fire resistance equal to that required for vertical enclosures in the building in which they are located.

Exception: In buildings constructed of Type I or Type II construction in accordance with the Building Code or in buildings equipped throughout with an approved automatic sprinkler system, standpipes laterals that are not located within an enclosed stairway or pressurized enclosure are not required to be enclosed within fire-resistance-rated construction.

905.5

905.5 Location of Class II standpipe hose connections. Class II standpipe hose connections shall be accessible and shall be located ~~so that all portions of the building where required by Section 905.5.1.~~ Hose connections shall be provided so that all areas described in Section 905.5.1 are within 30 feet (9144 mm) of a nozzle attached to 100 feet (30 480 mm) of hose.

905.5.3

905.5.3 Class II system 1 inch hose. A minimum 1 inch (25 mm) hose shall be allowed to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the ~~fire code official.~~

905.9

905.9 Valve supervision. Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall also be transmitted to the control unit.

Exceptions:

1. Valves to underground key or hub valves in roadway boxes provided by the municipality or public utility do not require supervision.
2. ~~Valves locked in the normal position and inspected as provided in this code in buildings not equipped with a fire alarm system.~~

906.1.1

906.1.1 Where required. Portable fire extinguishers shall be installed in the following locations.

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.
Exception: ~~In new and existing Group A, B, and E occupancies, equipped throughout with quick-response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.~~

906.2

906.2 General requirements. Portable fire extinguishers shall be selected, installed and maintained in accordance with this section and NFPA 10.

Exceptions:

1. The travel distance to reach an extinguisher shall not apply to spectator seating portions of Group A-5 occupancies.
2. Thirty-day inspections shall not be required and maintenance shall be performed annually ~~allowed to be once every three years~~ for dry-chemical or halogenated agent portable fire extinguishers that are supervised by a listed and approved electronic monitoring device, provided that all of the following conditions are met:
 - 2.1 Electronic monitoring shall confirm that extinguishers are properly positioned, properly charged and unobstructed.
 - 2.2 Loss of power or circuit continuity to the electronic monitoring device shall initiate a trouble signal.
 - 2.3 The extinguishers shall be installed inside of a building or cabinet in a noncorrosive environment.
 - 2.4 Electronic monitoring devices and supervisory circuits shall be tested annually ~~every three years~~ when extinguisher maintenance is performed.
 - 2.5 A written log of required hydrostatic test dates for extinguishers shall be maintained by the owner to ensure that hydrostatic tests are conducted at the frequency required by NFPA 10.

- 2.6 The electronic monitoring devices shall be interfaced with an approved control unit. A building's fire alarm control unit shall not serve as this required control unit. For buildings that have fire alarm systems installed, the electronic monitoring control unit shall be interfaced with the fire alarm control unit, and the electronic monitoring control unit shall send one, and only one, supervisory alarm signal to the building's fire alarm control unit when in an off-normal condition.
3. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations.

907.1

907.1 General. This section covers the application, installation, performance and maintenance of fire alarm systems and their components in new and existing buildings and structures. The requirements of Section 907.2 are applicable to new buildings and structures. The requirements of Section 907.3 are applicable to existing buildings and structures. An integrated campus system shall not supplant the fire alarm system requirements in new buildings and structures. Supplemental integrated campus systems may be allowed subject to the approval of the fire code official. When approved by the fire code official supplemental integrated campus systems circuits shall utilize class A, style 7, weatherproof raceway and wiring methods.

907.1.2

907.1.2 Fire alarm shop drawings. Shop drawings for fire alarm systems shall be submitted for review and approval prior to system installation. Where the installation changes from the approved shop drawings, corrected shop drawings showing the system as actually installed shall be submitted for review and approval prior to inspection. Shop drawings, ~~and~~ shall include, ~~but not be limited to,~~ all of the following ~~as required by the fire code official:~~

- ~~1. A floor plan that indicates the use of all rooms.~~
- ~~2. Locations of alarm initiating devices.~~
- ~~3. Locations of alarm notification appliances, including candela ratings for visible alarm notification appliances.~~
- ~~4. Locations of fire alarm control unit, transponders, and notification power supplies.~~
- ~~5. Annunciators.~~
- ~~6. Power connection.~~
- ~~7. Battery calculations.~~
- ~~8. Conductor type and sizes.~~
- ~~9. Voltage drop calculations.~~
- ~~10. Manufacturer's data sheets indicating model numbers and listing information for equipment, devices and materials.~~
- ~~11. Details of ceiling height and construction.~~
- ~~12. The interface of fire safety control functions.~~
- ~~13. Classification of the supervising station.~~
1. Project name, street address and owner's name.
2. Contractor name, address, phone number, license numbers, license classification, and license limit.
3. Wet/electronic signature of licensee (contractor's Master or Qualified Employee).
4. Wet/electronic signature of the NICET designer or Nevada Registered Fire Protection Engineer who prepared the plan, drawing and calculations. For plans prepared by a NICET designer, the designer's printed name and certificate number shall follow the signature.

5. Occupancy classification. For all occupancies, state the occupant load.
6. Fire alarm circuit classification (power-limited or non-power-limited).
7. Class/style designation of all initiating device circuit (IDC), signaling line circuits (SLC), and notification appliance circuits (NAC).
8. Conductor type and size.
9. Sequence of operation input/output matrix as required by NFPA 72.
10. Symbol legend with equipment description (manufacturer's name and model number) and mounting description (surface, semi-flush, flush, and exterior).
11. When required by the fire code official symbols used on the shop drawings shall follow NFPA 170, 2006 edition.
12. Site plan.
13. Floor plan drawn to an indicated scale (1/8" minimum) on sheets of a uniform size showing:
 - a. Point of compass (north arrow).
 - b. Walls, doors, windows, openings, stairs, elevators, passageways, high piled storage racks, etc., as applicable to depict the facility.
 - c. Room use identification labels.
 - d. Alarm initiating device, notification appliance, and auxiliary controlled or monitored equipment and systems, control and annunciation equipment location (s).
 - e. Conductor/conduit routing and size.
 - f. Location of end-of-line resistors.
 - g. Zone identification (conventional system).
 - h. Device addresses (addressable systems).
 - i. Notification appliance numbering by circuit and device corresponding to the riser and/or one line diagrams.
 - j. Power panels and circuit connections.
 - k. Key plan.
 - l. Ceiling heights, and construction (i.e., beam, joist, soffit, or other projection extending below the ceiling when a ceiling mounted device and/or appliance is used).
14. Mounting height detail for wall mounted device and/or appliance.
15. Riser diagram including the following information:
 - a. General arrangement of the system, in building cross-section.
 - b. Wall/shaft/stairwell and/or cable ratings when survivability or class A requirements apply.
 - c. Type and number of circuits in each riser.
 - d. Type and number of fire alarm system components/devices on each circuit, on each floor or level.
16. Fire code official standard shop drawing notes.
17. Standardized calculations (shown on the plans unless otherwise approved):
 - a. Battery (all panels).
 - b. Load (all notification appliance and auxiliary circuits).
 - c. Voltage drop (all notification appliance circuits, including remote annunciators and auxiliary appliances).
18. Product data submittal including a cover index sheet listing products used by make and model number, manufacturer data sheets and listing information for all equipment, devices, materials, wire and cable.
19. Design number and detail of penetration fire stop system when required.
20. Any additional information determined necessary by the fire code official.

Justification: This amendment is very similar to an amendment that was adopted in the Southern

907.1.4

907.1.4 Signage. A “FIRE ALARM CONTROL PANEL” sign shall be provided in minimum 2” letters with a minimum ½” stroke. The color of the letters shall be contrasting with respect to the background. The sign shall be provided on the door leading to the fire alarm control panel(s), unless otherwise approved by the *fire code official*.

907.2

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 907.2.23 and provide occupant notification in accordance with Section 907.6, unless other requirements are provided by another section of this code.

In separated mixed-use occupancy buildings the fire alarm/detection system shall be limited to the *fire area* that requires the system. In non-separated mixed-use occupancy buildings containing an occupancy with a fire alarm/detection system the system is required to be extended throughout the building or *fire area*.

A fire alarm system shall be installed throughout all buildings three or more stories in height.

Exception: Group R-3 occupancies and single-family dwellings built under the IRC.

A minimum of one manual fire alarm box shall be provided in an *approved* location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or water-flow detection devices. Where other sections of this code allow elimination of fire alarm boxes to sprinklers, a single fire alarm box shall be installed.

————— **Exceptions:**

- ~~1.~~ The manual fire alarm box is not required ~~shall not be installed~~ for fire alarm systems dedicated to elevator recall control and supervisory service- and fire sprinkler monitoring systems.
- ~~2.~~ The manual fire alarm box is not required for Group R-2 occupancies unless required by the *fire code official* to provide a means for fire watch personnel to initiate an alarm during a sprinkler system impairment event. ~~Where provided, the manual fire alarm box shall not be located in an area that is accessible to the public.~~

907.2.3.1

907.2.3.1 Locking manual pull stations. When buildings are protected throughout by an approved automatic sprinkler system, manual pull stations are allowed to be of the institutional type devices in areas normally occupied by students, subject to the following conditions:

1. Approval of the *fire code official* shall be obtained prior to any conversions or installation. The Key operated devices shall be a listed “institutional” type and not a field modified device.

2. All school staff members shall be trained in the operation of the key operated devices and shall receive a key with obvious markings, for operating the manual pull station. Staff members shall have their key at all times while on school property.
3. The school official shall collect training reports verifying that staff has had training on a quarterly basis and shall be available for review by the fire code official upon request.
4. The Fire Department may conduct unannounced drills or training.
5. Unacceptable performance as evaluated by the fire code official may result in a requirement to convert the devices back to traditional type.

907.2.7.1

907.2.7.1 Occupant notification. During times that the building is occupied, the initiation of a signal from a manual fire alarm box or from a water flow switch shall not be required to activate the alarm notification appliances when an alarm signal is activated at a constantly attended location from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed in accordance with Section 907.6.2.2.

907.2.8.2

907.2.8.2 Automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 shall be installed throughout all interior corridors serving sleeping units. For the purposes of this section, interior means a conditioned space.

Exception: An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units and where each sleeping unit has a means of egress doors opening directly to an exit or to an exterior exit access that leads directly to an exit.

907.2.9.1

907.2.9.1 Manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 707.6 shall be installed in Group R-2 occupancies where:

1. Any dwelling unit or sleeping unit is located three or more stories above the lowest level of exit discharge;
2. Any dwelling unit or sleeping unit is located more than one story below the highest level of exit discharge of exits serving the dwelling unit or sleeping unit; or
3. The building contains ~~more than 16~~ 15 or more dwelling units or sleeping units.

Exceptions:

- ~~1.~~ A fire alarm system is not required in buildings not more than two stories in height where all dwelling units or sleeping units and contiguous attic and crawl spaces are separated from each other and public or common areas by at least 1-hour fire partitions and each dwelling unit or sleeping unit has an exit directly to a public way, exit court or yard.
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 and the

occupant notification appliances will automatically activate throughout the notification zones upon a sprinkler water flow.

2.1 At least one manual fire alarm box is installed at an approved location.

3. A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1.1-or 903.3.1.2, provided that dwelling units either have a means of egress door opening directly to the exits or are served by open-ended corridors designed in accordance with Section 1026.6, Exception 4.

907.2.9.1.1

907.2.9.1.1 Automatic smoke detection system. When a fire alarm system is required, an automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 shall be installed throughout all interior corridors serving sleeping units. For the purposes of this section, interior means a conditioned space.

Exception: An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units and where each sleeping unit has a means of egress doors opening directly to an exit or to an exterior exit access that leads directly to an exit.

907.2.13

907.2.13 High-rise buildings. Buildings with a floor used for human occupancy located more than ~~75~~ 55 feet above the lowest level of fire department vehicle access shall be provided with an automatic smoke detection system in accordance with Section 907.2.13.1, a fire department communication system in accordance with Section 907.2.13.2 and an emergency voice/alarm communication system in accordance with Section 907.6.2.2.

Exceptions:

1. Airport traffic control towers in accordance with Section 907.2.22 and Section 412 of the IBC.
2. Open parking garages in accordance with Section 406.3 of the IBC.
- ~~3. Buildings with an occupancy in Group A-5 in accordance with Section 303.1 of the IBC.~~
3. Low-hazard special occupancies in accordance with Section 503.1.1 of the IBC.
- ~~5. Buildings with an occupancy in Group H-1, H-2 or H-3 in accordance with Section 415 of the IBC.~~
- ~~6. In Group I-1 and I-2 occupancies, the alarm shall sound at a constantly attended location and general occupant notification shall be broadcast by the emergency voice/alarm communication system.~~

907.2.13.1.1

907.2.13.1.1 Area smoke detection. Area smoke detectors shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shall operate the emergency voice/alarm communication system in accordance with Section 907.6.2.2. Smoke detectors shall be located as follows:

1. In each mechanical equipment, ~~electrical, transformer, telephone equipment~~—or similar room which is not provided with sprinkler protection.
2. In each elevator machine room and in elevator lobbies.
3. In each electrical, transformer, telephone equipment and information technology equipment room.
4. In each electrical room (i.e., a room designed and dedicated to electrical distribution).

Exception: Mechanical equipment and similar rooms containing electrical equipment necessary for the operation of that equipment, such as motor control centers, variable frequency drives, service disconnects, building automation controls, and other similar electrical equipment are not required to be provided with smoke detection.

907.2.13.2

907.2.13.2 Fire department communication system. Where a wired communication system is provided in addition to approved in lieu of a radio coverage system in accordance with Section 510, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 using warden stations and shall operate between a *fire command center* complying with Section 508, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside enclosed *exit stairways* and other locations as required by the fire code official.

907.2.13.3

907.2.13.3 Multi-channel voice evacuation. Voice evacuation systems for high-rise buildings shall be multi-channel systems.

907.2.13.4

907.2.13.4 Reliability. If a networked fire alarm system is installed, and if the fire alarm network nodes are interconnected utilizing physical conductors (e.g., metallic, optical fiber), the network nodes shall be interfaced with each other utilizing Style 6 or Style 7 wiring methods. The outgoing and return conductors shall not be run in the same cable assembly, enclosure, or raceway.

907.4.1

907.4.1 Duct smoke detectors. Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit when a fire alarm system is provided ~~required by Section 907.2.~~ Activation of a duct smoke detector shall initiate a visible and audible supervisory signal ~~at a constantly attended location on the building's fire alarm control unit when a fire alarm system is provided~~ and shall perform the intended fire safety function in accordance with this code and the IMC. Duct smoke detectors shall not be used as a substitute for required open area detection.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where duct smoke detectors activate ~~the building's alarm notification appliances.~~ a supervisory signal on the building's fire alarm system.
2. ~~In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an approved location. Smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.~~

907.5.1

907.5.1 Protection of fire alarm control unit. In areas that are not continuously occupied, ~~a single smoke detector~~ automatic smoke detection shall be provided at the location of each fire alarm control unit, notification appliance circuit power extenders and supervising station transmitting equipment.

Exceptions:

1. Where ambient conditions prohibit installation of smoke detector, a heat detector shall be permitted.
- ~~2. The smoke detector shall not be required where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.~~
2. Dedicated function fire alarm systems shall not have smoke detectors installed.

907.5.2

907.5.2 Manual fire alarm boxes. Where a manual fire alarm system is required by another section of this code, it shall be activated by dual action fire alarm boxes installed in accordance with section 907.5.2.1 through 907.5.2.5.

907.6.2.1.1

907.6.2.1.1 Average sound pressure. The audible alarm notification appliances shall provide a sound pressure level of 15 decibels (15 dBA) above the average ambient sound level or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is greater, in every occupiable space within the building. The minimum sound pressure levels shall be: ~~75 dBA in occupancies in Groups R and I-1;~~ 90 dBA in mechanical equipment rooms; and ~~60~~ 80 dBA in other occupancies. One of the two methods below shall be utilized to ensure that the minimum sound level will be achieved:

- (1) Audible notification devices shall be installed in each occupied area, including but not limited to spaces such as bathrooms, walk-in closets, storage rooms, and walk-in coolers/freezers.
- (2) In lieu of providing audible notification devices within certain spaces, calculations may be performed in order to prove that the alarm signals from the proposed adjacent audible devices will achieve a minimum of 80 decibels inside and throughout that space, where doors or other barriers between the space and the adjacent audibility device(s) are closed.

907.6.2.1.1.1

907.6.2.1.1.1 Where occupants are incapable of evacuating themselves because of age, physical or mental disabilities, or physical restraint, the private mode as described in NFPA 72, National Fire Alarm Code, may be permitted to be used when allowed by the fire code official. Only the attendants and other personnel required to evacuate occupants from a zone, area, floor, or building shall be required to be notified when allowed by the fire code official. The notification shall include means to readily identify the zone, area, floor, or building in need of evacuation.

907.6.2.1.2

907.6.2.1.2 Maximum sound pressure. The maximum sound pressure level for audible alarm notification appliances shall be 110 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than 95 dBA, visible alarm notification appliances shall be provided in accordance with NFPA 72, ~~and audible alarm notification appliances shall not be required.~~

907.6.2.3

907.6.2.3 Visible Alarms. Visible alarm notification appliances shall be provided in accordance with Sections 907.6.2.3.1 through 907.6.2.3.4.

Exceptions:

1. Visible alarm notification appliances are not required in alterations, when the building does not have visible devices installed anywhere within the building, except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.
2. Visible alarm notification appliances shall not be required in exits as defined in Section 1002.1.
3. Visible alarm notification appliances shall not be required in elevator cars.

907.6.2.3.1

907.6.2.3.1 Public and common areas. Visible alarm notification appliances shall be provided in public areas and common areas.

Exceptions:

1. Electrical and mechanical rooms that are not normally occupied or less than 400 square feet.
2. Janitor closets.
3. Storage rooms less than 400 square feet.
4. Exit enclosures .
5. Individual work areas or offices and private toilets serving individual work areas or offices.
6. Individual inmate sleeping areas and patient sleeping rooms.

907.7.3.1

907.7.3.1 Zoning indicator panel. Alarm Annunciator. ~~A zoning indicator panel and the associated controls shall be provided in an approved location. The visual zone indication shall lock in until the system is reset and shall not be canceled by the operation of an audible alarm silencing switch.~~ Alarm annunciators shall comply with all of the following:

1. If a building has a main entrance/foyer, a remote annunciator shall be provided inside the building at the main entrance/foyer.
Exception: When the fire alarm control unit is located inside the building at the main entrance/foyer, a remote annunciator is not required at the main entrance/foyer.
2. If a building has a fire riser room with an exterior door, a remote annunciator shall be provided within the fire riser room.
Exception: When the fire alarm control unit is located within the fire riser room, a remote annunciator is not required within the fire riser room.
3. The location of an operated initiating device shall be displayed by alphanumeric display at the annunciator.

4. The alphanumeric display shall state the device type, the floor level (if applicable), the device address and a descriptive location for the operated device(s).
5. The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.

907.7.5

907.7.5 Monitoring. Fire alarm systems required by this chapter or by the IBC shall be monitored by an approved supervising station in accordance with NFPA 72. Home care facilities that are licensed by the State of Nevada are also required to be monitored per this section. Proprietary Supervising Station Systems (also called self-monitoring systems), when allowed by the fire code official, shall be in accordance with the IFC, with NFPA 72, and with the fire code official guidelines.

Exception: Monitoring by a supervising station is not permitted unless specifically approved by the fire code official ~~is not required~~ for:

1. Single- and multiple station smoke alarms required by Section 907.2.11.
2. ~~Smoke detectors in Group I-3 occupancies.~~
- 3.2. Automatic sprinkler systems in one- and two-family dwellings.
- 4.3. Manual fire alarm systems, when provided with approved signs in the following locations: directly below the horn and strobe located on the exterior of the building and adjacent to each manual pull station. The signs shall read as follows: WHEN ALARM SOUNDS CALL 911. The signs below the horns and strobes shall be of durable material with permanent lettering having a 2" minimum height and minimum 1/2" stroke on a contrasting background. The sign adjacent to each pull station shall be of durable material with permanent lettering having a 1/4" minimum height on a contrasting background.

In occupancies provided with a fire alarm system, the following five distinctly different alarm signals shall be transmitted to an approved supervising station:

1. Water Flow Alarm, if provided with a fire sprinkler system.
2. Fire Alarm.
3. System Trouble.
4. Supervisory, when applicable.
5. Valve Tamper Supervisory, if provided with a fire sprinkler system.

The supervising station shall only retransmit Water Flow Alarm signals to the Fire Department, unless otherwise required by the fire code official.

907.7.5.2

907.7.5.2 Supervising Stations. A permit is required when the following occurs:

1. Supervising station adds a new monitoring subscriber.
2. Supervising station changes services or transfers accounts for an existing subscriber. For example, a new tenant or building owner utilizing the same supervising station.

Supervising stations shall not provide monitoring services for a subscriber until final acceptance and approval is granted by the fire code official.

Supervising stations shall not transfer accounts without notification to the Fire Department. Notification must be received in writing within 30 days of transfer.

In the event a monitoring contract is terminated, canceled or not renewed, the *fire code official* shall be notified in writing within 24 hours.

A current UL or FM Central Station Certification shall be provided on an annual basis.

Supervising stations shall annually provide documentation of runner service. Runner service shall be in accordance with UL 827.

907.7.6

907.7.6 Control units. Unless otherwise approved, not more than one main or master fire alarm control unit shall be permitted per building, in an approved location. Unless otherwise approved, not more than one monitoring panel shall be permitted per building.

907.7.7

907.7.7 Connections to other systems. A fire alarm system shall not be used for any purpose other than fire warning unless approved by the *fire code official*. Interconnections to other systems shall be listed for compatibility or approved by the *fire code official*.

907.7.8

907.7.8 Secondary Response Point. A Secondary Response Point (SRP) shall be provided in accordance with this section.

907.7.8.1 Where required. When required by the fire code official, an SRP shall be provided in buildings/facilities that are required to be served by a Fire Command Center.

907.7.8.2 Components required. The SRP shall have the following components:

1. A fire alarm LCD annunciator that provides a means to scroll through the list of devices that are activated and to acknowledge each alarm. The fire alarm annunciator shall not have the capability of silencing or resetting the building fire alarm system.
2. A microphone capable of providing all-call voice messaging over all notification appliance circuits of the alarm communication system.
3. A pull station capable of evacuating the entire building.
4. An elevator panel that allows the manual transfer of standby power to each elevator cab for all elevators located within the building.

907.7.8.3 Location. The SRP shall be located as follows, subject to the approval of the fire code official:

1. The SRP shall be located on the floor designated for primary elevator recall.
2. The exterior entrance leading to the SRP shall be adjacent to the fire department vehicle access lane.
3. The SRP shall be located in an area inaccessible to the public.
4. The SRP shall be located within a travel distance of 200 feet from the building entry.
5. The entrance to the SRP shall be separated from the Fire Command Center a minimum distance equal to 25% of the building perimeter, or a minimum of 250 feet, as measured along the building perimeter.

907.9

907.9 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with Sections 907.9.1 through 907.9.5 and NFPA 72.

All fire alarm systems shall be tested and inspected in accordance with nationally recognized standards and the State of Nevada Fire Marshals' Regulations. The alarm contractor shall also provide proof of a license to do business within the fire code official's area. A maintenance contract from an approved fire alarm company is required.

Inspection reports shall be kept on-site and shall be readily available to the inspection authority. A copy of inspection reports containing deficiencies shall be mailed to the fire code official within 48 hours, only when the owner or occupant has been notified of a discrepancy(s) and fails to correct the discrepancy(s) within 30 days whenever any deficiency of the system or violation of the Fire Code is noted.

Prior to service or testing of any equipment, the Fire Department's Dispatch Center shall be notified of the location of the test and the approximate time that the equipment will be inoperable. Upon the completion of the test and inspection, the Fire Department Dispatch Center shall be notified that the system is operable.

In the event a service/maintenance contract is canceled or not renewed, the fire code official shall be notified by the service company within 24 hours.

908.7

908.7 When an emergency alarm system is interfaced with a building's fire alarm system. When an emergency alarm system is interfaced with a building's fire alarm system, the signal produced at the fire alarm control unit shall be a supervisory signal.

909.4.6

909.4.6 Duration of operation. All portions of active or passive smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than ~~either 20 minutes or 1.5 times the~~ calculated egress time, whichever is less.

Exception: An engineered analysis utilizing twice the estimated egress time to demonstrate that all occupants can safely evacuate shall be permitted.

909.5.2

909.5.2 Opening protection. Openings in *smoke barriers* shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by *fire door assemblies* complying with Section 715.4.3 of the *International Building Code*.

Exceptions:

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors *listed* for releasing service installed in accordance with Section 907.10.
2. Fixed openings between smoke zones that are protected utilizing the airflow method.
3. In Group I-2, where such doors are installed across *corridors*, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with fire protection-rated glazing materials in fire protection-rated frames, the area of which shall not exceed that tested. The doors shall be close-fitting within operational tolerances and shall not have undercuts, louvers, or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and shall be automatic-closing by smoke detection in accordance with Section 715.4.8.3 of the *International Building Code*. Positive-latching devices are not required.
4. Group I-3
5. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank-down capacity of greater than 20 minutes as determined by the design fire size.
6. Door openings in *smoke barriers* shall be permitted to be protected by self-closing fire doors in the following locations:

6.1 Guest rooms.

6.2 Individual dwelling units.

6.3 Mechanical rooms.

6.4 Elevator machine rooms.

6.5 Electrical rooms used exclusively for that purpose.

6.6 Doors typically maintained in a closed position as approved by the Building Official.

909.16

909.16 Fire-fighter's smoke control panel. A fire-fighter's smoke control panel for fire department emergency response purposes only shall be provided and shall include manual control or override of automatic control for mechanical smoke control systems. The panel shall be located in a fire command center complying with Section 508 in high-rise buildings or buildings with smoke-protected assembly seating. In all other buildings, the fire-fighter's smoke control panel shall be installed in an approved location adjacent to the fire alarm control panel. The fire-fighter's smoke control panel shall comply with Sections 909.16.1 through 909.16.3.

909.16.1 Smoke control systems. ~~Fans within the building shall be shown on the fire fighter's control panel. A clear indication of the direction of airflow and the relationship of components shall be displayed. Status indicators shall be provided for all smoke control equipment, annunciated by fan and zone and by pilot lamp type indicators as follows:~~

- ~~1. Fans, dampers and other operating equipment in their normal status — WHITE.~~
- ~~2. Fans, dampers and other operating equipment in their off or closed status — RED.~~
- ~~3. Fans, dampers and other operating equipment in their on or open status — GREEN.~~
- ~~4. Fans, dampers and other operating equipment in a fault status — YELLOW/AMBER.~~

909.16.2 Smoke control panel. ~~The fire fighter's control panel shall provide control capability over the complete smoke control system equipment within the building as follows:~~

- ~~1. ON AUTO OFF control over each individual piece of operating smoke control equipment that can also be controlled from other sources within the building. This includes stairway pressurization fans; smoke exhaust fans; supply, return and exhaust fans; elevator shaft fans; and other operating equipment used or intended for smoke control purposes.~~
- ~~2. OPEN AUTO CLOSE control over individual dampers relating to smoke control and that are also controlled from other sources within the building.~~
- ~~3. ON OFF or OPEN CLOSE control over smoke control and other critical equipment associated with a fire or smoke emergency and that can only be controlled form the fire fighter's control panel.~~

~~Exceptions:~~

- ~~1. Complex systems, where approved, where the controls and indicators are combined to control and indicate all elements of a single smoke zone as a unit~~
- ~~2. Complex systems, where approved, where control is accomplished by computer interface using approved, plain English commands.~~

909.16.3 Control action and priorities. ~~The fire fighter's control panel actions shall be as follows:~~

- ~~1. ON OFF and OPEN CLOSE control actions shall have the highest priority of any control point within the building. Once issued from the fire fighter's control panel, no automatic or manual control from any other control point within the building shall contradict the control action. Where automatic means are provided to interrupt normal, nonemergency equipment operation or produce a specific result to safeguard the building or equipment (i.e., duct freezestats, duct smoke detectors, high temperature cutouts, temperature actuated linkage and similar devices), such means shall be capable of being overridden by the fire fighter's control panel. The last control action as indicated by each fire fighter's control panel switch position shall prevail. In no case shall control actions require the smoke control system to assume more than one configuration at any one time.~~

~~Exception: Power disconnects required by NFPA 70.~~

- ~~2. Only the AUTO position of each three position fire fighter's control panel switch shall allow automatic or manual control action from other control points within the building. The AUTO position shall be the NORMAL, nonemergency, building control position. Where a fire fighter's control panel is in the AUTO position, the actual status of the device (on, off, open, closed) shall continue to be indicated by the status indicator described above. When directed by an automatic signal to assume an emergency condition, the NORMAL position shall become the emergency condition for that device or group of devices within the zone. In no case shall control actions require the smoke control system to assume more than one configuration at any one time.~~

909.16.1 Smoke control systems. The fire-fighter's smoke control panel shall be designed in accordance with the fire code official's guidelines.

909.16.2 Smoke control panel. The fire-fighter's smoke control panel shall be designed in accordance with the fire code official's guidelines.

909.16.3 Control action and priorities. The fire-fighter's smoke control panel shall be designed in accordance with the fire code official's guidelines.

909.17

909.17 System response time. Smoke-control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as dampers and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts and other equipment. For purposes of smoke control, the fire-fighter's smoke control panel response time shall be the same for automatic or manual smoke control action initiated from any other building control point. The total response time, including that necessary for detection, shut-down of operating equipment and smoke control system startup, shall allow for full operational mode to be achieved before the conditions in the space exceed the design smoke condition. ~~The system response time for each component and their sequential relationships shall be detailed in the required rational analysis and~~ Upon receipt of an alarm condition at the fire alarm control panel, fans, dampers and automatic doors shall have achieved their proper operating state and final status shall be indicated at the smoke control panel within 90 seconds. ~~✓ Verification of their installed condition shall be reported in the required final report.~~

909.18.8.3

909.18.8.3 Reports. A complete report of testing shall be prepared by the special inspector or special inspection agency. The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or mark. The report shall be reviewed by the responsible registered design professional and, when satisfied that the design intent has been achieved, the responsible registered design professional shall seal, sign and date the report with a statement as follows:

I have reviewed this report and by personal knowledge and on-site observation certify that the smoke-control system is in substantial compliance with the design intent, and to the best of my understanding complies with requirements of the code.

909.18.8.3.1 Report filing. A copy of the final report shall be filed with the fire and building code official and an identical copy shall be maintained in an approved location at the building.

909.18.10

909.18.10 Alternative testing method. When required by the Code official, theatrical smoke or other approved tracer gases shall be used during final acceptance testing to visually verify air movement.

909.20

909.20 Maintenance. Smoke control systems shall be maintained in an operable condition at all times 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 909.20.1 through 909.20.5.~~

Inspection and periodic testing of existing smoke control systems shall be performed in accordance with the City of Las Vegas "Smoke Control System Testing & Recertification" policy, and Southern Nevada Fire Code Committee's Uniform Guideline for smoke control testing & recertification, the manufacturer's instructions and Sections 909.20.1 through 909.20.5.

909.20.4

909.20.4 Dedicated smoke control systems. Dedicated smoke control systems shall be operated for each control sequence semiannually. When required by the fire code official, ~~the~~ the system shall also be tested under standby power conditions.

909.20.5

909.20.5 Nondedicated smoke control systems. Nondedicated smoke control systems shall be operated for each control sequence annually. When required by the fire code official, ~~the~~ the system shall also be tested under standby power conditions.

910.3.2.2

910.3.2.2 Sprinklered buildings. Where installed in buildings equipped with an approved automatic sprinkler, smoke and heat vents shall be designed to operate automatically by actuation of a heat-responsive device rated at a minimum temperature of 360° F (182° C).

910.3.5

910.3.5 Draft curtains. Where required by Table 910.3, draft curtains shall be installed only in non-sprinklered buildings on the underside of the roof in accordance with this section.

~~Exception: Where areas of the building are equipped with ESFR sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers.~~

912.3.2

912.3.2 Clear space around connections. A working space of not less than 36 inches (762 mm) in width, 36 inches (914 mm) in depth and 78 inches (1981 mm) in height not including any doors or windows, shall be provided and maintained in front of and to the sides of wall-mounted fire department connections and around the circumference of free-standing fire department connections, except as otherwise required or approved by the ~~fire chief~~ fire code official.

913.1.1

913.1.1 Redundant pumps in high-rise structures. Where pumps are used in structures with walking levels greater than 250 feet (76 m) in height above the lowest level of fire department access, a redundant fire pump shall be provided for each required fire pump

913.1.2

913.1.2 Redundant pumps in multiple structures. Where a fire pump is used for booster pressure supply to multiple structures, a redundant fire pump shall be provided for each required fire pump.

913.2.1

913.2.1 Protection of pump rooms. Rooms where fire pumps are located shall be separated from all other areas of the building in accordance with Section 913.2.1 of the International Building Code: with 2-hour rated walls and ceilings.

Exception: Where the pump is housed in a room that is 50 feet or greater from the building being protected, then 2-hour rated walls and ceilings are not required.

913.2.1.1

913.2.1.1 Access. The fire pump room shall have an exterior access door.

913.2.2

913.2.2 Drains. Floor drains having a minimum diameter of 3 inches shall be provided in the fire pump room.

914.4.1

914.4.1 Automatic sprinkler system. An approved automatic sprinkler system shall be installed throughout the entire building.

Exceptions:

- ~~1. That area of a building adjacent to or above the atrium need not be sprinklered, provided that portion of the building is separated from the atrium portion by not less than a 2 hour fire barrier constructed in accordance with Section 712 of the International Building Code or horizontal assemblies constructed in accordance with Section 712 of the International Building Code, or both;~~
- ~~2. Where the ceiling of the atrium is more that 55 feet (16 764 mm) above the floor, sprinkler protection at the ceiling of the atrium is not required.~~

914.6.1

914.6.1 Automatic sprinkler system. Stages shall be equipped with an automatic fire-extinguishing system in accordance with Chapter 9. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the stage. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such stages.

Exceptions:

1. ~~Sprinklers are not required under stages less than 4 feet (1219 mm) in clear height utilized exclusively for storage of tables and chairs, provided the concealed space is separated from the adjacent spaces by not less than 5/8-inch (15.9 mm) Type X gypsum board.~~
 2. ~~Sprinklers are not required for stages 1,000 square feet (93 m²) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single backdrop.~~
- 3 Sprinklers are not required within portable orchestra enclosures on stages.

915

SECTION 915

SMOKE REMOVAL

915.1 General. Where required by this code or otherwise installed, smoke removal systems shall conform to the requirements of this section and the Building Code.

915.2 Where Required.

915.2.1 High rise buildings. Smoke removal systems shall be installed in accordance with the Building Code.

915.2.2 Enclosed parking garage. A smoke removal system is required throughout enclosed parking garages. Fans capable of providing a minimum of 10 air changes per hour shall be provided. Fans shall be bidirectional, having capacity equal or greater in the reverse direction as the forward direction. Fans shall automatically exhaust upon sprinkler waterflow. Individual manual control shall be provided for each fan on a graphic smoke control panel adjacent to the fire alarm control panel. The system shall comply with the *fire code official's* guidelines.

915.3 Status Indicators and Controls. Status indicators and controls shall be designed in accordance with the *fire code official's* guidelines.

915.4 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 of the system.

Exception: In buildings of phased construction, a temporary certificate of occupancy, as *approved* by the *fire code official*, shall be allowed, provided that those portions of the building to be occupied meet the requirements of this

section and that the remainder does not pose a significant hazard to the safety of the proposed occupants or adjacent buildings.

915.5 Maintenance. Smoke removal systems shall be maintained in an operable condition at all times to ensure to a reasonable degree that the system is capable of removing smoke when required.

Inspection and periodic testing of smoke removal systems shall be performed in accordance with the Southern Nevada Fire Code Committee's Uniform Guideline for smoke control testing & recertification using a Level I inspection firm, and the manufacturer's instructions.

916

SECTION 916

FIRE RISER ROOMS

916.1 Where required. A dedicated fire riser room shall be required for each fire sprinkler system riser.

Exceptions:

1. Where approved by the *Fire code official*, where systems are controlled by wall-mounted Post Indicator Valves (PIV), and where exterior access is provided to the monitoring panel that is located in a conditioned room, a fire riser room is not required.
2. When approved, where a single system serves the building and the system is controlled by a PIV, a riser room is not required.
3. In multi-story facilities, floor control risers are permitted to be located on each floor level in an exit stair enclosure.
4. Systems designed in accordance with NFPA 13D do not require fire riser rooms.
5. Systems designed in accordance with NFPA 13R shall have a riser room/closet that is large enough to facilitate access to all the necessary fire sprinkler and fire alarm valves and devices. This area shall be accessible from the outside with either a door or an access panel large enough to allow for testing and maintenance of system. The area shall also maintain a minimum temperature of 40° F and a maximum temperature of 100° F.

916.2 Contents. The primary fire riser room shall contain the fire riser into the building. The fire riser shall contain at a minimum, a flow switch, a check valve, and a control valve.

Exception: Where there is a single system in the building and an exterior Post Indicator Valve (PIV) is provided, then the control valve is not required in the fire riser room.

916.3 Exterior Access Door. Fire riser rooms shall have an exterior access door with a minimum width of 36 inches (914 mm) and a minimum height of 80 inches (2032 mm)

Exception: For large facilities, such as high-rise, airport terminal, and covered mall buildings, secondary fire risers may be contained in fire riser rooms that are located in dedicated rooms with direct corridor access inside the building without direct access from the exterior.

916.4 Protection. Fire riser rooms shall be separated from the rest of the building by 1-hour fire partitions.

916.5 Conditioning. Fire riser rooms shall be conditioned to maintain a minimum temperature of 40° F and a maximum temperature of 100° F. Heating and cooling units shall be permanently wired. Portable heating and cooling units are not approved for meeting the requirements of this section.

Exception: Where the riser room does not contain a Fire Alarm Control Unit or spare sprinklers heads, the riser room shall not be required to be conditioned for maximum temperature.

916.6 Lighting. Permanently installed artificial lighting with back-up power shall be provided for the riser room.

916.7 Size. The riser room shall have a minimum area of 16 square feet (1.49 m²), with a minimum dimension of 4 feet, for the first sprinkler riser, plus 10 additional square feet for each additional riser contained.

916.8 Clearances for a fire alarm control unit. Where a fire alarm control unit is located in the fire riser room, the unit shall be located so that there is a minimum clearance in accordance with the electrical code.

916.9 Auxiliary control valves. Fire riser rooms are not required for auxiliary control valves.

916.10 Signage. Weatherproof signage shall be provided on the exterior access door. Signage shall state "Fire Sprinkler Riser Room" in a contrasting color. Letters shall have a minimum height of 2 inches with a minimum stroke of 3/8 inch.

1008.1.9.1.7

1008.1.9.1.7 Delayed egress locks. *Approved, listed,* delayed egress locks shall be permitted to be installed on doors serving any occupancy except Group A, E and H occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved* automatic smoke or heat detection system installed in accordance with items Section 907, provided that the doors unlock in accordance with Items 1 through 6 below. A building occupant shall not be required to pass through more than one door equipped with a delayed egress lock before entering an exit.

1. The doors unlock upon actuation of the *automatic sprinkler system* or automatic fire detection system.
2. The doors unlock upon loss of power controlling the lock or lock mechanism.
3. The door locks shall have the capability of being unlocked by a signal from the fire command center.
4. The initiation of an irreversible process which will release the latch in not more than 15 seconds when a force of not more than 15 pounds (67 N) is applied for 1 second to the release device. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the door lock has been released by application of force to the releasing device, relocking shall be by manual means only.

Exception: ~~Where approved, a delay of not more than 30 seconds is permitted.~~

6. A sign shall be provided on the door located above and within 12 inches (305 mm) of the release device reading: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 ~~{30}~~ SECONDS.
7. Emergency lighting shall be provided at the door.

1011.6

1011.6 Low-level exit signs. Where exit signs are required by Section 1011.1, additional approved low-level exit signs that are internally or externally illuminated shall be provided in all corridors serving residential units in Group

R-1 occupancies and R-2 occupancies with transient use. The bottom of each such sign shall not be less than 6 inches (152 mm) nor more than 18 inches (455 mm) above the floor level and shall indicate the path of exit travel. For exit and exit access doors, the sign shall be on the door or adjacent to the door, with the closest edge of the sign within 4 inches (102 mm) of the doorframe.

1015.2.2

1015.2.2 Three or more exits or exit access doorways. Where access to three or more exits is required, at least two exit doors or exit access doorways shall be arranged in accordance with the provisions of Section 1015.2.1. Additional exits or exit access doorways shall be uniformly distributed so that if one becomes blocked, the others will be available.

1028.6.23

1028.6.2.3 Automatic sprinklers. Enclosed areas with walls and ceilings in buildings or structures containing *smoke-protected assembly seating* shall be protected with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1.

Exceptions:

- ~~1. The floor area used for contents, performances or entertainment provided the roof construction is more than 50 feet (15 240 mm) above the floor level and the use is restricted to low fire hazard uses.~~
- ~~2. Press boxes and storage facilities less than 1,000 square feet (93 m2) in area,~~
- ~~3. Outdoor seating facilities where seating and the means of egress in the seating area are essentially open to the outside.~~

1102.1

1102.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

Helistop. The same as "Heliport," except that no fueling, defueling, maintenance, repairs or storage (for longer than 24 hours) of helicopters is permitted.

1107.1

1107.1 General. All helistops and heliports shall be designed and constructed in accordance with this code, NFPA 418, and FAA AC No:150/5390-2B. Helistops and heliports shall be maintained in accordance with Sections 1107.2 through 1107.8. Helistops and heliports on buildings shall be constructed in accordance with the International Building Code.

1108

SECTION 1108

EMERGENCY HELICOPTER LANDING PAD

1108 Emergency Helicopter Landing Pad. Each high-rise building, and each separate tower portion of a multiple tower high-rise building, with normally occupied floor levels greater than 420 feet (128 meters) in height above the lowest level of fire department access shall be provided with a rooftop emergency helicopter landing pad in an approved location. A heliport as described in FAA Advisory 150/5390-2B shall be accepted in lieu of the emergency helicopter landing pad.

Exception: Where approved by the Fire Chief, high-rise buildings with small occupant loads, such as themed entertainment buildings, shall not require an emergency helicopter landing pad.

1108.1 Definitions The following definitions shall apply for section 1108.

Approach-Departure Path – The flight path of the helicopter as it approaches or departs from the emergency helicopter landing pad designated take off and landing area. The approach-departure path is measured from the edge of the takeoff and landing area to the property line at a public way and is a rising slope determined by a ratio of eight feet horizontal distance for every one foot of vertical height.

Peripheral Area – An obstruction free (i.e. no intrusions into the approach-departure path) area adjacent to the takeoff and landing area serving as a safety zone.

Takeoff and Landing Areas – The designated area on the emergency helicopter landing pad from which helicopter departures and approaches are intended to originate or terminate.

Touchdown Pad – The load bearing portion of the emergency helicopter landing pad designated takeoff and landing area on which a helicopter may land.

1108.2 Design and Installation: An emergency helicopter landing pad shall meet the following minimum requirements:

1. Approach-departure path: The pad shall have two approach-departure paths with a minimum 90-degree arc of separation between the two.

2. Touchdown Pad: The touchdown pad shall be square and shall have minimum dimensions of 50 feet by 50 feet.

3. Peripheral Area: The peripheral area (obstruction free safety zone) surrounding the takeoff and landing area/touchdown pad shall be 25 feet from the edge of the takeoff and landing areas.

4. Safety Net: If the touchdown pad is elevated more than 30 inches above the adjoining roof level, a horizontally attached safety net with a minimum width of 5 feet shall be installed around the perimeter. The safety net shall be located in such a manner that it will not penetrate the approach-departure paths. The safety net shall be designed to hold a minimum capacity of 25 lbs/ft² (122 kg/m²).

5. Wind Direction: A lighted wind sock shall be provided. The wind sock shall be visible from each approach-departure path, visible to the pilot at a minimum distance of 500 feet from the landing area, and visible from the landing area. The wind sock shall be located outside of the peripheral area. Where no single location will meet all criteria, multiple wind socks shall be permitted. Wind socks shall be lighted to ensure that the wind sock and the wind direction indicated is clearly visible at night.

6. Access: An exit stair enclosure that serves tower floors shall be extended to provide access from the roof. A lighted path, with minimum 1 foot candela on the walking surface, shall be designated and provided from the landing area to the access stair. The access stair shall be provided with a hose valve supplied by the building standpipe system in accordance with NFPA 14.

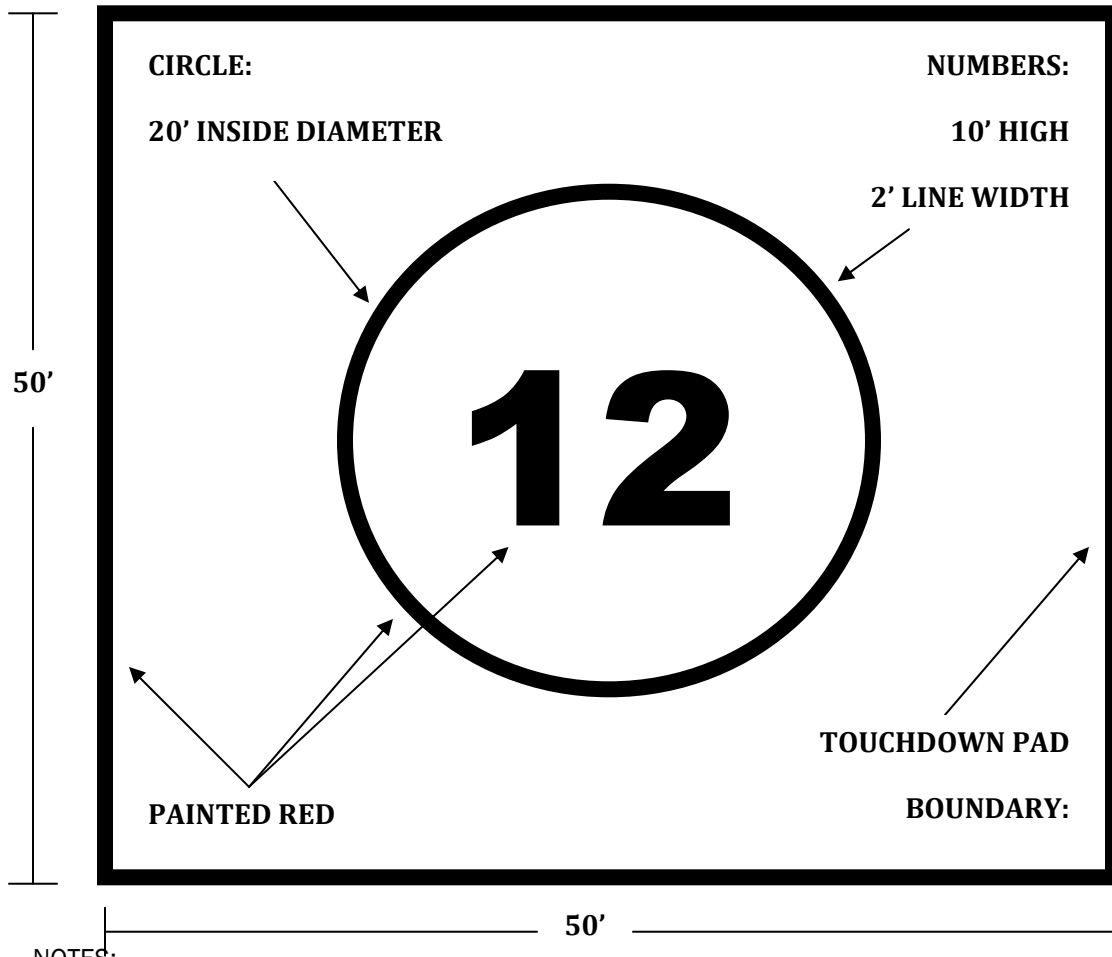
7. Lighting Requirements: Green lights shall be provided on the perimeter of both the touchdown pad and the peripheral area. A minimum of three lights shall be provided per side, with a minimum of 8 lights on the perimeter. Lights at corners shall be allowed to qualify for a light on each of the intersecting sides.

8. Loading Requirements: The touchdown pad shall be designed to withstand a minimum load of 12,000 lbs. Dynamic loading shall be a minimum of 18,000 lbs. Loading capacity shall be indicated by a number indicating the capacity in terms of thousands of pounds (i.e. the number 12 to indicate a capacity of 12,000 lbs.) in a circle in the center of the touchdown area.

9. Touchdown Pad Markings: The emergency helicopter landing pad shall be marked as indicated in Figure 1108.

1108.3 Other Limited Uses: Facilities that intend to use the emergency helicopter landing pad for private or commercial use other than for emergency helicopter landing shall comply with NFPA 418, in addition to all applicable FAA requirements, and in addition to the requirements set forth in this section. Other limited uses shall be limited to a maximum time period of 2 hours in every 24-hour period to ensure that the landing pad is available for emergency use.

Figure 1108



NOTES:

1. The preferred touchdown pad background color is white.
2. The red numeral indicates the allowable weight, in thousands of pounds, that the pad is capable of supporting.

1409.1

1409.1 Site identification. Emergency telephone. ~~Readily accessible emergency telephone facilities shall be provided in an approved location at the construction site. The street address of the construction site and the emergency telephone number of the fire department shall be posted in accordance with Section 505.1, adjacent to the telephone.~~

1412

SECTION 1412

WATER SUPPLY FOR FIRE PROTECTION

1412.1 When required. An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on the site. Additional fire flow shall be provided upon commencement of vertical construction in accordance with Section 1412.

1412.2 Volume required. The required volume of fire flow shall be based on the fire flow required for the building/facility when constructed, with reductions permitted as set forth in this section. In all cases, a minimum fire flow of 1,500 gpm shall be required.

Exception: Where approved by the fire code official for rural areas or other areas with decreased fire flow capacity, the minimum required fire flow may be reduced below 1,500 gpm

1412.3 Combustible material protection. Where combustibles are delivered to a construction site, a minimum fire flow in accordance with Section 1412.2 shall be provided. The fire hydrant(s) shall be within 300 feet of combustible materials.

1412.3 Vertical construction, combustible construction Types III, IV, and V. CM Required fire flow shall be provided at the commencement of vertical construction in accordance with the separation distance as specified in this section.

1412.3.1 Separation up to 20 feet (6.1m). (CM) Where the structure is separated 20 feet (6.1m) or less from property lines against **adjacent property lines or assumed lot lines as defined by IBC 705**, that has an existing structure or otherwise can be constructed upon, a fire flow of no less than 100% of the required fire flow, including all required hydrant locations, shall be provided.

1412.3.2 Separation greater than 20 feet (6.1m) up to 60 feet (18.3m) (CM). Where the structure is separated greater than 20 feet (6.1m) and up to 60 feet (18.3m) from **adjacent property lines or assumed or lot lines as defined by IBC 705 .3** against property that has an existing structure or otherwise can be constructed upon, a fire flow of no less than 50% of the required fire flow, and no less than 1,500 gpm shall be provided. Sufficient hydrants to accommodate the required flow shall be provided, subject to approval by the fire code official.

1412.3.3 Separation greater than 60 feet (18.3m) (CM). Where the structure is separated greater than 60 feet (18.3m) from **adjacent property lines or assumed or lot lines as defined by IBC 705 .3** property that has an

existing structure or otherwise can be constructed upon, fire flow shall no less than 1,500 gpm, shall be provided. The provided in accordance with Section 1412.2. The fire hydrant(s) shall be within 300 feet of the structure protected.

1412.4 Vertical construction, non-combustible construction Types I and II. Fire flow is not required prior to commencing vertical construction of non-combustible construction buildings. Where combustible materials are delivered to the construction site, fire flow in accordance with Section 1412.3 shall be provided. When a standpipe per Section 1413 is provided, fire flow shall be provided in accordance with Section 1412.2.

1412.5 Combustible loading (stocking). Where combustible loading (stocking) of the building has been approved by the fire code official, the fire flow provided shall be equal to 100% of the fire flow required at the time of building occupancy.

1412.6 Occupancy of Building. Prior to occupancy of the completed building, the required fire flow shall be provided and flow tested to verify the water system's capability to supply the required fire flow. All acceptance testing shall be witnessed by the fire code official.

1412.7 Access. Access in accordance with Section 1410 shall be provided between all hydrants required by this section and the construction being protected.

2206.2.3

2206.2.3 Above-ground tanks located outside, above grade. Above-ground tanks shall not be used for the storage of Class I, II, or IIIA liquid motor fuels except as provided by this section. The applicant is responsible for obtaining any use permits as required by the planning or zoning authority.

2301.3

2301.3 Construction documents. At the time of building permit application for new structures designed to accommodate high-piled storage or for requesting a change of occupancy/use, and at the time of application for a storage permit, plans and specifications shall be submitted for review and approval. In addition to the information required by the International Building Code, the storage permit submittal shall include the information specified in this section. Following approval of the plans, a copy of the approved plans shall be maintained on the premises in an approved location. The plans shall include the following:

1. Floor plan of the building showing locations and dimensions of high-piled storage areas.
2. Usable storage height for each storage area
3. Number of tiers within each rack, if applicable.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between storage array.
6. Maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 2303.
8. Location of commodities which are banded or encapsulated.
9. Location of required fire department access doors.
10. Type of fire suppression and fire detection systems.
 - a. For density/area fire sprinklers protecting the high-piled storage area, indicate the sprinkler identification number (SIN), the sprinkler k factor, square footage of the remote area, and the system design density. If the SIN is not available, a copy of the manufacturer specification sheet for the sprinkler head is required.

- b. For specific application sprinklers, such as large-drop and ESFR sprinklers, protecting the high-piled storage area, indicate the sprinkler identification number (SIN), the sprinkler k factor, the number of sprinkler heads in the remote area, and the minimum residual pressure provided at the most hydraulically demanding sprinkler head. If the SIN is not available, a copy of the manufacturer specification sheet for the sprinkler head is required.
- 11. Location of valves controlling the water supply of ceiling and in-rack sprinklers.
- 12. Type, location, and specifications of smoke removal and curtain board systems.
- 13. Dimension and location of transverse and longitudinal flue spaces.
- 14. Additional information regarding design features, commodities, storage arrangement and fire protection features within the high-piled storage area shall be provided at the time of permit, when required by the *fire code official*.
- 15. Type of shelving material used, whether it is solid, slatted, or wire mesh.
- 16. Verification of sufficient fire flow provided for the building

2306.6.1.2

2306.6.1.2 Door size and type. Access doors shall not be less than 3 feet (914 mm) in width and 6 feet 8 inches (2032 mm) in height. Roll-up doors shall not be used ~~unless approved~~.

2308.2.2

2308.2.2 Racks with solid shelving. Racks with solid shelving having an area greater than 20 square feet (1.86 m²) ~~32 square feet (3 m²)~~, measured between approved flue spaces at all four edges of the shelf, shall be in accordance with this section.

Exceptions:

- 1. Racks with mesh, grated, slatted, or similar shelves having uniform openings not more than 6 inches (152 mm) apart, comprised of at least 50 percent of the overall shelf area, and with approved flue spaces are allowed to be treated as racks without solid shelves.
- 2. Racks used for the storage of combustible paper records, with solid shelving, shall be in accordance with NFPA 13.

2403.9

2403.9 Anchorage required. Tents or membrane structures that require approval per Section 2403.2 or have more than one level and their appurtenances shall be adequately roped, braced and anchored to withstand the elements of weather and prevent against collapsing. Documentation of structural stability sealed by a Nevada registered civil or structural engineer shall be furnished to the *fire code official* on request. The documentation shall include a wind load calculation based on ASCE – 7.1, 2005 edition with a Class B, 90 mph wind speed three second gust exposure, a snow load calculation with a snow load of 15 psf or defined snow mitigation, and a seismic load calculation where the loads shall be: 10 psf for the roof assembly, 25 psf for the floor assembly and 15 psf for exterior walls.

2701.4

2701.4 Retail and wholesale storage and display. For retail and wholesale storage and display of nonflammable solid and nonflammable or noncombustible liquid hazardous material in Group M occupancies and in storage in Group S occupancies, see Sections 2702 and 2703.11.

2701.5.1

2701.5.1 Hazardous Materials Management Plan. Where required by the *fire code official* and when the Maximum Allowable Quantity per control area is exceeded, an application for a permit shall include a Hazardous Material Management Plan (HMMP). The HMMP shall include a facility site plan designating the following:

1. Access to each storage and use area.
2. Location of emergency equipment.
3. Location of where liaison will meet emergency responders.
4. Facility evacuation meeting point locations.
5. The general purpose of other areas within the building.
6. Location of all above-ground and underground tanks and their appurtenances including, but not limited to, sumps, vaults, below-grade treatment systems and piping.
7. The hazard classes in each area.
8. Locations of all control areas and Group H occupancies.
9. Emergency exits.

2701.5.2

2701.5.2 Hazardous Materials Inventory Statement (HMIS). Where required by the *fire code official*, an application for a permit shall include an HMIS, such as Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III, Tier II Report or other *approved* statement. The HMIS shall include the following information:

1. Product Name.
2. Component.
3. Chemical Abstract Service (CAS) number.
4. Location where stored or used.
5. Container size.
6. Hazard Classification.
7. Amount in Storage.
8. Amount in use-closed system.
9. Amount in use-open system.
10. Aggregate quantities per control area.
11. Site plan/Floor plan with designated control areas and details of 704 placard for facility and for each control area.
12. Sprinkler design criteria, if sprinklered.
13. Cabinets or exhausted enclosures.
14. NFPA 704 hazard numbers.

2702

RETAIL AND WHOLESALE. The sale of new or used goods to: consumers; retailers; industrial, commercial, institutional or professional users; or to other wholesalers.

2703.5

2703.5 Hazard Identification signs. Unless otherwise exempted by the *fire code official*, visible hazard identification signs as specified in NFPA 704 for the specific material contained shall be placed on stationary containers and above-ground tanks and at entrances to locations where hazardous materials are stored, dispensed, used or handled in quantities requiring a permit and at specific entrances and locations designated by the *fire code official*.

2703.5.1 Signage Rating Method. Where more than one chemical is present in a building or specific area, signs shall be provided using one of the following methods:

- (1) Composite Method. Where many chemicals are present, a single sign shall summarize the maximum ratings contributed by the material(s) in each category and the special hazard category for the building and/or the area.
- (2) Individual Method. Where only a few chemicals are present or where only a few chemicals are of concern to emergency responders (taking into account factors including physical form, hazard rating, and quantity), individual signs shall be displayed. The chemical name shall be displayed below each sign.
- (3) Composite-Individual Combined Method. A single sign shall be used to summarize the ratings via the Composite method for buildings or other numerous chemicals. Signs based on the individual Method shall be used for rooms or smaller area within the building containing small numbers of chemicals.

~~2703.5.1~~ 2703.5.2 Markings. Individual containers, cartons, or packages shall be conspicuously marked or labeled in an approved manner. Rooms or cabinets containing compressed gases shall be conspicuously labeled: COMPRESSED GAS.

2703.8.3.5

2703.8.3.5 Hazardous materials in retail and wholesale Group M display and storage areas and in retail and wholesale Group S storage areas. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed within a single control area of a retail and wholesale Group M display and storage area or a retail and wholesale Group S storage area is allowed to exceed the *maximum allowable quantities per control area* specified in Tables 2703.1.1(1) and 2703.1.1(2) without classifying the building or use as a Group H occupancy, provided that the materials are displayed and stored in accordance with Section 2703.11.

2703.8.8

2703.8.8 Hazardous Materials Information Storage. When required by the fire code official new or existing buildings or facilities containing hazardous materials in quantities exceeding the maximum allowable quantity per control area, a KNOX Cabinet Series 1300,, 7 inch depth with dual locks and rain hood part number 1201 shall be installed in an approved location.

2703.11

2703.11 Retail and wholesale Group M storage and display and retail and wholesale Group S storage. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed within a single *control area* of a retail and wholesale Group M display and storage occupancy, or an outdoor *control area*, or stored in a single *control area* of a retail and wholesale Group S storage occupancy, is allowed to exceed the *maximum allowable quantities per control area* indicated in Section 2703.1 when in accordance with Sections 2703.11.1 through 2703.11.3.10.

2703.11.1.1

2703.11.1.1. Table 2703.11.1 shall not be applicable to mixed occupancies which include either an A, E, I, or R occupancy.

Exception: Single-story buildings.

3001.1

3001.1 Scope. Storage, use and handling of compressed gases in compressed gas containers, cylinders, tanks and systems shall comply with this chapter, including those gases regulated elsewhere in this code. Partially full compressed gas containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Compressed natural gas (CNG) for use as a vehicular fuel shall comply with Chapter 22, NFPA 52 and the International Fuel Gas Code.

Cutting and welding gases shall also comply with Chapter 26.

Cryogenic fluids and liquid CO₂ shall comply with Chapter 32. Liquefied natural gas for use as a vehicular fuel shall also comply with NFPA 52 and NFPA 59A.

Compressed gases classified as hazardous materials shall also comply with Chapter 27 for general requirements and chapters addressing specific hazards, including Chapters 35 (Flammable Gases), 37 (Highly Toxic and Toxic Materials), 40 (Oxidizers, Oxidizing Gases and Oxidizing Cryogenic Fluids) and 41 (Pyrophoric Materials).

LP-gas shall also comply with Chapter 38 and the International Fuel Gas Code.

3006.5

3006.5 Medical gas system plan submittal. Plans and specifications shall be submitted for review and approval. Following approval of the plans, a copy of the approved plans and permit shall be maintained on the premises in an approved location. As required by the *fire code official*, the plans shall include the following:

1. Project name, street address and owners name.
2. Contractor name, address, phone number, license numbers (City, State Contractor and State Fire Marshal).
3. Signature of the licensee (contractors Master or Qualified Employee) or seal and signature of a Professional Engineer licensed in the state of Nevada.
4. Code edition of standards used in the design.
5. System classification (Level).
6. When used - gas type, container size and quantity.
7. Symbol legend with equipment description (manufacture's name and model number) and mounting description (surface, semi-flush, flush, and exterior).
8. Site plan.
9. Floor plan drawn to an indicated scale (1/8" minimum) on sheets of a uniform size showing:
 - a. Point of compass (north arrow).
 - b. Walls, doors, windows, openings, stairs, elevators, passageways, high-piled storage racks, etc., as applicable to depict the facility.
 - c. Room use identification labels.
 - d. Gas, air and vacuum piping distribution systems, manifolds, sizes and material types. Piping hangers and slopes.
 - e. Valves and valve boxes, outlets, gages and other components.
 - f. Electrical warning systems (local and master alarm panels), conductor/conduit routing and size, power panel and circuit connection.
 - g. Key plan.
 - h. Compressor inlet location and vacuum exhaust outlet location.
 - i. For interior gas supply rooms provide construction fire ratings, ventilation and fire sprinkler information.
10. Product data submittal including a cover index sheet listing products used by make and model number, manufacturer data sheets (highlighted or marked) and listing information for all equipment, devices, and materials.
11. Design number and detail of penetration fire stop system when required.
12. Verification & inspection requirements.
13. Name of independent medical gas testing agency to certify the system.
14. Any additional information determined necessary.

3006.6

3006.6 Medical gas systems, testing. Hyperbaric systems and medical gas systems required by NFPA 99 to be verified by person other than the installing contractor shall be certified by an independent medical gas testing agency prior to use of the system. The independent medical gas inspector shall hold a current NITC certification and Nevada State Fire Marshal certification as a medical gas inspector. The *fire code official* may witness any or all testing. Copies of the system certification shall be provided to the *fire code official*.

3301.1.3

Section 3301.1.3 Fireworks The possession, manufacture, storage, sale, handling, and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 3304.
2. Manufacturer, assembly and testing of fireworks as allowed in Section 3305.
3. The use of fireworks for fireworks displays as allowed in Section 3308.
4. The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided such fireworks comply with CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR, Parts 100-185, for consumer fireworks.
5. The possession, storage, use, handling, and sale of consumer safe and sane fireworks in accordance with the current "Fire Prevention Association of Nevada Guidelines for Fireworks".

3301.2.2

3301.2.2 Sale and retail display. ~~No person shall construct a retail display nor offer for sale explosives, explosive materials, or fireworks upon highways, sidewalks, public property, or in Group A or E occupancies. All sales and retail displays of fireworks and explosives are prohibited.~~

Exception: Consumer fireworks 1.4G (safe and sane) offered for sale at portable retail fireworks stands that are in accordance with the current "Fire Prevention Association of Nevada Guidelines for Fireworks".

3301.2.4

3301.2.4 Financial Responsibility. Before a permit is issued, as required by Section 3301.2, the applicant shall file with the jurisdiction a ~~corporate surety bond in the principal sum of \$100,000 or a public liability insurance policy for the same amount~~ valid certificate of insurance complying with Section 105.1.4.1 in the amount of \$5,000,000.00, for the purpose of the payment of all damages to persons or property which arise from, or are caused by, the conduct of any act authorized by the permit upon which any judicial judgment results. The *fire code official* is authorized to specify a greater ~~or lesser~~ amount when, in his or her opinion, conditions at the location of use indicate a greater ~~or lesser~~ amount is required. ~~Government entities shall be exempt from this bond requirement.~~

3301.2.4.1

3301.2.4.1 Blasting. Before approval to do blasting is issued, the applicant for approval shall ~~file a bond or~~ submit a certificate of insurance as specified in Chapter 1 in such form, amount and coverage as determined by the legal

department of the jurisdiction to be adequate in each case to indemnify the jurisdiction against any and all damages arising from permitted blasting.

3301.2.4.2

3301.2.4.2 Fireworks Display. The permit holder shall furnish a ~~bond or~~ certificate of insurance as specified in Chapter 1 in an amount deemed adequate by the fire code official for the payment of all potential damages to a person or persons or to property by reason of the permitted display, and arising from any acts of the permit holder, the agent, employees or subcontractors.

3301.5

3301.5 Supervision. The *fire code official* is authorized to require operations permitted under the provisions of Section 3301.2 to be supervised at any time by the *fire code official* in order to determine compliance with all safety and fire regulations. Fire code official(s) or approved designee(s) shall be required for all productions where pyrotechnic special effects are used.

3303.8

3303.8 Shot reports. Shot reports shall be maintained for every blast and for every pyrotechnical event. These reports shall be available to the fire code official upon request within 48 hours. The report shall at a minimum contain the following information:

1. Date and time of the blast or pyrotechnical event.
2. Company name and contact information.
3. Location of the blast or pyrotechnical event.
4. Weather conditions including temperature and wind speed.
5. Quantity and description of all materials used.
6. A list of any un-spent or misfired products.
7. A list of all personnel present.
8. The license type and card number of the blaster or shooter.
9. The signature of the blaster or shooter in charge.
10. For blasting operations the report shall include the seismic data.

3304.1

3304.1 General. Storage of explosives and explosives materials, small arms ammunition, small arms primers, propellant-actuated cartridges, and smokeless propellants in magazines shall comply with the provisions of this section. Explosive materials shall be stored only in areas with appropriate zoning and use permits as required by the planning or zoning authority, and shall be subject to the approval of the fire code official.

3304.6.5

3304.6.5 Signs and placards. Property upon which Type 1 magazines and outdoor magazines of Types 2, 4 and 5 are located shall be posted with signs stating: NO SMOKING and EXPLOSIVES—KEEP OFF. These signs shall be of contrasting colors with a minimum letter height of 3 inches (76 mm) with a minimum brush stroke of ½ inch (12.7 mm). The signs shall be located to minimize the possibility of a bullet shot at the sign hitting the magazine.

3304.6.5.2 Placards. Type 5 magazines containing Division 1.5 blasting agents shall be prominently placarded during storage as required during transportation by DOTn 49CFR, Part 172 and DOTy 27 CFR, Part 55. All other magazines shall be labeled with the hazard classification only.

3304.7.1

3304.7.1 Security. Magazines shall be kept locked in the manner prescribed in NFPA 495 at all times except during placement or removal of explosives, inventory, or inspection. In addition to the locking requirements the following security measures shall be required at all explosives storage locations.

1. The entire magazine site shall be fenced. The fence shall be a minimum of 8 feet in height and constructed of non-combustible materials.

Exception: Indoor storage locations shall be secured in a manner approved by the fire code official.

2. All outdoor explosives magazines and storage sites shall be equipped with an approved centrally monitored security system.

Exception: For temporary installations with a duration of less than 30 days, 24 hour manned security guards may be used in lieu of the centrally monitored security system when approved by the fire code official.

3305.1

3305.1 General. The manufacture, assembly and testing of explosives, ammunition, blasting agents and fireworks is prohibited shall comply with the requirements of this section and NFPA 495 or NFPA 1124.

Exceptions:

1. The hand loading of small arms ammunition prepared for personal use and not offered for resale.
2. The mixing and loading of blasting agents at blasting sites in accordance with NFPA 495.
3. The use of binary explosives or phosphoric materials in blasting or pyrotechnic special effects applications in accordance with NFPA 495 or NFPA 1126.

4. Subject to approval of the fire code official and obtaining proper approvals from the planning and zoning authority.

3307.3

3307.3 Blasting in congested areas. When blasting is done in ~~a congested area~~ or in close proximity to a structure, railway or highway, ~~development, quarry,~~ or any other installation, precautions shall be taken to minimize earth vibrations and air blast effects. Blasting mats or other protective means shall be used to prevent fragments from be thrown.

3307.3.1 Blasting activities. The blasting contractor shall comply with the following requirements in connection with all blasting activities:

1. All blasts shall be monitored at the nearest structure by a third party engineering firm. Such monitoring shall be done by a seismologist using a certified, annually calibrated, seismic monitor that shall be capable of measuring blast-induced vibration and blast-induced sound levels.
2. A minimum of two seismographs shall be used to obtain data from each blast as required by the fire code official.
3. The maximum ground-borne vibrations shall not exceed a single component peak particle velocity (vector sum) of 0.5 inches per second at the nearest structure.
4. The maximum airblast shall not exceed 120 db at the nearest structure.
5. Monitoring results shall be reported to the fire code official within 48 hours in a manner prescribed by the fire code official.
6. The blasting contractor shall provide a minimum of 72 hours prior written notice to all residences, property owners, businesses, and public uses within 2500 feet of the blasting area. The manner, form, and content of any such notice shall be subject to the approval of the fire code official.
7. For utility notification see 3307.5.
8. The blasting contractor shall notify the fire department and fire dispatch a minimum of two (2) hours prior to each blast, and immediately following each blast in a manner prescribed by the fire code official.
9. The blasting contractor shall provide for pre-blast, project duration, and post blast inspections of neighboring properties within 300 feet from the nearest blast hole, upon which are located structures in close proximity to the blasting area, or when otherwise required by condition of the fire code official. These inspections must be completed by a third party engineering firm.
10. A traffic and access control plan shall be provided when blasting activities are conducted within 100 feet of any public roadway, or when required by the fire code official. The plan shall include warning signage, flagging, temporary road closures, and detour routes. This plan may be subject to the approval of the local law enforcement, of traffic enforcement agency.
11. The blasting contractor shall be responsible for removing and cleaning up any blast-related debris from the blast site and adjacent properties.

Exception: These requirements may be modified by the fire code official.

3307.3.2 Permit Requirements. A permit is required for the storage and or use of explosives, and for any proposed excavation or development activity that will involve blasting. The permit must be obtained by the blasting contractor prior to the beginning of any drilling or blasting activities. The application shall be made to the fire department in

such a form and detail as described by the *fire code official*. Applications for permits shall be accompanied by plans detailing the proposed blasting activities as required by the *fire code official*.

3307.4

3307.4 Restricted hours. ~~Surface blasting operations shall be limited to the hours of 8 a.m. to 4 p.m., Monday through Friday, only be conducted during daylight hours between sunrise and sunset. Other blasting shall be performed during daylight hours unless otherwise approved by the *fire code official*.~~

3307.5

3307.5 Utility Notification. ~~Whenever blasting is being conducted in the vicinity of utility lines or right of way, the blaster shall notify the appropriate representatives of the utilities at least 24 hours in advance of blasting, specifying the location and intended time of such blasting. Verbal notices shall be confirmed with written notice. The blasting contractor shall contact "Call Before You Dig" to obtain a utility notification dig-ticket number a minimum of 48 hours prior to commencing any drilling or blasting activities. A copy of the dig ticket shall be provided to the *fire code official* upon request.~~

3307.6

3307.6 Electric or electronic detonator precautions. Precautions shall be taken to prevent accidental discharge of electric or electronic detonators from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous energy.

3307.13

3307.13 Firing Control Pre-blast procedures. ~~No blast shall be fired until: the blaster had made certain that all surplus explosive materials are in a safe place in accordance with Section 3307.10, all persons and equipment are at a safe distance or under sufficient cover and that an adequate warning signal has been given.~~

- ~~1. The blaster has made certain that all surplus explosives materials are in a safe place in accordance with Section 3307.10 and;~~
- ~~2. All construction workers and equipment are at a safe distance and;~~
- ~~3. Seismic monitor(s) are set up and;~~
- ~~4. All access to the blast site has been shut down and secured and;~~
- ~~5. Communication has been set up between the blaster in charge and those persons securing the blast site and;~~
- ~~6. That adequate warning signals have been given.~~

3307.13.1

3307.13.1 Warning Signals. Warning signals shall be given to alert construction workers on or near a blast site that a blast is going to occur.

1. A warning signal shall be given five minutes prior to the blast and:
2. A warning signal shall be given one minute prior to the blast and:
3. A warning signal shall be given following the blast in accordance with 3307.14 (4).

3307.14

3307.14 Post-blast procedures. After the blast, the following procedures shall be observed.

1. No *person* shall return to the blast area until allowed to do so by the blaster in charge.
2. The blaster shall allow sufficient time for smoke and fumes to dissipate and for dust to settle before returning to or approaching the blast area.
3. The blaster shall inspect the entire blast site for misfires before allowing other personnel to return to the blast area.
4. The blaster shall sound an all clear warning signal in accordance with 3307.13.1

3308.1

3308.1 General. Outdoor fireworks displays, use of pyrotechnics before a proximate audience displays and pyrotechnic special effects in motion picture, television, theatrical, and group entertainment productions, shall comply with the fire code official's guidelines, Sections 3308.2 through 3308.10, and NFPA 1123, ~~or NFPA 1126,~~ or NFPA 160.

3404.2.13.1.3

3404.2.13.1.3 Out of service for one year. Underground tanks that have been out of service for a period of one year shall be removed from the ground in accordance with Section 3404.2.14 ~~or abandoned in place in accordance with Section 3404.2.13.1.4.~~ Coordination and compliance with Environmental Health Division of Clark County Health District for tank removal is the responsibility of the owner and contractor.

3404.2.13.1.4

~~3404.2.13.1.4 Tanks abandoned in place.~~ Tanks abandoned in place shall be as follows:

- ~~1. Flammable and combustible liquids shall be removed from the tank and connected piping.~~
- ~~2. The suction, inlet, gauge, vapor return and vapor lines shall be disconnected.~~
- ~~3. The tank shall be filled completely with an approved inert solid material.~~
- ~~4. Remaining underground piping shall be capped or plugged.~~
- ~~5. A record of tank size, location and date of abandonment shall be retained.~~
- ~~6. All exterior above grade fill piping shall be permanently removed when tanks are abandoned or removed.~~

3404.5

3404.5 Generator and Fire Pump Diesel Fuel Tanks.

3404.5.1 Exterior Installations. Exterior installations shall be in accordance with Sections 3404.5.1.1 through 3403.5.1.3.

3404.5.1.1 Tanks containing 240 gallons (908.5 L.) of fuel or less. Tanks containing 240 gallons (908.5 L.) of fuel or less shall comply with Chapter 34 be listed and labeled as secondary containment tanks in accordance with UL 142.

3404.5.1.2 Tanks containing more than 240 gallons (908.5 L.) up to 500 gallons (1893 L.) of fuel. Tanks containing more than 240 gallons (908.5 L.) up to 500 gallons (1893 L.) of fuel shall comply with Chapter 34 and either Section 3404.5.1.2.1 or Section 3404.5.1.2.2.

3404.5.1.2.1 Secondary containment and enclosure requirement. Tanks shall be listed and labeled as a secondary containment tank in accordance with UL 142, and be provided with an *approved* protective enclosure complying with Sections 3404.5.1.2.1.1 and 3404.5.1.2.1.2.

3404.5.1.2.1.1 Protective enclosure construction. When approved by the *fire code official*, the methods described in this section are acceptable as bullet-resistant construction. The steel and wood dimensions indicated are actual thicknesses. Concrete block and brick dimensions indicated are the manufacturer's represented thicknesses. The height of the protective enclosure shall be a minimum of 18 inches above the height of the tank.

1. Exterior of 5/8-inch (15.9 mm) steel, lined with an interior of any type of nonsparking material.
2. Exterior of 1/2-inch (12.7 mm) steel, lined with an interior of not less than 3/8-inch (9.5 mm) plywood.
3. Exterior of 3/8-inch (9.5 mm) steel, lined with an interior of 2 inches (50.8 mm) of hardwood.
4. Exterior of 3/8-inch (9.5 mm) steel, lined with an interior of 3 inches (76.2 mm) of softwood or 2 1/4 inches (57.2 mm) of plywood.
5. Exterior of 1/4-inch (6.4 mm) steel, lined with an interior of 3 inches (76.2 mm) of hardwood.
6. Exterior of 1/4-inch (6.4 mm) steel, lined with an interior of 5 inches (127 mm) of softwood or 5 1/4 inches (133.4 mm) of plywood.
7. Exterior of 1/4-inch (6.4 mm) steel, lined with an intermediate layer of 2 inches (50.8 mm) of hardwood and an interior lining of 1 1/2 inches (38.1 mm) of plywood.
8. Exterior of 3/16-inch (4.8 mm) steel, lined with an interior of 4 inches (101.6 mm) of hardwood.
9. Exterior of 3/16-inch (4.8 mm) steel, lined with an interior of 7 inches (177.8 mm) of softwood or 6 3/4 inches (171.4 mm) of plywood.
10. Exterior of 3/16-inch (4.8 mm) steel, lined with an intermediate layer of 3 inches (76.2 mm) of hardwood and an interior lining of 3/4-inch (19.1 mm) of plywood.
11. Exterior of 1/8-inch (3.2 mm) steel, lined with an interior of 5 inches (127 mm) of hardwood.
12. Exterior of 1/8-inch (3.2 mm) steel, lined with an interior of 9 inches (228.6 mm) of softwood.
13. Exterior of 1/8-inch (3.2 mm) steel, lined with an intermediate layer of 4 inches (101.6 mm) of hardwood and an interior lining of 3/4-inch (19.1 mm) plywood.
14. Exterior of any type of fire-resistant material which is structurally sound, lined with an intermediate layer of 4 inches (101.6 mm) of solid concrete block or 4 inches (101.6 mm) of solid brick or 4 inches (101.6 mm) of solid concrete, and an interior lining of 1/2-inch (12.7 mm) plywood placed securely against the masonry lining.
15. Standard 8-inch (203.2 mm) concrete block with voids filled with a well-tamped sand/cement mixture.
16. Standard 8-inch (203.2 mm) solid brick.

17. Exterior of any type of fire-resistant material which is structurally sound, lined with an intermediate 6-inch (152.4 mm) space filled with well-tamped dry sand or a well-tamped sand/cement mixture.
18. Exterior of 1/8-inch (3.2 mm) steel, lined with a first intermediate layer of 3/4-inch (19.1 mm) plywood, a second intermediate layer of 35/8 inches (92.1 mm) of a well-tamped dry sand or sand/cement mixture and an interior lining of 3/4-inch (19.1 mm) plywood.
19. Exterior of any type of fire-resistant material, lined with a first intermediate layer of 3/4-inch (19.1 mm) plywood, a second intermediate layer of 35/8 inches (92.1 mm) of a well-tamped dry sand or sand/cement mixture, a third intermediate layer of 3/4-inch (19.1 mm) plywood, and a fourth intermediate layer of 2 inches (50.8 mm) of hardwood or not less than 0.068 inch (1.7 mm) of steel and an interior lining of 3/4-inch (19.1 mm) plywood.
20. Eight-inch-thick (203.2 mm) solid concrete.

3404.5.1.2.1.2 Protective enclosure doors. Doors shall be bullet resistant as specified in Section 3404.5.1.2.1.1. Hinges and hasps shall be attached to the doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed in such a manner that they cannot be removed when the doors are closed and locked.

Exception: Doors not facing the public way.

3404.5.1.2.2. Protected secondary containment tanks. Tanks shall be listed and labeled as 2 hour protected secondary containment tanks in accordance with UL 2085.

3404.5.1.3 Tanks containing more than 500 gallons (1893 L.) of fuel. Tanks containing more than 500 gallons (1893 L.) of fuel shall comply with Chapter 34 and shall be listed and labeled as 2 hour protected secondary containment tanks in accordance with UL 2085.

3404.5.1.4 Separation distances. A protected aboveground tank shall be separated from property lines, important buildings, public ways, and other tanks in accordance with 2008 NFPA 30 Section 22.4.

3404.5.2 Interior Installations. Interior installations of aboveground fuel tanks shall comply with Chapters 27 and 34.

3406.2.4

3406.2.4.4 Locations where above-ground tanks are prohibited. ~~CD~~ The storage of class I, ~~and II, and class III~~ liquids in above-ground tanks outside of buildings is prohibited. ~~within the limits established by law as the limits of districts in which such storage is prohibited. (see Section 3 of the Sample Ordinance for Adoption of the International Fire Code on page v).~~

Exception: When approved by the planning or zoning authority (in jurisdictions requiring this specific approval) and when *approved by the fire code official.*

3406.5.4.5

***3406.5.4.5 Commercial, industrial, governmental or manufacturing.** Dispensing of ~~Class II and III~~ motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or

manufacturing establishments is allowed where permitted, provided such dispensing operations are conducted in accordance with the following:

1. Dispensing shall occur only out of mobile fueling vehicles that have been issued a permit to dispense fuel and only at sites that have been issued a permit to conduct mobile fueling.

*2 – 25 remain unchanged.

3506.2

3506.2 Limitations. Storage of flammable *cryogenic fluids* in stationary containers outside of buildings is prohibited. ~~within the limits established by law as the limits of districts in which such storage is prohibited. (see Section 3 of the Sample Ordinance for Adoption of the International Fire Code on page v).~~

Exception: When approved by the planning or zoning authority (in jurisdictions requiring this specific approval) and when approved by the fire code official.

3804.2

3804.2 Liquefied petroleum gas storage containers. CD Maximum capacity within established limits. Within the limits established by law restricting ~~The~~ storage of liquefied petroleum gas for the protection of heavily populated or congested areas the aggregate capacity of any one installation shall not exceed a water capacity of 2,000 gallons (7570 L) is prohibited.

Exception: In particular installations, this capacity limit shall be determined by the *fire code official*, after consideration of special features such a topographical conditions, nature of occupancy, and proximity to buildings, capacity of proposed LP-gas containers, degree of fire protection to be provided and capabilities of the local fire department.

When approved by the planning or zoning authority (in jurisdictions requiring this specific approval) and when approved by the fire code official.

4603.6

4603.6 Fire alarm systems. An approved fire alarm system shall be installed in existing buildings and structures in accordance with Sections 4603.6.1 through 4603.6.7 and provide occupant notification in accordance with Section 907.6 unless other requirements are provided by other sections of this code. When required by the fire code official, when a fire alarm control unit is upgraded, or when a fire alarm control unit is replaced by a different model, the fire alarm system shall be upgraded in accordance with Sections 4603.6.1 through 4603.6.7 and

provide occupant notification in accordance with Section 907.6 unless other requirements are provided by other sections of this code.

Exception: Occupancies with an existing previously approved fire alarm system.

4604.23

4604.23 Egress path markings. Existing buildings of Groups A,B,E,I, M and R-1 having occupied floors more than ~~75 55~~ feet (~~22 860 mm~~) (16 764 mm) above the lowest level of fire department vehicle access shall be provided with luminous egress path markings in accordance with Section 1024.

47

Chapter 47 REFERENCED STANDARDS, NFPA,

~~22-03~~ 08 Water Tanks for Private Fire Protection.....507.2.2

54-06 National Fuel Gas Code

Appendix B

B105.2 Buildings other than one- and two-family dwellings.The minimum fire-flow and flow duration for buildings other than one- and two-family *dwellings* shall be as specified in Table B105.1.

Exceptions: ~~A reduction in required fire flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire flow shall not be less than 1,500 gallons per minute (95678 L/min) for the prescribed duration as specified in table B105.1.~~

1. When a building is provided with an approved NFPA 13 or NFPA 13R automatic sprinkler system throughout, a reduction in the required fire flow of 50% is permitted.
2. A reduction in the required fire flow of 25% is permitted in buildings with any of the following:
 - a. floors used for human occupancy more than 3 stories in height or more than 55 feet above the lowest level of fire apparatus access;
 - b. Buildings containing high-piled combustible storage protected by other than ESFR fire sprinklers;
OR
 - c. Flammable/combustible liquids in excess of the maximum allowable quantity; OR
 - d. Hazardous materials in excess of the maximum allowable quantity.
3. ~~A reduction in the required fire flow of 50% is permitted in buildings with high piled combustible storage protected by ESFR fire sprinklers.~~
4. The resulting fire flow for all buildings shall not be less than 1,500 gallons per minute (95678 L/min) for the prescribed duration as specified in table B105.1

Appendix C

Delete Existing Appendix C Text and Replace with the Following:

Section C101

General

C101.1 Scope. Fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, as required by Section 507. Design shall comply with the Clark County Uniform Design and Construction Standards (UDACS) for public installations or NFPA 24 for private installations, as applicable.

Section C102

Location

C102.1 Fire hydrant locations. Fire hydrants shall be provided along required fire apparatus access roads

C102.2 Intersections. The spacing of fire hydrants shall start by placing fire hydrants at all intersections.

C102.3 R-3 Occupancies and single-family dwellings built under the IRC. In all residential areas (R-3 occupancies and single-family dwellings built under the IRC only), hydrants shall be spaced not to exceed 500 feet, or 600 feet if all homes are protected by approved automatic fire sprinkler systems.

C102.4 Distance from Hydrant to R-3 Occupancy and single-family dwelling built under the IRC. The maximum distance from a one- or two-family dwelling to a fire hydrant shall not exceed 300 feet, as measured from an approved point on a street or road frontage to a fire hydrant. An approved point is defined as the property line furthest from the hydrant, at a right angle to the street.

C102.5 Commercial and Residential Occupancies other than R-3 and single-family dwelling built under the IRC. In all commercial and industrial areas, including multi-family R-1 and R-2 occupancies, hydrants shall be spaced not to exceed 300 feet, or 400 feet if all buildings are protected by approved automatic sprinkler systems.

C102.6 Distance to Dead-End Street. The maximum distance from a hydrant to the end of a dead-end street shall not exceed 200 feet.

C102.7 Distance to a Fire Department Connection (FDC). The maximum distance from a fire hydrant to a fire department connection (FDC) supplying fire sprinklers and/or standpipes shall not exceed 100 feet, as measured by an approved route. An approved route is defined as an unobstructed path of travel on which hose can easily be laid.

C102.8 Spacing Along Major Streets. Where streets are provided with median dividers, or have four or more travel lanes and a traffic count of more than 30,000 vehicles per day, hydrants shall be spaced at a maximum of 1,000 feet along both sides of the street; arranged on an alternating basis at 500-foot intervals.

C102.9 Hydrants Provided with New Water Mains. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide water for transportation hazards

C102.11 Hydrant Clearances from Structures. No fire hydrant shall be located within 6 feet of a driveway, power pole, light standard, or any other obstruction. For wall, fence and planter locations, a perimeter around the hydrant measuring a minimum of 3 feet from its exterior shall be maintained clear of all obstructions at all times.

C102.12 Hydrant set-back from curbs. Fire hydrants shall be located 4 feet to 7 feet from the back of curb. Where it is not possible to locate the hydrant a minimum of 4 feet from the back of the curb, the hydrant shall be protected against vehicular impact in accordance with Section 312.

C102.13 Hydrant Pad. A concrete pad, with minimum dimensions of 3 feet by 3 feet, with a minimum depth of 10 inches, shall be provided at each fire hydrant.

Section C103

Approved Fire Hydrants

C103.1 Scope. Hydrants that are proposed for installation in public water systems shall be in accordance with approved fire hydrants as allowed by the water purveyor. Hydrants proposed for installation on private water systems shall be in accordance with approved fire hydrants as allowed by the Fire Department.

Section C104

Supply and Underground Mains

C104.1 Supply points. Two sources of water supply are required whenever 4 or more fire hydrants and/or sprinkler lead-ins are installed on a single system.

C104.2 Sectional Control Valves. Sectional control valves shall be installed so that no more than 2 fire hydrants and/or 2 sprinkler lead-ins can be out of service due to a break in a water main.

C104.3 Minimum Size of Line. Supply lines feeding fire hydrants shall have a minimum diameter of 6 inches, with a dead-end maximum length of 150 feet of 6-inch underground pipe supplying only one hydrant.

C104.4 Pressure Rating. Underground piping shall have a minimum working pressure of 150 psi. Underground piping connected to a fire pump or a Fire Department Connection (FDC) shall have a minimum working pressure of 200 psi.

C104.5 Restraint. All underground water lines shall be restrained in accordance with applicable codes and standards.

C104.6 Listings. All on-site underground water mains and materials shall be U.L. listed, A.W.W.A. compliant , and shall be rated for the appropriate working pressure.

Section C105

Satisfying Fire Flow Requirements

(in Accordance with Appendix B)

C105.1 Minimum number of hydrants. The minimum number of fire hydrants required to meet the fire flow shall be based on a maximum flow of 1,000 gallons per minute per hydrant. All hydrants utilized in providing the fire flow shall be within 750 feet of the structure being protected as measured along the street or approved fire apparatus access road.

Exception: In unincorporated Clark County and the City of Las Vegas the maximum flow per hydrant shall be 1,500 gallons per minute.

C105.2 Hydrants on adjacent properties. Fire hydrants on adjacent properties shall not be considered unless fire apparatus access roads extend between properties and recorded easements are established.

C105.3 Hydrants across major streets and highways . All hydrants being utilized to deliver fire flow to the proposed development shall be located on the same side of the street as the proposed development.

Section C106

Construction Operations

C106.1 Construction Hydrants. Hydrants shall be provided for construction in accordance with Section 1412.

C106.2 Placing hydrant out of service. If during construction it becomes necessary to close any control valve or place a hydrant out of service, approval shall be obtained from the Fire Department prior to placing the hydrant out of service.

Section C107

Hydrant Markings

C107.1 Hydrant Markings. Hydrants shall be painted safety yellow for public and safety red for private, shall have their location marked in the adjacent fire access lane by a blue reflective pavement marker and shall have red painted curbs 15 feet in each direction. Hydrant markings shall be in accordance with Section 507.

C107.2 Hydrant Marking Maintenance. Hydrant marking shall be maintained in accordance with Section 507.

Appendix E

E102.2.2.4 Radioactive materials. Examples include more than 100 radioisotopes in common usage in various medical, academic and industrial test and measuring situations. Most emit beta and gamma radiation. Some emit alpha radiation also. Some emit beta and gamma exclusively.

Table E-1 indicates the type of radiation each isotope emits.

TABLE E-1—RADIATION EMITTED FROM ISOTOPES¹

eridium-241 α , y	Dysprosium-165 β , y	Krypton-85 β , y	Praseodymium-143 β	Technetium-99m γ
Antimony-122 β , y	Dysprosium-166 β , y	Krypton-87 β , y	Promethium-147 β	Technetium-99 β
Antimony-124 β	Erbium-169 β , y	Lanthanum-140 β , y	Promethium-149 β , y	Tellurium-125m γ
Antimony-125 β , y	Erbium-171 β , y	Lead-210 α , β , y	Radium-226 α , y	Tellurium-127m β , y
Arsenic-73 γ	Europium-152 9.2h β , y	Lutetium-177 β , y	Rhenium-185 β , y	Tellurium-127 β , y
Arsenic-74 β , γ	Europium-152m β , y	Manganese-52 β , y	Rhenium-188 β , y	Tellurium-129m β , y
Arsenic-76 β , y	Europium-154 β , y	Manganese-54 γ	Rhodium-103m γ	Tellurium-129 β , y
Arsenic-77 β , y	Europium-155 β , y	Manganese-56 β , y	Rhodium-105 β , y	Tellurium-131m β , y
Barium-131 γ	Fluorine-18 β , y	Mercury-197m γ	Rubidium-81 β , y	Tellurium-132 β , y
Barium-133 γ	Gadolinium-153 γ	Mercury-197 γ	Rubidium-86 β , y	Terbium-160 β , y
Barium-140 β , y	Gadolinium-159 β , y	Mercury-203 β , y	Rubidium-87 β	Thallium-200 γ
Beryllium-7, γ	Gallium-67 γ	Molybdenum-99 β , y	Ruthenium-97 γ	Thallium-201 γ
Bismuth-210 α , β , γ	Gallium-72 β , y	Neodymium-147 β , y	Ruthenium-103 β , y	Thallium-202 γ
Bromine-82 β , y	Germanium-71 γ	Neodymium-149 β , y	Ruthenium-105 β , y	Thallium-204 β , y
Cadmium-109 γ	Gold-198 β , y	Nickel-59 γ	Ruthenium-106 β	Thorium (natural) α , γ
Cadmium-115m β , y	Gold-199 β , y	Nickel-63 γ	Samarium-151 β , y	Thulium-170 β , y
Cadmium-115 β , y	Hafnium-181 β , y	Nickel-65 β , y	Samarium-153 β , y	Thulium-171 β , y
Calcium-45 β	Holmium-166 β , y	Niobium-93m γ	Scandium-46 β , y	Tin-113 γ
Calcium-47 β , y	Hydrogen-3 β	Niobium-95 β , y	Scandium-47 β , y	Tin-125 β , y
Carbon-14 β	Indium-111 γ	Niobium-97 β , y	Scandium-48 β , y	Tungsten-181 γ
Cerium-141 β , y	Indium-113m γ	Osmium-185 γ	Selenium-75 γ	Tungsten-185 β

Cerium-143 β , γ	Indium-114m γ	Osmium-191m γ	Silicon-31 β , γ	Tungsten-187 β , γ
Cerium-144 β , γ	Indium-115m β , γ	Osmium-191 β , γ	Silver-105 γ	Uranium (natural or
Cesium-131 β	Iodine-123 γ	Osmium-193 β , γ	Silver-110m β , γ	Uranium-233 α , γ
Cesium-134m β , γ	Iodine-125 γ	Palladium-103 γ	Silver-111 β , γ	Uranium-234 α , γ
Cesium-134 β , γ	Iodine-126 β , γ	Palladium-109 β , γ	Sodium-22 β , γ	Uranium-235 α , γ
Cesium-135 β	Iodine-129 β , γ	Phosphorus-32 β	Sodium-24 β , γ	Vanadium 48 β , γ
Cesium-136 β , γ	Iodine-131 β , γ	Platinum-191 γ	Strontium-85 γ	Xenon-131m γ
Cesium-137 β , γ	Iodine-132 β , γ	Platinum-193m γ	Strontium-89 β , γ	Xenon-133 β , γ
Chlorine-36 β , γ	Iodine-133 β , γ	Platinum-193 γ	Strontium-90 β	Xenon-135 β , γ
Chlorine-38 β , γ	Iodine-134 β , γ	Platinum-197m β , γ	Strontium-91 β , γ	Ytterbium-175 β , γ
Chromium-51 γ	Iodine-135 β , γ	Platinum-197 β , γ	Strontium-92 β , γ	Yttrium-90 β , γ
Cobalt-57 γ	Iridium-192 β , γ	Plutonium-239 β , γ	Sulphur-35 β	Yttrium-91 β , γ
Cobalt-58m γ	Iridium-194 β , γ	Polonium-210 β , γ	Tantalum-182 β , γ	Yttrium-92 β , γ
Cobalt-58 β , γ	Iron-52 β , γ	Potassium-42 β , γ	Technetium-96 γ	Yttrium-93 β , γ
Cobalt-60 β , γ	Iron-55 γ	Potassium-43 β , γ	Technetium-97m γ	
Copper-64 β , γ	Iron-59 β , γ	Praseodymium-142 β , γ	Technetium-97 γ	

α = alpha radiation

β = beta radiation

γ = gamma radiation

Appendix J

APPENDIX J EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

SECTION J101

GENERAL

J101.1 Scope. Systems, components and equipment required to provide emergency responder radio coverage shall be in accordance with this appendix.

J101.2 Permit. Construction and operational permits shall be required as set forth in Section 105.6 and 105.7. A construction permit is required for installation of or modification to emergency responder radio coverage systems and related equipment. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

J101.2.1 Construction documents. Construction documents for emergency responder radio coverage systems shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations as determined by the fire code official.

J101.2.2 Plans. Plans shall be submitted to the fire code official for review and approval prior to installation.

J101.2.2.1 Plan Submittals. Plan submittals shall include, but not be limited to all of the following:

- a. A floor plan that indicates the use of all rooms, emergency responder radio coverage system equipment locations, power panel connections, raceway routing layout, conduit and conductor types and sizes, compliance with survivability criteria and locations of building access to the equipment.
- b. A roof plan showing the location of antenna(s) including a line of site plan to agency transmitting and receiving antenna(s).
- c. Schematic drawings of the electrical system, backup power, antenna system and other associated equipment.
- d. Rack and equipment cabinet plans showing arrangement and configuration of emergency responder radio coverage system equipment.
- e. System riser diagram(s).

J101.2.2.2 Data sheets. Manufacturer's data sheets shall be provided for equipment to be installed. Manufacturers' data sheets shall indicate model numbers and listing information for equipment, devices and materials.

J101.2.2.3 As-built documents. Any field changes that occur during construction shall be incorporated onto new as-built plans and data sheets. Plans shall be submitted to the fire code official and be approval prior to final inspections.

J101.2.3 Equipment. Systems and components shall be listed and approved for the purpose for which they are installed.

SECTION J102

DEFINITIONS

J102.1 Definitions. For the purpose this appendix, certain terms are defined as follows:

AGENCY. Any emergency responder department within the jurisdiction that utilizes radio frequencies for communication. This could include, but not be limited to, various public safety agencies such as fire department, emergency medical services and law enforcement.

DELIVERED AUDIO QUALITY (DAQ). A measure of audio quality over a transmission medium. This is a universal standard often cited in system designs and specifications.

DAQ 1: Unusable, speech present but unreadable.

DAQ 2: Understandable with considerable effort. Frequent repetition due to noise or distortion.

DAQ 3: Speech understandable with slight effort. Occasional repetition required due to noise / distortion.

DAQ 3.5: Speech understandable with repetition only rarely required. Some noise or distortion.

DAQ 4: Speech easily understood. Occasional noise or distortion.

DAQ 4.5: Speech easily understood. Infrequent noise or distortion.

DAQ 5: Speech easily understood.

DONOR ANTENNA. The outside antenna on the building where an emergency responder radio coverage system operates.

DONOR SITE. The repeater or base station site with which an emergency responder radio coverage system communicates.

DOWNLINK. The radio signal from the agencies base station transmitter to the portable public safety subscriber receiver.

EMERGENCY RESPONDER RADIO COVERAGE SYSTEM. An emergency responder radio coverage system is a two-way radio communication system installed to assure the effective operation of radio communications systems for fire, emergency medical services or law enforcement agencies within a building or structure. A system used by firefighters, police, and other emergency services personnel.

SOUTHERN NEVADA AREA COMMUNICATIONS COUNCIL (SNACC). The SNACC oversees, manages, and maintains the fire and EMS radio system utilized by multiple jurisdictions in southern Nevada.

UPLINK. The radio signal from the portable public safety subscriber transmitter to the agencies base station receiver.

SECTION J103

TECHNICAL REQUIREMENTS

J103.1 System design. The emergency responder radio coverage system shall be designed in accordance with Sections J103.1.1 through J103.1.5.

J103.1.1 Amplification systems allowed. Buildings and structures that cannot support the required level of radio coverage shall be equipped with a radiating cable system, a distributed antenna system with Federal Communications Commission (FCC)-certified signal boosters or other system approved by the *fire code official* in order to achieve the required adequate radio coverage.

J103.1.1.1 Human exposure to radio frequency and electromagnetic fields. The system design, and installation, shall in no case exceed the FCC's OET 65 Standards.

J103.1.2 Technical criteria. The *fire code official* shall maintain a document providing the specific technical information and requirements for the emergency responder radio coverage system. This document shall contain, but not be limited to, the inbound/outbound frequency pairs, the various frequencies required, the location of radio sites, the location and effective radiated power (ERP) of radio sites used by the emergency responder radio coverage system, the maximum propagation delay (in microseconds), and other supporting technical information.

J103.1.2.1 System radio frequencies. The emergency responder radio coverage system shall be capable of transmitting all public safety radio frequencies (700 and 800 Megahertz public safety bands) assigned to the agency, and be capable of using any modulation technology.

J103.1.2.2 Frequency changes. Systems shall be capable of upgrade, modification, or expansions in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC.

J103.1.2.3 Band migration capability. The signal booster shall include re-tunable or replaceable filters to accommodate rapid and economic passband changes in the event of mandatory FCC changes within the 806-824 and 851-869 MHz band. The use of non-adjustable and non-replaceable RF input and output filters is prohibited.

J103.1.2.6 Amplification Components. Systems shall be equipped with a radiating cable system and/or a distributed antenna system (DAS) with FCC certified signal boosters, or systems otherwise approved in order to achieve the required adequate radio coverage.

J103.1.2.7 Reliability Factor. The system shall be designed and capable of providing a 95% reliability factor.

J103.1.2.8 Isolation. Isolation shall be maintained between the donor antenna and all inside antennas and shall be a minimum of 15 db above the signal booster gain under all operating conditions.

J103.1.2.9 Monitoring. Monitoring shall be provided to annunciate the status of the system. A single supervisory signal shall be sent to the fire alarm control unit upon any off-normal condition. The following conditions shall be monitored:

- a. Normal ac power
- b. Active component trouble
- c. Loss of normal ac power
- d. Battery system trouble
- e. Low battery capacity, at 70% of required capacity.

J103.1.3 Secondary power. The emergency responder radio coverage system shall be equipped with a secondary source of power. The secondary source of power shall be either a battery system or an emergency generator. The secondary power supply shall supply power automatically when the primary power source is lost. The secondary source of power shall be capable of operating the emergency responder radio coverage system for a period of at least 12 hours.

J103.1.3.1 Battery Systems. The active components of the installed system or systems shall be capable of operating on an independent battery system for a period of at least 12 hours without external power input. The battery system shall automatically charge in the presence of external power input.

J103.1.4 System Components. System components shall be in accordance with this section.

J103.1.4.1 Component Approval and Compatibility. Components utilized in the installation of the emergency responder radio coverage system, such as repeaters, transmitters, receivers, signal boosters, cabling, fiber distributed antenna systems shall be approved and shall be compatible with the agencies public safety radio systems.

J103.1.4.2 J103.1.4 Signal booster component requirements. If used, signal boosters shall ~~meet the following requirements~~ be compatible with both analog and digital communications simultaneously at the time of installation.

1. All signal booster components shall be contained in a NEMA4-type waterproof cabinet.
2. The battery system shall be contained in a NEMA4-type waterproof cabinet.
3. ~~The system shall include automatic alarming of malfunctions of the signal booster and battery system. Any resulting trouble alarm shall be automatically transmitted to an approved central station or proprietary supervising station as defined in NFPA 72 or, when approved by the fire code official, shall should and audible signal at a constantly attended location.~~
4. ~~Equipment shall have FCC certification prior to installation.~~

J103.1.4.3 Filters. Filters shall be provided in accordance with this section.

J103.1.4.3.1 External Filters. Permanent external filters and attachments shall not be permitted except as permitted by J103.1.4.4.2.

J103.1.4.3.2 Reject filters. Notch filter sections shall be incorporated to minimize adjacent channel cellular and SMR (Nextel) degradation of the signal booster performance. The minimum downlink band adjacent band rejection shall be 35 dB or greater at 865 MHz and 870 MHz.

J103.1.4.3.3 Passive filters. Passive filter equipment shall have a passband of 700-900 Mhz. IP rating of 2 Ghz.

J103.1.4.3.4 Analog / Digital Capability. The system shall be 100% compatible with analog or digital modulations after installation without additional adjustment or modifications.

J103.1.4.3.5 Output Level control. An automatic output leveling circuit shall be included for both passbands with a minimum dynamic range of 60 dB, less any gain reduction setting, to maintain FCC out of band and spurious emission compliance.

J103.1.4.3.6 Cable. Cable shall have a passband of 700-900 MHz. Cable shall be fire plenum or riser rated.

J103.1.4.3.7 Degraded performance in emergencies: The system shall be designed to allow degraded performance in adverse conditions, such as abnormally high temperatures resulting from nearby fires, extreme voltage fluctuations or other abnormal conditions that may occur during an emergency. Circuits that intentionally disable the signal booster in such situations (i.e. under/over voltage, over/under current, over/under temperature, etc.) will not be implemented as the standard mode for public safety applications. It is the purpose of this specification to assure the maximum possible level of communications to public safety personnel depending upon the signal booster even to the extent of damaging the signal booster as long as some communications benefit can be provided during the emergency.

J103.1.4.3.8 Mode of Operation. The system shall be normally powered on and shall continuously provide passing of frequencies within the public safety bands.

J103.1.5 Additional frequencies and change of frequencies. The emergency responder radio coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC. **Cabling.** Cabling shall be in metal conduit, be metal-clad, or be otherwise enclosed in metal sheathing.

J103.2 Installation requirements. The installation of the public safety radio coverage system shall be in accordance with Sections J103.2.1 through J103.2.5.

J103.2.1 Approval prior to installation. No amplification system capable of operating on frequencies or causing interference on frequencies assigned or licensed to any public safety agency by the FCC shall be installed without prior coordination and approval of the *fire code official*. The building manager/owner shall suspend and correct other equipment installations that degrade the performance of the public safety radio system or emergency responder radio coverage system.

J103.2.2 Permit required. A construction permit, as required by Section 105.7.5 of the International Fire Code, shall be obtained prior to the installation of the emergency responder radio coverage system. **Licensing.** All systems utilizing repeaters shall be FCC licensed under the agency's and SNACC system.

J103.2.3 Minimum qualifications of personnel. The minimum qualification of the system designer and lead installation personnel shall include:

1. A valid FCC-issued General Radio Operators License, and
2. Certification of in-building system training issued by a nationally recognized organization or school or a certification issued by the manufacturer of the equipment being installed.

The agency may waive these requirements upon successful demonstration of adequate skills and experience satisfactory to the *fire code official*.

J103.2.4 Commissioning Test. It is the building owner's responsibility to ensure that a commissioning test of the radio repeater or amplification system occurs prior to issuance of a certificate of occupancy for the building. The test shall ensure that two-way coverage on each floor of the building meets the minimum signal strength coverage requirements described in Section 510.2. At the conclusion of the testing a report which shall verify compliance with this section shall be submitted to the *fire code official*. A copy of this report shall be maintained on site.

J103.2.5 FCC compliance during testing. All testing must be done on frequencies authorized by the FCC. A valid FCC license will be required if testing is done on frequencies different from the police, fire or emergency medical frequencies. The installer shall coordinate with the *fire code official* the frequencies to be utilized during testing.

J103.2.6 Acceptance Commissioning test procedure. When an emergency responder radio coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to ensure that two-way coverage is provided on each floor of the building is a minimum of 90 percent. The test procedure shall be conducted as follows:

J103.2.6.1 General Building Areas. General building areas shall be tested to ensure coverage is provided at a minimum of 95 percent. The test procedure shall be conducted as follows:

1. Each 100,000 square foot sector floor of the building floor shall be divided into a grid of 20 40 approximately equal areas. The maximum grid dimension shall be 50 feet, and the maximum grid size shall be 2,500 square feet.
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 and a calibrated signal level recording system. Measurements of DAQ and signal strength shall be made in each grid area.
3. A maximum of two nonadjacent areas shall be allowed to fail the test.
4. In the event that three of the areas fail the test, in order to be more statistically accurate, the grid resolution may be doubled, so that the each 100,000 square foot sector of each floor may be divided into 40 160 equal areas, each having a maximum dimension of 25 feet and a maximum area of 625 square feet. A maximum of four eight nonadjacent areas shall be allowed to fail the test. If the system fails the 40 160-area test, the system shall be altered to meet the 90 95-percent coverage requirement.
5. A test location approximately in the center of each grid area shall be selected for the test, then the radio shall be 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 area. If the test fails in the selected test location, that grid area shall fail, and prospecting for a better spot within the grid area shall not be allowed.
6. Measurements shall be made with the antenna held in a vertical position at three (3) to four (4) feet above the floor. (Portable radio worn on the belt or turnout coat pocket).
7. 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.
8. As part of the installation a spectrum analyzer or other suitable test equipment shall be utilized to insure spurious oscillations are not being generated by the subject installation and subsequent annual inspections.
9. A sweep test to measure the level of RF radiation shall be conducted to verify that the antennae system complies with FCC OET 65 Standards.

J103.2.6.2 Critical Areas. Critical areas shall be tested to ensure 100 percent coverage. The test procedure shall be conducted as follows:

1. Each 100,000 square foot sector floor of the building floor shall be divided into a grid of 20 40 approximately equal areas. The maximum grid dimension shall be 50 feet, and the maximum grid size shall be 2,500 square feet.
2. All grids shall pass the test (failure is not an option).
3. 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 and a calibrated signal level recording system. Measurements of DAQ and signal strength shall be made in each grid area.

4. A test location approximately in the center of each grid area shall be selected for the test, then the radio shall be 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 area. If the test fails in the selected test location, that grid area shall fail, and prospecting for a better spot within the grid area shall not be allowed.
5. Measurements shall be made with the antenna held in a vertical position at three (3) to four (4) feet above the floor. (Portable radio worn on the belt or turnout coat pocket).
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 insure spurious oscillations are not being generated by the subject installation and subsequent annual inspections.
8. A sweep test to measure the level of RF radiation shall be conducted to verify that the antennae system complies with FCC OET 65 Standards.

J103.2.7 FCC Compliance. The emergency responder radio coverage system installation and components shall also comply with all applicable federal regulations, including but not limited to, FCC 47 CFR 90.219.

J103.3 Maintenance. The emergency responder radio coverage system shall be maintained in accordance with Sections J103.3.1 through J103.3.5.

J103.3.1 Operational Maintenance. The emergency responder radio coverage system shall be maintained operational at all times.

J103.3.1.1 Maintenance contract. The owner is responsible for holding a maintenance contract with a company that is capable of providing emergency response 24 hours a day, 7 days a week.

J103.3.1.2 Maintenance records. Maintenance records shall be maintained on-site. Copies of all maintenance records shall be submitted to SNACC.

~~J103.3.2 Permit required.~~ ~~A construction permit, as required by Section 105.7.5x of the International Fire Code, shall be obtained prior to the modification or alteration of the emergency responder radio coverage system.~~

J103.3.3 Annual Testing and proof of compliance. The emergency responder radio coverage system shall be inspected and tested annually or whenever 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 J103.2.4.
2. Signal boosters shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance.
3. Backup batteries and power supplies shall be tested under load for a period of one hour to verify that they will properly operate during an actual power outage. If within the one-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional one-hour periods until the integrity of the battery can be determined.
4. All other active components shall be checked to verify operation within the manufacturer's specifications.
5. At the conclusion of the testing a report which shall verify compliance with Section J103.3.4 shall be submitted to the *fire code official*. A copy of this report shall be maintained on-site

J103.3.4 Additional frequencies. The building owner shall modify or expand the emergency responder radio coverage system at his or her expense in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC. Prior approval of a public safety radio coverage system on previous frequencies does not exempt this section.

J103.3.5 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.

J103.4 Fire Department Radios. The owner shall provide the fire department with portable radios in accordance with this section.

J103.4.1 Number of radios. A minimum of two radios, and no less than one radio for every 1 million square feet of building area, shall be provided to the fire department.

J103.4.2 Radio model. Radios shall be Motorola Model XTS/XTL 5000, with lapel microphone.

J103.4.3 Warranty and ownership transfer. Warranty and ownership of the radios shall be transferred to the fire department upon successful completion of the acceptance test.

SECTION J104

REFERENCED STANDARDS

FCC 47 CFR 90.219 – 2007	Private Land Mobile Radio Services – Use of Signal Boosters	J103.2.5
<u>FCC OET 65</u>	<u>FCC's Bulletin 65 Provides Guidelines for Human Exposure to Radio Frequency and Electromagnetic Fields.</u>	J 103.1.1.1
ICC IFC -09	International Fire Code	J103.2.2, J103.3.2
NFPA 72 – 07	National Fire Alarm Code	J103.1.4

Appendix K

Appendix K

Proprietary Supervising Station Facilities

Section K101

General

K101.1 Scope. Proprietary supervising station facilities (self-monitoring facilities) shall meet all of the requirements of this appendix.

K101.2 Permit Required. The proprietary supervising station facility shall maintain an annual operational permit.

Section K102

Site Requirements

K102.1 Location. The proprietary supervising station shall be located in a property's Fire Command Center, or other approved location.

K102.1.1 Equipment. The approved location shall have at a minimum the following items:

1. A fire alarm annunciator that has appropriate control capabilities.
2. An all-call microphone and all-call evacuation switch.
3. Switches that activate the evacuation message, the investigation message (if applicable), and the all-clear message for the active alarm zones.
4. A printer that is provided with a secondary power source such as an uninterruptible power supply or other approved means.
5. Copy of the approved SOP as required by Section K104.

K102.2 Retransmission Means. Two means of retransmission shall be provided. The primary means of retransmission shall be a land-line telephone. The secondary means of retransmission shall be a dedicated cellular telephone.

Section K103

Personnel

K103.1 Qualifications. Proprietary supervising stations shall be operated by trained, competent personnel in constant attendance who are responsible to the owner of the protected property.

K103.1.1 Evidence of training. Annually the applicant shall certify in writing to the *fire code official* that all authorized personnel have received training in the recognition and proper handling of alarm signals. Evidence of annual training for each authorized personnel shall be provided when requested by the *fire code official*.

K103.2 Training. Operators shall be trained on a yearly basis either by the installing fire alarm contractor, by the fire alarm maintenance contractor, or by the manufacturer's representative of installed fire alarm system. Documentation of annual training shall be kept on site and available upon request of the *fire code official*.

Operators shall be trained on the following:

1. How to differentiate between a water flow alarm signal, a fire alarm signal, a fire supervisory signal, and a fire trouble signal.
2. The basic operations of the panel, including but not limited, to the following: signal acknowledgment, resetting of the fire alarm system, selection of evacuation zones, and activating of the evacuation, investigation (if applicable), and all-clear evacuation messaging.
3. The Standard Operating Procedures (SOP's) required by Section K104 for the facility.

K103.3 Number of personnel. At least two operators shall be on duty at all times. One of the two operators shall be permitted to be a runner.

Section K104

Standard Operating Procedures

K104.1 General. A Standard Operating Procedure (SOP) shall be submitted to the *fire code official* when applying for the required annual permit for proprietary supervising station facilities. The SOP shall outline procedures with regards to emergency procedures and the disposition of the alarm, supervisory, and trouble signals. The SOP shall include at a minimum the following items:

1. The number of operators that will be on duty at all times.
2. The location and the equipment found within the proprietary supervising station facility.
3. The facilities' procedures in handling alarm, supervisory, and trouble signals.
4. The following procedures if a positive alarm sequence is provided:
 - a. Describe whether positive alarm sequencing is to be utilized, whether an evacuation message will be played, or whether an investigation message will be played for the first 180 seconds after the receipt of a fire alarm signal.
 - b. Describe that an evacuation message will automatically activate per the fire alarm operational matrix after 180 seconds if the fire alarm system has not been reset.

Section K105

Disposition of Signals

K105.1 Alarm signals. Upon receipt of a fire alarm signal, the proprietary supervising station operator shall initiate action to perform the following:

1. Immediately dispatch runner to the alarm location identified on the fire alarm control unit.
 - a. If the fire is verified, immediately activate the evacuation message on the fire alarm system and initiate notification procedures.
 - b. If the alarm is false, the fire alarm system shall be reset. If either an investigation message or an evacuation message has been activated, then sound an all-clear message.

K105.2 Supervisory signals. Upon receipt of a supervisory signal, the proprietary supervising station operator shall initiate action to perform the following:

1. Immediately dispatch runner to the location identified on the fire alarm control unit, unless the supervisory conditions are promptly restored.
2. If unable or unqualified to clear the supervisory signal, then personnel shall contact a fire alarm contractor within two hours to service the fire alarm system.
3. Notify the *fire code official* when sprinkler systems are wholly or partially out of service for eight hours or more.
4. Provide written notice to the *fire code official* as to the nature of the signal, time of occurrence, and restoration of service, when equipment has been out of service for eight hours or more.

K105.3 Trouble signals. Upon receipt of trouble signals or other signals pertaining solely to matters of equipment maintenance of the fire alarm system, the proprietary supervising station operator shall initiate action to perform the following, if required:

1. Immediately dispatch runner to the location identified on the fire alarm control unit, unless the trouble conditions are promptly restored.
2. If unable or unqualified to clear the trouble signal, then personnel shall contact a fire alarm contractor within four hours to service the fire alarm system.
3. Notify the *fire code official* when interruption of service exists for four hours or more.
4. When equipment has been out of service for eight hours or more, provide written notice to the *fire code official* as to the nature of the signal, time of occurrence, and restoration of service.

Section K106

Record-Keeping

K106.1 Alarms. A written log of all fire alarm signals shall be maintained in the Fire Command Center including:

1. The investigating person's name.
2. The device address.
3. The type of alarm.
4. The date and time of receipt of the fire alarm signals.
5. The cause and disposition of the fire alarm signals.

NFPA 10

6.1.3.2

6.1.3.2 Fire extinguishers shall be located along normal paths of travel, including exits from areas, unless the fire code official determines that the hazard posed indicates the need for placement away from normal paths of travel.

6.1.3.10.1

6.1.3.10.1 Cabinets housing fire extinguishers shall not be locked, ~~except where fire extinguishers are subject to malicious use and cabinets include a means of emergency access.~~

Exceptions:

1. Where portable fire extinguishers subject to malicious use or damage are provided with a means of ready access.
2. In Group I-3 occupancies and in mental health areas in Group I-2 occupancies, access to portable fire extinguishers shall be permitted to be locked or to be located in staff locations provided the staff has keys.

6.2.1.3.1.1

6.2.1.3.1.1 Up to two water-type extinguishers, each with 1-A rating, shall be permitted to be used to fulfill the requirements of one 2-A rated extinguisher for light (low hazard) occupancies only.

6.6.3

6.6.3 All solid fuel cooking appliances (whether or not under a hood) with fire boxes of 5 ft³ (0.14 m³) volume or less shall ~~at least have a listed 2-A rated water type fire extinguisher or 1.6 gal (6 L) wet chemical fire extinguisher listed for Class K fires.~~ 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 the IFC Section 904.11.5.

6.6.4

6.6.4 When 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.

NFPA 13

5.3.2

5.3.2.1 Ordinary Hazard (Group 2) Ordinary hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents is moderate to high, where stockpiles of contents with moderate rates of heat release do not exceed 12 ft (3.66 m), and stockpiles of contents with high rates of heat release do not exceed 8 ft (2.4m).

Occupancies containing Casinos, Mini-Storage Facilities, and Shell Buildings, regardless of occupancy classification (unknown tenants and/or floor layout), shall be designed to meet the requirements of Ordinary Hazard Group 2.

6.1.3

6.1.3 Rated Pressure. System components shall be rated for the maximum system working pressure to which they are exposed but shall not be rated at less than 175 psi (12.1 bar) for components installed aboveground and 150 psi (10.4 bar) for components installed underground. When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 200), or 50 psi greater than the system design pressure, whichever is greater.

6.2.9.7.1

6.2.9.7.1 The list shall be on a machine-engraved metal or rigid plastic sign with capitalized lettering a minimum 14 point (1/4 inch high) in Arial or similar font and include the following:

- (1) Sprinkler Identification Number (SIN) if equipped; or the manufacturer, model, orifice, deflector type, thermal sensitivity, and pressure rating.
- (2) General description.
- (3) Quantity of each type to be contained in the cabinet.
- (4) Issue or revision date of the list.

6.3.1.1.1

6.3.1.1.1 Pipe or tube shall have a minimum Corrosion Resistant Ratio (CRR) of 1.

6.8.1.4

6.8.1.4 The minimum number of required inlets shall be one 2 1/2 inch inlet for every 250 gpm of the sprinkler and/or standpipe demand, or fraction thereof. Fire Department Connections (FDC) shall be provided with internal check valve(s) such that water being supplied into any inlet will not flow back out of any other inlet. For the purposes of this section, internal clapper valve devices provided by the manufacturer in listed FDC shall be considered internal check valves.

6.9.1

6.9.1 Waterflow alarm devices shall be listed for the service and so constructed and installed that any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler of the smallest orifice installed on the system will result in an audible alarm on the premises within 60 seconds ~~5 minutes~~ after such flow begins and until such flow stops.

6.9.1.1

6.9.1.1 Multi-story buildings shall have water flow alarm annunciation on a floor by floor basis.

6.9.1.2

6.9.1.2 Sprinkler systems, such as those protecting atriums, covered mall buildings, and other areas with non-standard ceiling heights within the building, shall be designed such that system water flow annunciation indicates the protected floor level, rather than the floor level where the system piping occurs.

6.9.3.1

6.9.3.1 Alarm Unit(s). Alarm unit(s) shall be a horn/strobe device listed for fire alarm signaling. An alarm unit shall include a listed mechanical alarm, horn, or siren or a listed electric gong, bell, speaker, horn, or siren

6.9.3.2

6.9.3.2. Exterior Alarm Unit(s). Exterior alarm unit(s) shall be weatherproofed. Outdoor water motor-operated or electrically operated bells shall be weatherproofed and guarded.

6.9.3.3

6.9.3.3. Exterior Alarm Unit. There shall be a minimum of one exterior horn/strobe alarm unit provided on the exterior wall above the Fire Department Connection. All piping to water motor-operated devices shall be galvanized or brass or other corrosion-resistant material acceptable under this standard and of a size not less than 3/4 in. (20 mm)

6.9.3.4

6.9.3.4. Number of Interior Alarm Unit(s). There shall be a minimum of one interior horn/strobe alarm unit provided in a normally occupied location. In multi-tenant buildings, there shall be one interior alarm unit in each tenant space. All interior alarm units associated with a single sprinkler system shall activate simultaneously upon activation of that fire sprinkler system. Piping between the sprinkler system and a pressure-actuated alarm-initiating device shall be galvanized or of nonferrous metal or other approved corrosion-resistant material of not less than 3/8 in. (10 mm) nominal pipe size.

6.9.3.5

6.9.3.5 Interior alarm units are not required when the building is protected throughout with a fire alarm system in accordance with adopted codes and the fire alarm system will activate upon actuation of any sprinkler system within the building

7.1.3

7.1.3 A wet pipe system shall be permitted to supply an auxiliary antifreeze, dry pipe, or preaction, ~~or deluge system provided the water supply is adequate~~ provided the auxiliary system covers less than 10% of the permitted system size.

7.2.3.1

7.2.3.1 The system capacity (volume) controlled by a dry pipe valve shall be determined by 7.2.3.2, ~~7.2.3.3, 7.2.3.4, 7.2.3.5, or 7.2.3.7.~~

A.7.2.3.1

A.7.2.3.1 The 60 second limit does not apply to dry systems with capacities of 500 gal (1893 L) or less, nor to dry systems with capacities of 750 gal (2839 L) or less if equipped with a quick opening device.

7.2.3.3

7.2.3.3 A system size of not more than 500 gal (1893 L) shall be permitted without a quick opening device and shall not be required to meet any specific water delivery requirement to the inspection test connection.

7.2.3.4

7.2.3.4 A system size of not more than 750 gal (2839 L) shall be permitted with a quick opening device and shall not be required to meet any specific water delivery requirement to the inspection test connection.

7.2.3.5

7.2.3.5 System size shall be based on dry systems being calculated for water delivery in accordance with 7.2.3.6. Testing of the system shall be accomplished by the methods indicated in 7.2.3.7.

7.2.7

7.2.7 Application of Dry-Pipe Systems. Dry pipe systems shall not be utilized for the protection of areas that can be maintained above 40 degrees.

Exception: When permitted by the fire code official, dry sprinklers may be installed in small conditioned rooms within buildings that otherwise require dry sprinkler systems throughout.

7.3.2.3.1.3

7.3.2.3.1.3 The system size for double-interlock preaction systems shall be based on calculating water delivery in accordance with 7.2.3.6, anticipating that the detection system activation and sprinkler operation will be simultaneous. A system meeting the requirements of this section shall be required to also meet the requirements of 7.2.3.5.

7.6.2.4

7.6.2.4 An antifreeze solution shall be prepared with a freezing point ~~below the expected minimum temperature for the locality~~ at or below 0° F (-17.8° C)

7.6.2.4.1

7.6.2.4.1 Where the antifreeze system is intended to be installed at an elevation where temperatures below 0° F (-17.8° C) are expected, the system shall be prepared with a freezing point below the minimum expected temperature for the area.

7.10.2.2

7.10.2.2 Sprinklers or automatic spray nozzles in ducts, duct collars, and plenum chambers shall not be required where all cooking equipment is served by listed grease extractors.

7.10.2.6

7.10.2.6 Sprinklers protecting cooking exhaust ducts shall be supplied from dedicated supply risers separate from overhead sprinkler systems. Activation of the associated water flow switch shall shut down the fuel and/or electrical power supply to the associated cooking equipment and the makeup air supplied internally to the hood.

7.10.3.1

7.10.3.1 Unless the requirements of 7.10.3.2 or 7.10.3.4 are met, exhaust ducts shall have one sprinkler or automatic spray nozzle located at the top of each vertical riser, and at the midpoint of each offset, and an additional sprinkler shall be installed within the duct at 20-foot intervals on vertical risers where not otherwise provided with sprinklers due to offsets in buildings over two stories.

8.2.4

8.2.4 When acceptable to the authority having jurisdiction, Multiple buildings that are assigned the same street address, without independent building numbers, and are attached by canopies, covered breezeways, common roofs, or a common wall(s) shall be permitted to be supplied by a single fire sprinkler riser. The maximum system size shall comply with 8.2.1

8.2.6

8.2.6 In multi-story buildings, each story requires a separate system with control valve and water flow switch.

8.2.7

8.2.7 For tenant spaces adjacent to and having public access exclusively through an adjacent assembly space, such as tenant spaces adjacent to casinos, covered mall buildings, and other assembly spaces, the tenant spaces shall be provided with individual isolation control valves. For the purposes of this section, the isolation control valve does not define a separate sprinkler system, such that the overall size of the sprinkler system serving the tenant space(s) and adjacent spaces must meet size limitations of 8.2.1 when measured from the control valve located on the system riser.

8.3.3.1

8.3.3.1 Sprinklers in light hazard occupancies, shell buildings of combustible construction, casinos, and exhibition areas shall be one of the following:

- (1) Quick-response type as defined in 3.6.2.9
- (2) Residential sprinklers in accordance with the requirements of 8.4.5

- (3) Standard response sprinklers used for modifications or additions, within the existing compartment, to existing ~~light hazard~~ systems equipped with standard response sprinklers
- (4) Standard response sprinklers used where individual standard response sprinklers are replaced in existing ~~light hazard~~ systems

8.6.4.1.1.3

8.6.4.1.1.3 The requirements of 8.6.4.1.1.1 shall not apply for light and ordinary hazard occupancies with ceilings of noncombustible ~~or limited combustible~~ construction, as follows:

(A) Where there is a vertical change in ceiling elevation within the area of coverage of the sprinkler creates a distance of more than 36 in. (914 mm) between the upper ceiling and the sprinkler deflector, a vertical plane extending down from the ceiling at the change in elevation shall be considered a wall for the purpose of sprinkler spacing as shown in Figure 8.6.4.1.1.3(A).

(B) Where the distance between the upper ceiling and the sprinkler deflector is less than or equal to 36 in. (914 mm), the sprinklers shall be permitted to be spaced as though the ceiling was flat, provided the obstruction rules are observed as shown in Figure 8.6.4.1.1.3(B).

8.8.4.1.1.4

8.8.4.1.1.4 The requirements of 8.8.4.1.1.1 shall not apply for light and ordinary hazard occupancies with ceilings of noncombustible ~~or limited combustible~~ construction, as follows.

(A) Where there is a vertical change in ceiling elevation within the area of coverage of the sprinkler creates a distance of more than 36 in. (914 mm) between the upper ceiling and the sprinkler deflector, a vertical plane extending down from the ceiling at the change in elevation shall be considered a wall for the purpose of sprinkler spacing.

(B) Where the distance between the upper ceiling and the sprinkler deflector is less than or equal to 36 in. (914 mm), the sprinklers shall be permitted to be spaced as though the ceiling was flat, provided the obstruction rules and ceiling pocket rules are observed.

8.14.6

8.14.6 Pilot line detectors shall be permitted to be spaced more than 22 in. (559 mm) below a ceiling or deck where the maximum spacing between pilot line detectors is 10 ft (3 m) or less, and where such spacing is supported by an engineering analysis discussing sprinkler temperature and response rating, plume diameter, temperature within the plume that will pass across the sprinklers, and the expected fire size required to activate the pilot sprinklers.

8.15.1.2.1*

8.15.1.2.1* Concealed spaces of noncombustible ~~and limited combustible~~ construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. For purposes of this section, "construction" is limited to wall assemblies, floor assemblies, ceiling assemblies, and structural members.

8.15.1.2.1.2

8.15.1.2.1.2 Minor quantities of combustible materials limited to: cabling, nonmetallic piping conveying non-combustible liquids, and nonmetallic HVAC ductwork as expressly allowed by the current adopted building code, shall be permitted in concealed spaces constructed of non-combustible materials and shall not require sprinklers.

8.15.1.2.2

8.15.1.2.2 Concealed spaces of non-combustible and limited combustible construction with limited access and minimal combustible loading and not permitting occupancy or storage of combustibles shall not require sprinkler protection. For the purposes of this section, limited access does not include access to catwalks and mechanical mezzanines. Catwalks and mechanical mezzanines require sprinkler protection, which may be designed in accordance with 8.15.1.5. Additionally, "construction" is limited to wall assemblies, floor assemblies, ceiling assemblies, and structural members.

8.15.1.2.10

~~**8.15.1.2.10** Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less, and the materials have been demonstrated not to propagate fire when tested in accordance with NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials, extended for an additional 20 minutes in the form in which they are installed, shall not require sprinkler protection.~~

8.15.1.2.11

~~**8.15.1.2.11** Concealed spaces in which the exposed materials are constructed entirely of fire retardant treated wood as defined by NFPA 703, Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials, shall not require sprinkler protection.~~

8.15.1.2.16

8.15.1.2.16 Concealed spaces formed by noncombustible ~~or limited combustible~~ ceilings suspended from the bottom of wood joists, composite wood joists, wood bar joists, or wood trusses that have insulation filling all of the gaps between the bottom of the trusses or joists, and where sprinklers are present in the space above the installation within the trusses or joists, shall not require sprinklers.

8.15.1.2.17

8.15.1.2.17 Concealed spaces formed by noncombustible ~~or limited combustible~~ ceilings suspended from the bottom of wood joists and composite wood joists with a maximum nominal chord width of 2 in. (50.8 mm), where joist spaces are full of noncombustible batt insulation with a maximum 2 in. (50.8 mm) air space between the roof decking material and the top of the batt insulation. Facing that meets the requirements for noncombustible ~~or limited combustible~~ material covering the surface of the bottom chord of each joist and secured in place per the

8.15.5.1

8.15.5.1 Sidewall spray sprinklers shall be installed at the bottom of each elevator hoistway not more than 2 ft (0.61 m) above the floor of the pit. Sprinklers are prohibited at the top of the hoistway and in the machine room, unless otherwise approved by the Authority Having Jurisdiction.

8.15.5.2

~~8.15.5.2~~ The sprinkler required at the bottom of the elevator hoistway by 8.15.5.1 shall not be required for enclosed, noncombustible elevator shafts that do not contain combustible hydraulic fluids.

8.15.5.3

~~8.15.5.3~~ Automatic sprinklers in elevator machine rooms or at the tops of hoistways shall be of ordinary or intermediate temperature rating.

8.15.5.4

~~8.15.5.4~~ Upright, pendant, or sidewall spray sprinklers shall be installed at the top of elevator hoistways.

8.15.5.5

8.15.5 Elevator Hoistways and Machine Rooms

~~8.15.5.1~~ Sidewall spray sprinklers shall be installed at the bottom of each elevator hoistway not more than 2 ft (0.61 m) above the floor of the pit. Sprinklers are prohibited at the top of the hoistway and in the machine room, unless otherwise approved by the Authority Having Jurisdiction.

~~8.15.5.2~~ Automatic sprinklers shall be installed in elevator machine rooms containing hydraulic fluids. The sprinkler required at the bottom of the elevator hoistway by 8.15.5.1 shall not be required for enclosed, noncombustible elevator shafts that do not contain combustible hydraulic fluids.

~~8.15.5.3~~ Automatic sprinklers in elevator machine rooms or at the tops of hoistways shall be of ordinary or intermediate-temperature rating.

~~8.15.5.4~~ Upright, pendant, or sidewall spray sprinklers shall be installed at the top of elevator hoistways.

~~8.15.5.5~~ The sprinkler required at the top of the elevator hoistway by 8.15.5.4 shall not be required where the hoistway for passenger elevators is noncombustible or limited combustible and the car enclosure materials meet the requirements of ASME A17.1, *Safety Code for Elevators and Escalators*.

~~8.15.5.6~~ Sprinklers shall be installed at the top and bottom of elevators that utilize polyurethane-coated steel belts or other similar combustible belt material.

8.15.5.6

~~8.15.5.6~~ Sprinklers shall be installed at the top and bottom of elevators that utilize polyurethane-coated steel belts or other similar combustible belt material.

8.15.7.1

~~8.15.7.1~~ Unless the requirements of 8.15.7.2, ~~8.15.7.3~~, or 8.15.7.4 are met, sprinklers shall be installed under exterior roofs, canopies, porte-cocheres, balconies, decks, or similar projections exceeding 4 ft (1.2 m) in width

8.15.7.2

Chapter 8.15.7 Exterior roofs; canopies of porte-cochere

8.15.7.1 Unless the requirements of 8.15.7.2, ~~8.15.7.3~~, or 8.15.7.4 are met, sprinklers shall be installed under exterior roofs, canopies, porte-cocheres, balconies, decks, or similar projections exceeding 4 ft (1.2 m) in width

8.15.7.2 Sprinklers shall be permitted to be omitted where the canopy, or roof, ~~or porte-cochere~~ is constructed entirely with materials that are noncombustible, ~~limited combustible, or fire retardant treated wood as defined in NFPA 703, Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials, and~~ where the canopy or roof, ~~or porte-cochere~~ does not support occupancy above.

8.15.7.3 ~~Sprinklers shall be permitted to be omitted from below the canopy, roof, or porte-cochere of combustible construction, provided the exposed finish material on the roof, canopy, porte-cocheres, balconies, decks, or similar projections of combustible construction, provided the exposed finish material on the roofs, canopies, or porte-cocheres are non-combustible, limited combustible, or fire retardant treated wood as defined in NFPA 703, Standard for Fire Retardant Wood and Fire Retardant Coatings for Building Materials, and the roof, canopy, or porte-cochere contains only sprinklered concealed spaces or any of the following unsprinklered combustible concealed spaces:~~

- ~~(1) Combustible concealed spaces filled entirely with noncombustible insulation~~
- ~~(2) Light or ordinary hazard occupancies where noncombustible or limited combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.5 m³) or less in volume, including space below the insulation that is laid directly on top or within the ceiling joists in an otherwise sprinklered attic [See 11.2.3.1.4(4)(d)].~~
- ~~(3) Concealed spaces over isolated small roofs, canopies, or porte-cocheres not exceeding 55ft² (5.1m²) in area~~

8.15.7.3

8.15.7.3 ~~Sprinklers shall be permitted to be omitted from below the canopies, roofs, porte-cocheres, balconies, decks, or similar projections of combustible construction, provided the exposed finish material on the roof, canopy, porte-cocheres, balconies, decks, or similar projections of combustible construction, provided the exposed finish material on the roofs, canopies, or porte-cocheres are non-combustible, limited combustible, or fire retardant treated wood as defined in NFPA 703, Standard for Fire Retardant Wood and Fire Retardant Coatings for Building Materials, and the roofs, canopies, or porte-cocheres contains only sprinklered concealed spaces or any of the following unsprinklered combustible concealed spaces:~~

- ~~(4) Combustible concealed spaces filled entirely with noncombustible insulation~~
- ~~(5) Light or ordinary hazard occupancies where noncombustible or limited combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.5 m³) or less in volume, including space below the insulation that is laid directly on top or within the ceiling joists in an otherwise sprinklered attic [See 11.2.3.1.4(4)(d)].~~
- ~~(6) Concealed spaces over isolated small roofs, canopies, or porte-cocheres not exceeding 55ft² (5.1m²) in area~~

8.15.8.1.1

8.15.8.1.1 Sprinkler protection shall be provided in all bathrooms. Unless sprinklers are required by 8.15.8.1.2 or 8.15.8.1.3, sprinklers shall not be required in bathrooms that are located within dwelling units, that do not exceed 55 ft² (5.1m²) in area, and that have walls and ceilings of noncombustible or limited combustible materials with a 15 minute thermal barrier rating, including the walls and ceilings behind any shower enclosure or tub.

8.15.8.2

8.15.8.2 Closets and Pantries. Sprinklers protection shall be ~~are not required~~ provided in clothes closets, linen closets, and pantries, within dwelling units in hotels and motels where the area of the space does not exceed 24 ft² (2.2 m²), the least dimension does not exceed 3 feet (0.9 m), and the walls and ceilings are surfaced with noncombustible or limited combustible materials.

8.15.10.1

8.15.10.1 Unless the requirements of 8.15.10.3 are met, Sprinkler protection shall be required in electrical equipment rooms.

8.15.10.3

8.15.10.3 Sprinklers shall not be required in electrical equipment rooms where all of the following conditions are met:

- (1) The room is dedicated to electrical equipment only
- (2) Only dry type electrical equipment is used.
- (3) Equipment is installed in a 2-hour fire-rated enclosure including protection for penetrations.
- (4) No combustible storage is permitted to be stored in the room.

8.15.14.1

8.15.14.1 Drop-out ceilings shall be permitted to be installed beneath sprinklers where ceilings are listed for that service and are installed in accordance with their listings. Drop-out ceilings are not permitted to be installed beneath fire sprinklers.

8.15.14.2

8.15.14.2 Drop-out ceilings shall not be installed below quick response or extended coverage sprinkler unless specifically listed for that application.

8.15.14.3

8.15.14.3 Drop-out ceilings shall not be considered ceilings within the context of this standard.

8.15.14.4

8.15.14.4 Piping installed above drop-out ceilings shall not be considered concealed piping.

8.15.19.1.1

8.15.19.1.1 Unless hydraulically calculated, each one-inch outlet shall supply a maximum of one sprinkler head providing protection below a ceiling, and if necessary, a maximum of one head above the ceiling. Such sprinkler head(s) shall have a k-factor equal to the k-factor of existing upright sprinklers.

8.15.19.1.2

8.15.19.1.2 Unless otherwise hydraulically calculated, a one-inch outlet shall be allowed to supply a maximum of two sprinkler heads where the two sprinkler heads protect areas that are physically separated by a ceiling, walls and/or doors with a minimum lintel depth of 8 in (203 mm) and maximum total area of door openings into the room of 50 ft² (4.6 m²). The sprinklers shall have a k-factor equal to the k-factor of existing upright sprinklers.

8.15.19.1.3

8.15.19.1.3 When approved sprinkler heads installed under a ceiling may have a k factor less than the overhead sprinklers, provided the occupancy hazard classification for the area under the ceiling is less than the classification that the overhead sprinklers are designed for.

8.15.19.1.4

8.15.19.1.4 Flexible sprinkler hose drops shall be proven by hydraulic calculations.

8.15.22.3

8.15.22.3 Where there is a noncombustible space above a noncombustible or limited-combustible drop ceiling that is sprinklered because it is open to an adjacent sprinklered space on only one side and where there is no possibility for storage above the drop ceiling, the sprinkler system shall be permitted to extend only as far into the space as 0.6 times the square root of the design area of the sprinkler system in the adjacent space.

8.15.23

8.15.23 Openings in Rated Assemblies. Where sprinkler protection is serving as the alternative to opening protection in rated assemblies, such sprinklers shall be listed for use, and installed in accordance with their listing.

8.16.1.1.1.4

8.16.1.1.1.4 Valve rooms shall be lighted and heated.

8.16.1.1.1.5

8.16.1.1.1.5 The source of heat shall be of a permanently installed type.

8.16.1.1.1.6

8.16.1.1.1.6 Heat tape shall not be used in lieu of heated valve enclosures to protect the valve and supply pipe against freezing.

8.16.1.1.2.1

8.16.1.1.2.1 Valves on connections to water supplies, sectional control and isolation valves, and other valves in supply pipes to sprinkler and other fixed water-based fire suppression systems shall be electrically supervised by a ~~one of the following methods:~~

- ~~(1) Central station, proprietary, or remote station signaling service~~
- ~~(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended point~~
- ~~(3) Valves locked in the correct position~~
- ~~(4) Valves located within fenced enclosures under the control of the owner, sealed in the open position, and inspected weekly as part of an approved procedure~~

8.16.1.1.2.3

8.16.1.1.2.3 The requirements of 8.16.1.1.2.1 shall not apply to underground gate valves with roadway boxes or to valves at backflow prevention devices at the municipal water supply connection where the valves are locked in the open position.

8.16.4.1.6

8.16.4.1.6 Design Temperature and Duration. The minimum criteria for an engineered solution in calculating heat loss for the requirement to maintain 40°F (4.4°C) shall be 0° F (-17.8°C) for 8 hours. The initial starting temperature of the water shall be no greater than 50°F (10°C).

8.17.1.1

8.17.1.1. Local Waterflow Alarms Units. A local waterflow alarm unit shall be provided on every sprinkler system having more than 20 sprinklers. Such waterflow alarm units shall be installed in accordance with 6.9.

8.17.2.3

8.17.2.3 Size. The size of the pipe for the fire department connection shall be in accordance with one of the following:

- (1) Pipe size shall be a minimum of 4 in. (100 mm) for fire engine connections when the fire department connection has three or fewer 2-1/2 in (65 mm) inlets, and shall be a minimum of 6 in. (150 mm) for fire engine connections when the fire department connection has four or more 2-1/2 in (65 mm) inlets.
- (2) Pipe size shall be a minimum of 6 in. (150 mm) for fire boat connections.
- (3) For hydraulically calculated systems the fire department connection shall be permitted to be less than 4 in. (100 mm) and no less than the size of system riser, where serving one system riser.

8.17.2.7

8.17.2.7 The fire department connection shall be located not less than 18 in (457 mm) and not more than 4 ft (1.2 m) above the level of the adjacent grade or access level.

9.1.3.9.3

9.1.3.9.3 Powder-driven fasteners shall be allowed for branch lines less than or equal to 2 in. (50 mm) pipe. Representative samples of concrete into which studs are to be driven shall be tested to determine that the studs will hold a minimum load of 750 lb (341 kg) for 2 in. (50 mm) or smaller pipe; 1000 lb (454 kg) for 2 ½ in., 3 in., 3 ½ in. (65 mm, 80 mm, or 90 mm) pipe; and 1200 lb (545 kg) for 4 in. or 5 in. (100 mm or 125 mm) pipe.

9.1.3.9.4

9.1.3.9.4 Increaser couplings shall not be permitted with ~~be attached directly to the~~ powder-driven studs.

9.2.1.3.3.4

9.2.1.3.3.4 Where flexible sprinkler hose fittings are supported by a ceiling that does not meet design and installation criteria set forth in 9.2.1.3.3.2, such fitting shall be provided with hangers in accordance with 9.2.3.5, unless the flexible hose fitting is provided with a hanger assembly specifically approved by a Nationally Recognized Testing Laboratory for both the flexible sprinkler hose fitting and the specific method of installation.

9.3.5.6.2

9.3.5.6.2 The horizontal force, F_{pw} , acting on the brace shall be taken as $F_{pw} = C_p W_p$, where C_p is the seismic coefficient selected in Table 9.3.5.6.2 utilizing the short period response parameter S_s . The value of S_s used in Table 9.3.5.6.2 shall be 0.95 obtained from the authority having jurisdiction or derived from seismic hazard data from the U.S. Geological Survey using ASCE Standard 7, 2005 edition. Linear interpolation shall be permitted to be used for intermediate values of S_s .

10.1.5

10.1.5 Working Pressure. Pipe shall be designed to withstand a system working pressure of not less than 150 psi (10.3 bar). When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 200), or 50 psi greater than the FDC design pressure, whichever is greater.

11.2.3.1.4(4)

11.2.3.1.4 (4) The following unsprinklered concealed spaces shall not require a minimum area of sprinkler operation of 3000 ft² (279 m²):

11.2.3.1.4(4)(a) ~~Noncombustible and limited combustible~~ concealed spaces with minimal combustible loading having no access. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

11.2.3.1.4(4)(b) ~~Noncombustible and limited combustible~~ concealed spaces with limited access and not permitting occupancy or storage of combustibles. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

11.2.3.1.4(4)(c) (No Change)

11.2.3.1.4(4)(d) ~~Light or ordinary hazard occupancies where noncombustible or limited combustible~~ ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.8 m³) or less in volume, including space below insulation that is laid directly on top or within the ceiling joist in an otherwise sprinklered attic.

11.2.3.1.4(4)(e) ~~Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less and the materials have been demonstrated to not propagate fire when tested in accordance~~

with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed in the space.

11.2.3.1.4(4)(f) ~~Concealed spaces in which the exposed materials are constructed entirely of fire-retardant treated wood as defined by NFPA 703, *Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials*.~~

11.2.3.1.4(4)(g) (No Change)

11.2.3.1.4(4)(h) (No Change)

11.2.3.1.4(4)(i) (No Change)

11.2.3.1.4(4)(j) Light or ordinary hazard occupancies where non-combustible ~~or limited-combustible~~ ceilings are attached to the bottom of composite wood joists either directly or on to metal channels not exceeding 1 in. (25.4 mm) in depth, provided the adjacent joist channels are firestopped into volumes not exceeding 160 ft³ (4.5 m³) using materials equivalent to ½ in. (12.7 mm) gypsum board and at least 3 ½ in. (90 mm) of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels.

11.3.1.1

11.3.1.1 The design area shall be ~~the area that includes the four adjacent sprinklers that produce the greatest hydraulic demand in accordance with either 11.2.3.2 or 11.2.3.3.~~

11.3.1.3

11.3.1.3 Unless the requirements of 11.3.1.4 are met, the minimum required discharge from each ~~of the four most demanding sprinklers~~ sprinkler shall be the greater of the following:

- (1) In accordance with the minimum flow rates indicated in the individual listings
- (2) Calculated based on delivering a minimum of 0.1 gpm/ft² (4.1 mm/min) over the design area in accordance with the provisions of 8.5.2.1 or 8.6.2.1.2.

11.3.3

11.3.3.1; Sprinklers in a water curtain such as described in 8.15.4 ~~or 8.15.16.2 or 8.15.23~~ shall be hydraulically designed to provide a discharge of 3 gpm per lineal foot (37 L/min per lineal meter) of water curtain, with no sprinklers discharging less than 15 gpm (56.8 L/min) or per the listing requirements of the specific head being used.

11.3.3.3

11.3.3.3 ~~If a single fire can be expected to operate sprinklers within the water curtain and within the design area of a hydraulically calculated system,~~ The water supply to the water curtain shall be added to the water demand of the hydraulic calculations and be balanced to the calculated area demand.

11.3.4

11.3.4 NONSTORAGE OCCUPANCIES WITH HIGH CEILINGS

11.3.4.1 Light and Ordinary Hazard Group 1 and 2 Occupancies with ceiling heights between 25 and 50 feet. Light and Ordinary Hazard 1 and 2 occupancies shall be designed to provide a minimum density of 0.10 gpm/ft², 0.15

gpm/ft² and 0.20 gpm/ft² respectively. The minimum design area shall be equal to the ceiling height times 100. The sprinkler system shall utilize listed quick response sprinklers with a K-factor of 11.2 or greater. The maximum sprinkler discharge pressure allowed is 30 psi.

11.3.4.2 Non-storage occupancies with ceiling heights over 50 feet. All structures, regardless of occupancy or hazard classification, with ceiling heights exceeding 50'-0", require a design analysis from a licensed Fire Protection Engineer. This analysis must be submitted to the Authority Having Jurisdiction for review and approval prior to the start of construction. Deluge systems shall be installed using sprinklers with a minimum k-factor of 11.2 with a maximum sprinkler discharge pressure of 30 psi.

11.3.4.3 Extra Hazard Occupancies with ceiling height over 25 feet. Extra Hazard occupancies with ceiling heights over 25 feet require a design analysis from a licensed Fire Protection Engineer. This analysis must be submitted to the Authority Having Jurisdiction for review and approval prior to the start of construction.

11.3.4.4 Exhibition Spaces and Stages with Fly Galleries. For design criteria for Exhibition Spaces and Stages with Fly Galleries, see Section 11.3.5.

11.3.5

11.3.5 SPRINKLER PROTECTION FOR EXHIBITION SPACES AND STAGES WITH FLY GALLERIES

11.3.5.1 Exhibition Spaces and Stages with Fly Galleries with ceiling heights up to 35 feet. Sprinkler systems protecting exhibition spaces and stages with fly galleries with ceiling heights up to 35 feet shall be designed to provide a minimum density of 0.30 gpm/ft². The minimum design area shall be 2,500 square feet. The sprinkler system shall utilize standard coverage quick response sprinklers with a k-factor of 8.0 or greater. The maximum sprinkler discharge pressure allowed is 30 psi. A hose stream demand of 500 gpm shall be provided.

11.3.5.2 Exhibition Spaces and Stages with Fly Galleries with ceiling heights between 35 and 60 feet. Sprinkler systems protecting exhibition spaces and stages with fly galleries with ceiling heights between 35 and 60 feet shall be designed to provide a minimum density of 0.45 gpm/ft². The minimum design area shall be 2,500 square feet. The sprinkler system shall utilize standard coverage quick response sprinklers with a k-factor of 11.2 or greater. The maximum sprinkler discharge pressure allowed is 30 psi. A hose stream demand of 500 gpm shall be provided.

11.3.5.3 Exhibition Spaces and Stages with Fly Galleries ceiling heights over 60 feet. Exhibition spaces and stages with fly galleries with ceiling heights exceeding 60'-0", require a design analysis from a licensed Fire Protection Engineer. This analysis must be submitted to the Authority Having Jurisdiction for review and approval prior to the start of construction. Deluge systems shall be installed using standard coverage sprinklers with a minimum k-factor of 11.2 with a maximum sprinkler discharge pressure of 30 psi. A hose stream of 500 gpm shall be provided.

12.9.2

12.9.2 The following unsprinklered concealed spaces shall not require a minimum area of sprinkler operation of 3000 ft² (279 m²):

12.9.2(1) Noncombustible ~~and limited-combustible~~ concealed spaces with minimal combustible loading having no access. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

12.9.2(2) Noncombustible ~~and limited-combustible~~ concealed spaces with limited access and not permitting occupancy or storage of combustibles. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

12.9.2(3) (No Change)

12.9.2(4) Light or ordinary hazard occupancies where noncombustible ~~or limited-combustible~~ ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.8 m³) or less in volume, including space below insulation that is laid directly on top or within the ceiling joist in an otherwise sprinklered attic.

12.9.2(5) ~~Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less and the materials have been demonstrated to not propagate fire when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed in the space.~~

12.9.2(6) ~~Concealed spaces in which the exposed materials are constructed entirely of fire retardant treated wood as defined by NFPA 703, *Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials*.~~

12.9.2(7) (No Change)

12.9.2(8) (No Change)

12.9.2(9) (No Change)

12.9.2(10) Light or ordinary hazard occupancies where non-combustible ~~or limited-combustible~~ ceilings are attached to the bottom of composite wood joists either directly or on to metal channels not exceeding 1 in. (25.4 mm) in depth, provided the adjacent joist channels are firestopped into volumes not exceeding 160 ft³ (4.5 m³) using materials equivalent to ½ in. (12.7 mm) gypsum board and at least 3 ½ in. (90 mm) of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels.

21.15.2.2.1.3.3

21.15.2.2.1.3.3 Chute Sprinkler Supply. Sprinklers serving chutes shall be on separate dedicated supply risers.

21.38

21.38 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC. CM

21.38 Mitigation Protection Matrix for Group R Division 3 Occupancies CM and buildings built under the IRC. When a sprinkler system is being upgraded to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the sprinkler system shall be designed in accordance with section 21.38.2.

Table 21.38.1 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC⁴

Building Area Size Range ⁶	PROTECTION RESIDENTIAL SYSTEM TYPE^{1,3}	SEPARATE SPRINKLER LEAD-IN REQUIRED ⁵	MINIMUM UNDERGROUND PIPE SIZE ⁵	MINIMUM WATER SIZE⁷	METER	SPRINKLERS REQUIRED IN AREAS SUBJECT TO FREEZING.
<3,600 sq ft	Standard NFPA 13D ²	See NFPA 13D for design requirements.				
≥3,600 sq ft & <10,000 sq ft	Enhanced NFPA 13D ^{1,2}	See NFPA 13D for design requirements				
≥10,000 sq ft & <15,000 sq ft	Enhanced NFPA 13R ¹	See NFPA 13R for design requirements				
≥ 15,000 sq ft	Modified NFPA 13 ¹	Yes	N/A	N/A		Yes

N/A = Not Applicable

1. This protection constitutes a building "protected with an approved fire sprinkler system" per the IFC.
2. Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
3. Free-standing detached guest houses or garages shall be protected by a minimum Enhanced NFPA 13D system.
4. Excluding Group R Division 3 Occupancies and buildings built under the IRC used as Group Care Homes.
5. U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
6. Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte cocheres.
7. Water meters used for residential sprinkler systems shall be residential fire service meters or other meters approved by the water purveyor.

21.38.2 Modified 13 Design Criteria. When Table 21.38.1 requires a Modified 13 Design, the sprinkler system shall be installed to meet the requirements of this code, with the exception of the following items:

1. **Fire Department Connections (FDC):** A 2½-inch fire department connection is required. A single snoot connection will be accepted. The FDC shall be located on the garage wall facing the street except for special circumstances where the FDC may be freestanding and located adjacent to the street or private drive. A freestanding FDC in these circumstances may be designed into the mailbox column.

2. **Riser Room:** Risers shall be located in either the garage or within a dedicated room with an exterior door. Provided the garage/room is fully insulated the requirement for maintaining 40°F will not require a source of heat.
3. **Inspectors Test Connection:** The inspectors test location may be piped off the system riser.
4. **Piping in locations less than 40°F:** Dry pipe systems are not permitted for the protection of living spaces, anti-freeze systems shall be used. The protection of non-living spaces such as attics may be protected by dry-pipe systems.
5. **Anti-Freeze Loops:** The capacity shall not exceed 80 gallons.
6. **Separate Water Supply:** A separate water lead-in for the fire sprinkler system along with an approved (by the local water authority) back-flow prevention device is required. The back-flow prevention device shall be located at the street with in an approved insulated enclosure. The lead-in shall be sized using the minimum pipe size available that provides the calculated flow.
7. **Control Valves:** All valves used to control the sprinkler system are required to be indicating. A Post Indicator Valve (PIV) is not permitted.
8. **Electrical Supervision:** When required by the *fire code official*, the main control valves shall be electrically supervised. The back-flow valves are not required to be electrically supervised.
9. **Fire Pumps:** Electric fire pumps normally accepted in NFPA –13D systems for residential use (UL listed jockey pump) are acceptable.
10. **Notification Devices:** Interior – One (1) interior horn/strobe shall be installed in a location specified by the homeowner. Exterior – One (1) exterior horn/strobe shall be located above the FDC or other acceptable location. The sprinkler flow switch shall activate both of the required devices.
11. **Residential Sprinkler Heads:** Residential sprinkler heads shall be utilized and the design allowances specified in section 11.2.3.2.3.1 (reduction to design area) may be applied.
12. **Hangers and Earthquake Bracing:** The hanging of sprinkler pipe shall be in accordance Chapter 9. Earthquake bracing is not required.
13. **Garages:** Garages shall be classified as Ordinary Hazard Group I. Commercial style QR sprinkler heads are required.
14. **Location of Sprinklers:** Sprinklers shall be installed in all areas except where omissions are permitted as follows:
 - a. Inaccessible attic spaces, Less than 15,000 sq ft.
 - b. Exterior overhangs, porches, and carports.
 - c. Rooms not provided with environmental control.

21.38.3 Other Protection Designs: For the other protection designs listed in Table 21.37.1, see the respective revised codes for NFPA 13D and NFPA 13R design requirements.

22.1.3

22.1.3 Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following list that pertain to the design of the system:

- (1) Name of owner and occupant
- (2) Location, including street address
- (3) Point of compass
- (4) Full height cross section, or schematic diagram, including structural member information is required for clarify and including ceiling construction and method of protection for nonmetallic piping
- (5) Ceiling/roof heights and slopes not shown in the full height cross section
- (6) Location of partitions

- (7) Location of fire walls
- (8) Occupancy class, label and name of ~~each~~ all areas or rooms
- (9) Location and size of concealed spaces, closets, attics, and bathrooms
- (10) Any small enclosures in which no sprinklers are to be installed
- (11) Size of city main in street and whether dead end or circulating; if dead end, direction and distance to nearest circulating main; and city main test results and system elevation relative to test hydrant (see A.23.1.8)
- (12) Other sources of water supply, with pressure and elevation
- (13) Make, type, model, and nominal K-factor of sprinklers including sprinkler identification number
- (14) Temperature rating and location of high-temperature sprinklers
- (15) Total area protected by each system on each floor
- (16) Number of sprinklers on each riser per floor
- (17) Total number of sprinklers on each dry pipe system, preaction system, combined dry pipe-preaction system, or deluge system
- (18) Approximate capacity in gallons of each dry pipe system
- (19) Pipe type and schedule of wall thickness
- (20) Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions). Where typical branch lines prevail, it shall be necessary to size only one typical line
- (21) Location and size of riser nipples
- (22) Type of fittings and joints and location of all welds and bends. The contractor shall specify on drawing any sections to be shop welded and the type of fittings or formations to be used
- (23) Type and locations of hangers, sleeves, braces, and methods of securing sprinklers when applicable
- (24) All control valves, check valves, drain pipes, and test connections
- (25) Make, type, model, and size of alarm or dry pipe valve
- (26) Make, type, model, and size of preaction or deluge valve
- (27) Kind and location of alarm bells
- (28) Size and location of standpipe risers, hose outlets, hand hose, monitor nozzles, and related equipment
- (29) Private fire service main sizes, lengths, locations, weights, materials, point of connection meters, and valve pits; and the depth that the top of the pipe is laid below grade
- (30) Piping provisions for flushing
- (31) Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear
- (32) For hydraulically designed systems, the information on the hydraulic data nameplate
- (33) A graphic representation of the scale used on all plans
- (34) Name, ~~and~~ address, phone number, and contractor's license number of sprinkler contractor
- (35) Nevada State Fire Marshal registration number
- (36) Signature and NICET number, or engineer's seal, of the designer
- (37) General notes as required by the AHJ
- (38) Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets
- (39) The minimum rate of water application (density or flow or discharge pressure), the design area of water application, in-rack sprinkler demand, and the water required for hose streams both inside and outside
- (40) The total quantity of water and the pressure required noted at a common reference point for each system
- (41) Relative elevations of sprinklers, junction points, and supply or reference points
- (42) If room design method is used, all unprotected wall openings throughout the floor protected
- (43) Calculation of loads for sizing and details of sway bracing
- (44) The setting for pressure-reducing valves
- (45) Information about backflow preventers (manufacturers, size, type)
- (46) Information about antifreeze solution used (type and amount)
- (47) Size and location of hydrants, showing size and number of outlets and if outlets are to be equipped with independent gate valves. Whether hose houses and equipment are to be provided, and by whom, shall be indicated. Static and residual hydrants that were used in the flow tests shall be shown
- (48) Utility plans and/or plumbing plans necessary to show connection from water supply to fire sprinkler system

- (49) Size, location, and piping arrangement of fire department connections
- (50) Ceiling/roof heights and slopes not shown in the full height cross section
- (51) Edition year of NFPA 13 that the sprinkler system is designed to.

22.2.1

22.2.1 Water Supply Capacity Information. Water supply information shall only be valid for a period of 6 months from the date the flow test was conducted to the initial submittal. The following information shall be included:

- (1) Location and elevation of static and residual test gauge with relation to the riser reference point
- (2) Flow location
- (3) Static pressure, psi (bar)
- (4) Residual pressure, psi (bar)
- (5) Flow, gpm (L/min)
- (6) Date
- (7) Time
- (8) ~~Test conducted by or information supplied by.~~ Flow tests shall be witnessed by the Authority Having Jurisdiction
- (9) Other sources of water supply, with pressure or elevation

22.2.1.1

22.2.1.1 Where a water flow test is used for the purposes of system design, the test shall be conducted no more than 6 ~~12~~ months prior to working plan submittal.

22.4.1.6

22.4.1.6 The maximum velocity for use in hydraulic calculations shall be 32 ft/sec (9.8 m/sec).

22.4.1.7

22.4.1.7 Hydraulically calculated fire sprinkler systems shall be designed to ensure the required system pressure is a minimum of ten (10) psi below the available supply pressure.

24.2.3.2.2

24.2.3.2.2 The test shall measure the time to trip the valve and the time for water to be discharged from the inspector's test connection. The flow from the inspector's test shall be predominantly continuously flowing water with small amounts of air permitted. All times shall be measured from the time the inspector's test connection is completely opened.

24.2.3.2.2.1

24.2.3.2.2.1 Dry systems calculated for water delivery in accordance with 7.2.3.6 shall be required to prove the exempt from any specific water delivery time requirement set forth in 7.2.3.5 and 7.2.3.7.

24.5.1

24.5.1 The installing contractor shall identify a hydraulically designed sprinkler system with a machine-engraved permanently-marked weatherproof metal or rigid plastic sign with capitalized lettering a minimum 14 point (¼ inch high) in Arial or similar font secured to the riser it serves with corrosion-resistant wire, chain, or other ~~approved~~ means approved by the AHJ. Such signs shall be placed at the alarm valve, dry pipe valve, preaction valve, or deluge valve supplying the corresponding hydraulically designed area. Signs located at the system control riser shall be allowed to be combined with the General Information Sign described in 24.6.

24.6.1

24.6.1 The installing contractor shall provide a general information sign used to determine system design basis and information relevant to the inspection, testing, and maintenance requirements required by NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

24.6.1.1 Such general information shall be provided with a ~~permanently-marked~~ machine-engraved weatherproof metal or rigid plastic sign with capitalized lettering a minimum 14 point (¼ inch high) in Arial or similar font, secured with corrosion resistant wire, chain, or other acceptable means.

24.6.1.2 Such signs shall be placed at each system control riser, antifreeze loop, and auxiliary system control valve. Signs located at the system control riser shall be allowed to be combined with the Hydraulic Design Information Sign described in 24.5.

NFPA 13D

1.1

1.1 This standard shall cover the design and installation of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.

When sprinkler protection is being provided to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the minimum design criteria shall be as outlined in Section 8.7 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC.

3.3.9.3

3.3.9.3 Flush Multipurpose Piping System. A piping system, other than a network system, intended to serve ~~both~~ one or more domestic toilet fixture(s) and fire protection needs.

3.3.9.4

3.3.9.4 Network System. A type of multipurpose system utilizing a common piping system supplying all domestic fixtures and fire sprinklers ~~where each sprinkler is supplied by a minimum of three separate paths.~~

4.1.1

4.1.1 The installer shall provide to the owner/occupant instructions on inspecting, testing, and maintaining the system. The instructions shall be attached to the riser or the inside of the panel access door. The instructions shall be weatherproof.

4.7

4.7 Working Plans ~~Documentation~~

Documentation shall be available on request to ensure adequate water supply, listed devices, and adequate sprinkler coverage have been addressed.

Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, and shall show those items from the following list that pertain to the design of the system:

1. Name of owner.
2. Location, including street address.
3. Point of compass.
4. Full height cross section.
5. Ceiling/roof heights and slopes not shown in the full height cross section.
6. Location of partitions, lintels, and doorways. Lintel openings require a cross section view to indicate the area of the opening.
7. Name and label for each area or room.
8. For systems supplied by city mains, location and size of city main in street, and location, size, and type of domestic line, including length to city connection, and water meter location and size. Static and residual hydrants that were used in flow tests shall be shown. The location of the 5 gpm domestic demand shall be indicated.
9. Make, type, model, temperature rating, nominal K-factor, and number of each type of sprinkler, including sprinkler identification number.
10. Pipe type and schedule of wall thickness.
11. Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions). Where typical branch lines prevail, it shall be necessary to size only one typical line.
12. Location and size of riser nipples and drops.
13. Type of fittings and joints.
14. Type and locations of hangers, and methods of securing sprinklers when applicable.
15. Location and size of all valves and drain pipes.
16. Location and size of water gauges.
17. Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear.
18. A summary of the hydraulics, including the static pressure, residual pressure, and flow of the water supply, the pressure and flow demands at the point of connection to the water supply, and the pressure and flow demands at the bottom of the system riser.
19. Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets.
20. Relative elevations of sprinklers, junction points, and supply or reference points.
21. A graphic representation of the scale used on all plans.
22. Name, address, phone number, and contractor's license number of contractor.
23. Nevada State Fire Marshal registration number.
24. Signature and NICET number, or engineer's seal, of the designer.
25. Indicate by note the minimum rate of water application per sprinkler head, the maximum spacing for each head, and the domestic demand.
26. Information about antifreeze solution used. Indicate the type of antifreeze used, the amount of antifreeze in the system, and information about antifreeze compatibility with the pipe.
27. General notes as required by the AHJ.
28. Edition year of NFPA 13D to which the sprinkler system is designed.

29. Utility plans and/or plumbing plans necessary to show connection from water supply to fire sprinkler system.

6.2.3.1

6.2.3.1 The control valve shall be required ~~permitted~~ to serve the domestic water supply.

6.3.1

6.3.1 A multipurpose piping system shall be installed in accordance with 6.3.2 through ~~6.5.4~~

6.3.1.1

6.3.1.1 All one and two-family dwellings sprinkler systems supplied by the water purveyor shall be multi-purpose, in accordance with this section. This requirement applies both to systems fed with a single-outlet water meter and to systems fed with a dual-outlet water meter, which may be required by the water purveyor.

6.5

~~6.5 Common Supply Piping~~ Flush Multipurpose Systems. Flush multipurpose systems shall supply a minimum of one toilet fixture. These systems may be used both with a single-outlet meter or a dual-outlet water meter, which may be required by the water purveyor. Such systems shall be considered acceptable by this standard where designed in accordance with 6.5.1 through 6.5.7.

~~6.5.1 Where common supply pipes serve both fire sprinkler and domestic use, they shall comply with 6.5.2 through 6.5.4. An accessible check valve shall be installed on the fire sprinkler riser to maintain system pressure.~~

~~6.5.2 In common water supply connections serving more than one dwelling unit, 5 gpm (19 L/min) shall be added to the sprinkler system demand to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler. A minimum demand of 5 gpm (19 L/min) shall be added to the sprinkler system demand at the discharge side of the water meter to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.~~

~~6.5.3 Where a single-outlet meter is provided, a common underground supply for both domestic and fire sprinkler needs is permitted. No separate control valve controlling only the fire sprinkler system shall be permitted. The domestic supply shall serve all domestic fixtures except for the toilet in the master bathroom.~~

~~6.5.3 A warning sign, with minimum 1/4 in. (6.4 mm) letters, shall be affixed adjacent to the main shutoff valve and state the following:~~

~~**Warning:** The water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign.~~

~~6.5.4 Where a dual-outlet meter is provided, the fire sprinkler system shall be piped separately from the domestic system starting at the discharge side of the water meter. There shall be no separate control valve that controls only~~

the fire sprinkler system (See UDACS for details). The domestic supply shall serve all hot water fixtures, and all cold water fixtures except for the toilet in the master bathroom.

i. ~~Where water treatment and filtration are installed, one of the following conditions shall be met:~~

- a. ~~The flow restriction and pressure loss through the water treatment equipment shall be taken into account in the hydraulic calculations.~~
- b. ~~An automatic bypass shall be installed around the water treatment equipment that directs all water directly to the system.~~

6.5.5 The installation of a backflow preventer, water treatment and filtration device, or a pressure reducing valve between the water meter and the fire sprinkler system is prohibited.

6.5.6 The fire sprinkler system piping shall be designed as a looped system, with vertical and horizontal looping, in a manner that water circulates throughout the system. Dead-end supply lines off of the loop to individual sprinkler heads shall be permitted where each individual dead end does not exceed 50 feet in total length.

6.5.7 A supply line from the sprinkler system loop shall feed into the toilet in the master bathroom.

6.6

6.6 Network Multipurpose Systems. Network multipurpose systems shall provide supply for all interior domestic fixtures and fire sprinkler needs. This design may be used with a single-outlet meter, but is prohibited from use with a dual-outlet meter, which may be required by the water purveyor. Such systems shall be considered acceptable by this standard where designed in accordance with 6.6.1 through 6.6.7

6.6.1 A minimum demand of 5 gpm (19 L/min) shall be added to the sprinkler system demand at the discharge side of the water meter to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

6.6.2 Where a single-outlet meter is provided, a common underground supply for both domestic and fire sprinkler needs is required. No separate control valve controlling only the fire sprinkler system shall be permitted. The domestic supply shall serve all domestic fixtures and all fire sprinklers.

6.6.3 Where a dual-outlet meter is provided, the use of a network system is prohibited. System design shall be in accordance with 6.5.

6.6.4 The fire sprinkler system piping shall be designed as a networked system, with interconnection of all domestic fixtures and fire sprinkler heads, in a manner that water circulates throughout the system when any domestic fixture is flowing. Dead-end supply lines are permitted to supply domestic fixtures only.

6.6.5 Where required by the fire code official, networked systems shall be performance tested to prove one-head and two-head flow scenarios, in addition to other inspections and approvals required by this code. Testing shall replicate the effect of devices that restrict flow and pressure, such as water filtration systems, water softeners and pressure reducing valves.

6.6.6 A warning sign, with minimum ¼ in. (6.4 mm) letters, shall be affixed adjacent to the main shutoff valve and state the following:

Warning: The water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the

fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign.

6.6.7 Where water treatment and filtration loops are installed, the network sprinkler design shall incorporate one of the following conditions:

1. The flow restriction and pressure loss through the water treatment equipment shall be taken into account in the hydraulic calculations.
2. An automatic bypass shall be installed around the water treatment equipment that directs all water directly to the system.

7.1.1

7.1.1 A single control valve arranged to shut off both the domestic system and the sprinkler system shall be installed ~~unless a separate shutoff valve for the sprinkler system is installed in accordance with 7.1.2.~~

7.1.2

7.1.2 The sprinkler system piping shall not have a separate control valve installed ~~unless supervised by one of the following methods:~~

- ~~(1) Central station, proprietary, or remote station alarm service~~
- ~~(2) Local alarm service that causes the sounding of an audible signal at a constantly attended location~~
- ~~(3) Valves that are locked open~~

7.3.3

7.3.3 For wet systems, a pressure gauge shall be installed on the supply side of the check valve

7.7

7.7 Attics. Unconditioned Spaces

When nonmetallic piping is installed in unconditioned spaces attics, the piping shall be insulated or covered with insulation to a minimum of R-2 level. ~~adequate~~ insulation shall be provided on the unconditioned space attic side of the piping to avoid exposure of the piping to temperatures in excess of the pipe's rated temperature.

7.8

7.8 Stock of Spare Sprinklers. A supply of at least two spare sprinklers for each type installed shall be provided. Where the amount of spare sprinklers is 4 or less sprinkler heads, the spare sprinklers shall be permitted to be zipped or wire tied to fire sprinkler riser piping. Where the amount of spare sprinklers exceeds 4 sprinkler heads, a sprinkler head box shall be installed adjacent to the fire riser access panel.

8.1.1.2.2

8.1.1.2.2* The system shall provide at least the flow required to produce a minimum discharge density of 0.05 gpm/ft² (2.04 mm/min) to the design sprinklers including fire sprinklers required in garages per section 8.6.4.1.

8.1.3.1.2

8.1.3.1.2 Where construction features or other special conditions exist that are outside the scope of sprinkler listings, listed sprinklers shall be permitted to be installed beyond their listing limitations, provided the installation conforms to a modification or alternative materials and methods report that has been approved by the authority having jurisdiction.

8.6.4.1

8.6.4.1 Attached garages with any habitable rooms above shall be required to be protected with fire sprinklers

8.6.5

8.6.5 Sprinklers shall not be required in attics, penthouse equipment rooms, elevator machine rooms, concealed spaces dedicated exclusively to and containing dwelling unit ventilation equipment, floor/ceiling spaces, elevator shafts, crawl spaces, and other concealed spaces that are not used or intended to be used for living purposes ~~and do not contain fuel-fired equipment.~~

8.7

8.7 Mitigation Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC When a sprinkler system is being upgraded to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the sprinkler system shall be designed in accordance with section 8.7.1

8.7.1 General. When a sprinkler system is being installed to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the design requirements in Table 8.7 shall be applied.

Table 8.7 Mitigation Matrix for Group R Division 3 Occupancies and buildings built under the IRC⁴

Building Area Size Range ⁶	Mitigation Residential System Type ^{1,3}	SEPARATE SPRINKLER LEAD-IN REQUIRED ⁵	MINIMUM UNDERGROUND PIPE SIZE ⁵	MINIMUM WATER METER SIZE ⁷	SPRINKLERS REQUIRED IN AREAS SUBJECT TO FREEZING.
< 3,600 sq.ft.	Standard NFPA 13D ²	No	1"	3/4"	No
≥ 3,600 sq.ft. and < 10,000 sq.ft.	Enhanced NFPA 13D ^{1,2}	No	1"	3/4"	No
≥ 10,000 sq.ft. and < 15,000 sq.ft.	Enhanced NFPA 13R ¹	See NFPA 13R for design requirements (section 6.8.5)			

≥15,000 sq.ft.	Modified NFPA 13 ¹	See NFPA 13 for design requirements (section 21.37)
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N/A = Not Applicable

1. This mitigation constitutes a building "protected with an approved fire sprinkler system" per the IFC.
2. Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
3. Free-standing detached guest houses or garages shall be protected by a minimum Enhanced NFPA 13D system.
4. Excluding Group R Division 3 Occupancies and buildings built under the IRC used as Group Care Homes.
5. U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
6. Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte cocheres.
7. Water meters used for residential sprinkler systems shall be residential fire service meters or other meters approved by the water purveyor.

8.7.2.1 Where required. When Table 8.7 requires an Enhanced 13D design, sprinklers shall be installed throughout the structure except where omissions are permitted by sections 8.6.6 and 8.6.7, and the following:

1. Unheated attic spaces.
2. Floor/ceiling spaces.
3. Concealed combustible spaces with no access for storage or living purposes.
4. Exterior overhangs, porches, and carports

8.7.3 Other Protection Designs. For other protection designs listed in Table 8.7, see the respective revised codes for NFPA 13 and NFPA 13R minimum design requirements.

NFPA 13R

1.1

1.1 Scope

This standard covers the design and installation of automatic sprinkler systems for protection against fire hazards in residential occupancies up to and including two ~~four~~ stories in height. Residential occupancies three or more stories in height shall be protected throughout in accordance with NFPA 13.

When sprinkler protection is being provided to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access for single-family residential occupancies, the minimum design criteria shall be as outlined in Section 6.8.5 Protection Matrix for Group R Division 3 Occupancies and buildings built under the IRC.

5.1.3

5.1.3 Rated Pressure. System components shall be rated for the maximum system working pressure to which they are exposed but shall not be rated at less than 175 psi (12.1 bar) for components installed aboveground and 150 psi (10.4 bar) for components installed underground. When the underground piping can be supplied or pressurized by a Fire Department Connection (FDC), the underground piping shall be designed to withstand a working pressure of not less than 200 psi (Class 200), or 50 psi greater than the system design pressure, whichever is greater.

5.2.1

5.2.1 Pipe or tube used in sprinkler systems shall be of the materials specified in Table 5.2.1 or in accordance with 5.2.2. Piping shall have corrosion resistance ratio (CRR) of 1 or more.

6.4.4

6.4.4 Where construction features or other special conditions exist that are outside the scope of sprinkler listings, listed sprinklers shall be permitted to be installed beyond their listing limitations, provided the installation conforms to a modification or alternative materials and methods report that has been approved by the authority having jurisdiction.

6.6.4

6.6.4 Sprinklers shall be installed in any closet used for heating and air-conditioning equipment ~~except as permitted by 6.6.7~~ or containing fuel-fired equipment

6.6.5

6.6.5 Sprinklers shall not be required in any porches, balconies, corridors, and stairs that are open and attached, unless specifically required in any of these areas by the Building Code and/or Fire Code.

6.6.6.1

6.6.6.1 Protection of Fuel-Fired Equipment. ~~When fuel-fired equipment is present, at least one quick-response intermediate temperature sprinkler shall be installed above the equipment.~~ Where protection of fuel-fired equipment is required by 6.9.4, 6.9.6 and 6.9.7, sprinkler protection shall be provided in accordance with the following:

- (1) At least one quick-response sprinkler with a minimum k-factor of 5.6 shall be provided above the fuel-fired equipment. Sprinklers shall be sufficient to cover the fuel-fired equipment protection area, which is equal to the entire perimeter of the fuel-fired equipment when viewed on a plan view.
- (2) Where the sprinkler(s) protecting the fuel-fired equipment is located under a ceiling with slope equal to or greater than a 4:12 pitch, a minimum of one sprinkler shall be located above the edge of the fuel-fired equipment protection area, on the upslope side of the equipment.
- (3) Freeze protection shall be provided in accordance with 6.1.4.1.

6.6.7

6.6.7 Sprinklers shall not be required in closets (regardless of size) on exterior balconies and exterior breezeways/corridors, regardless of size, as long as the closet does not have doors or unprotected penetrations directly into the dwelling unit, and as long as the closet does not contain fuel-fired equipment.

6.7.2.2.2

6.7.2.2.2 Where water supplies are known to have unusual corrosive properties and threaded or cut-groove steel pipe is to be used, wall thickness shall be in accordance with Schedule 30 [in sizes 8 in. (200 mm) or larger] or Schedules 40 [in sizes less than 8 in. (200 mm)]. Piping shall have corrosion resistance ratio (CRR) of 1 or more.

6.8.2

6.8.2 The sprinkler system piping shall not have a separate control valve installed unless supervised by a one of the following methods:

- (1) Central station, proprietary, or remote station alarm service
- ~~(2) Local alarm service that causes the sounding of an audible signal at a constantly attended location~~
- ~~(3) Valves that are locked open~~

6.15

6.15 Drop-Out Ceilings. ~~Drop out ceilings shall be permitted to be installed beneath sprinklers where ceilings are listed for that service and are installed in accordance with their listings.~~

7.1.1.4

7.1.1.4 Systems installed in accordance with the single family residential protection matrix (Section 7.5) shall not require monitoring.

7.5

7.5 Mitigation - Protection Matrix for Group R Division 3 Occupancies When a sprinkler system is being installed to mitigate the minimum Fire Code requirements for fire flow, number of fire hydrants, or fire department access, the design requirements in Table 6.8.5 shall be applied.

Table 7.5 Mitigation Protection Matrix for Group R Division 3 Occupancies⁴

Building Area SIZE RANGE ⁶	Mitigation Residential SYSTEM TYPE ^{1,3}	SEPARATE SPRINKLER LEAD-IN REQUIRED ⁵	MINIMUM UNDERGROUND PIPE SIZE ⁵	MINIMUM WATER SIZE ⁵	METER	SPRINKLERS REQUIRED IN AREAS SUBJECT TO FREEZING.
< 3,600 sq.ft.	Standard NFPA 13D ²	See NFPA 13D for design requirements (section 8.7)				
≥ 3,600 sq.ft. and < 10,000 sq.ft.	Enhanced NFPA 13D ^{1,2}	See NFPA 13D for design requirements (section 8.7)				
≥ 10,000 sq.ft. and < 15,000 sq.ft.	Enhanced NFPA 13R ¹	Yes	N/A	N/A		Yes
≥ 15,000 sq.ft.	Modified NFPA 13 ¹	See NFPA 13 for design requirements (section 21.37)				

N/A = Not Applicable

1. This mitigation constitutes a building "protected with an approved fire sprinkler system" per the IFC.
2. Domestic demand of 5 gpm is required to be added to the sprinkler demand in the hydraulic calculations.
3. Free-standing detached guest houses or garages shall be protected by an Enhanced NFPA 13D system.
4. Excluding Group R Division 3 occupancies used as Group Care Homes.
5. U.G. lead-in shall be the minimum size required hydraulically as proven by the sprinkler contractor and shall be hydrostatically tested and flushed, witnessed by the fire dept.
6. Building area is defined as all areas under roof except for porches, patios, balconies, carports and porte cocheres.

7.5.1 Enhanced 13R Design. When Table 6.8.5 requires an Enhanced 13R design, the sprinkler system shall be designed and installed in accordance with NFPA 13R, except that sprinklers shall be installed throughout the structure except where omissions are permitted by the following:

1. Unheated attic spaces that do not contain fuel fired equipment.
2. Floor/ceiling spaces.
3. Concealed combustible spaces with no access for storage or living purposes.

7.5.2 Other Protection Designs. For other protection designs listed in Table 6.8.5, see the respective revised codes for NFPA 13 and NFPA 13D minimum design requirements.

8.1.7

8.1.7 Sprinkler plans shall indicate the following:

1. Name of owner and occupant.
2. Location, including street address.
3. Point of compass.
4. Ceiling construction.
5. Full height cross section.
6. Ceiling/roof heights and slopes not shown in the full height cross section.
7. Location of fire walls.
8. Location of partitions, lintels, and doorways. Lintel openings require a cross section view to indicate the area of the opening.
9. Occupancy, label, and name of all each areas or rooms.
10. Location and size of concealed spaces, attics, closets, and bathrooms.
11. Any small enclosures in which no sprinklers are to be installed.
12. Size of city main in street; pressure; whether dead end or circulating, and, if dead end, the direction and distance to nearest circulating main; and city main test results including elevation of the test hydrant.
13. Make, manufacturer, model, type, heat-response element, temperature rating, nominal K-factor, number of sprinklers installed, and nominal orifice size of the sprinkler, including sprinkler identification number.
14. Temperature rating and location of high-temperature sprinklers
15. ~~Number of sprinkler on each riser, per floor~~
14. Type Kind and location of alarm bells horn/strobes.
15. Type of pipe and fittings.
16. Pipe type and schedule of wall thickness.
17. Type of protection for nonmetallic pipe.
18. Nominal pipe size with lengths shown to scale.
19. Location and size of riser nipples.
20. Type of fittings and joints and the location of all welds and bends.
21. Type and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable.
22. All control valves, check valves, drain pipes, and test connections.
23. Underground pipe size, length, location, weight, material, and point of connection to city main; type of valves, meters, and valve pits; and depth at which the top of the pipe is laid below grade.
24. In case of hydraulically designed systems, the information on the hydraulic data nameplate.
25. Name, ~~and~~ address, phone number, and contractor's license number of sprinkler contractor.
26. Nevada State Fire Marshal registration number.
27. Signature and NICET number, or engineer's seal, of the designer.
28. General notes as required by the AHJ.
29. Approximate capacity in gallons of each dry pipe system.
30. Make, type, model, and size of alarm or dry pipe valve.
31. Piping provisions for flushing.
32. Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear.
33. A graphic representation of the scale used on all plans.
34. Hydraulic reference points shown on the plan that correspond with comparable reference points on the hydraulic calculation sheets.
35. The minimum rate of water application (density or flow or discharge pressure), the design area of water application, and the domestic demand.
36. The total quantity of water and the pressure required noted at a common reference point for each system.

37. Relative elevations of sprinklers, junction points, and supply or reference points.
38. Information about backflow preventers (manufacturer, size, type).
39. Information about antifreeze solution used (type and amount).
40. Size and location of hydrants, showing size and number of outlets. Static and residual hydrants that were used in flow tests shall be shown.
41. Size, location, and piping arrangement of fire department connections.
42. Location of fuel-fired equipment and heating and air-conditioning equipment.
43. Location of closets on exterior balconies, and a note indicating whether there is any type of door or penetration between the closet and the dwelling unit.
44. Edition year of NFPA 13R to which the sprinkler system is designed.
45. Utility plans and/or plumbing plans necessary to show connection from water supply to fire sprinkler system.

NFPA 14

3.3.5

3.3.5 High-Rise Building. A building where the floor of an occupiable story is greater than 55 ft (17 m) ~~75 ft (23 m)~~ above the lowest level of fire department vehicle access.

4.2.3.2

4.2.3.2 Where system pressures exceed 300 psi, piping expected to experience greater than 300 psi at zero flow shall be rated for the pressures expected, and have minimum nominal pipe wall thickness in accordance with Schedule 40.

4.6.1.1.1

4.6.1.1.1 Within the cabinet, the hose connections shall be located so that there is at least 1 in. (25.4 mm) between any part of the cabinet and the handle of the valve when the valve is in any position ranging from fully open to fully closed, 6 in (150 mm) clearance perpendicular from the valve handle to any part of the cabinet, and 6 in (150 mm) clearance around the circumference of outlet to any part of the cabinet. The door shall not be considered to be part of the cabinet for the purposes of this section.

4.8.2

4.8.2 Each fire department connection shall have at least two, and not less than one for each 250 gpm of system demand or fraction thereof, 2 ½ inch (65 mm) internal threaded fittings having NHS threads, as specified in NFPA 1963, *Standard for Fire Hose Connections*. Fire Department Connections shall be provided with internal check valve(s) such that water being supplied into any inlet will not flow back out of any other inlet. For the purposes of this section, internal clapper valve devices provided by the manufacturer in listed Fire Department Connections shall be considered internal check valves. (See Section 7.7 and 7.12 for design requirements)

4.8.2.3

4.8.2.3 Fire department connection piping shall be a minimum of 4 in (100 mm) for three or fewer inlets, a minimum of 6 in (150 mm) for four or more inlets, and shall in all cases have a diameter equal or greater to the largest supply line.

5.2.1.2.1

5.2.1.2.1 Piping volume shall not be limited where the system is designed in accordance with Section 5.2.1.3.2. Not more than 750 gal (2839 L) system capacity shall be controlled by one dry pipe valve

5.2.1.2.2

5.2.1.2.2 Piping volume shall be permitted to exceed the requirements of 5.2.1.3.1 where the system design shall be such that water is delivered to the system at the most remote hose connection in not more than 3 minutes, starting at the normal air pressure on the system and at the time of fully opened hose connection.

6.1.2.2.1

6.1.2.2.1 In buildings constructed of Type I or Type II construction in accordance with the International Building Code or in buildings equipped with an approved automatic sprinkler system, standpipes lateral piping to 2 1/2 in. (65 mm) hose connections shall not be required to be protected by fire rated construction.

6.3.2.1

6.3.2.1 Individual hose valves fed from the feed main shall each be provided with an isolation valve, such that maintenance of the individual hose valve can be accomplished without interrupting the supply to standpipes fed from the feed main.

6.3.7.1

6.3.7.1 System water supply valves, isolation control valves, and other valves in feed mains shall be electrically supervised in an approved manner in the open position by one of the following methods:

- (1) A central station, proprietary, or remote station signaling service
- (2) A local signaling service that initiates an audible signal to a constantly attended location
- (3) Locking of valves in the open position
- (4) Sealing of valves and an approved weekly recorded inspection where valves are located within fenced enclosures under the control of the owner

6.4.5.2.2

6.4.5.2.2 A sign also shall indicate the pressure required at the inlets to deliver the system demand

6.4.5.3

6.4.5.3 Signs shall be provided at fire department connections, indicating the areas of the building served and the minimum required pressure and flow to be delivered through the inlets. Where a fire department connection services multiple buildings, structures, or locations, a the sign shall be provided indicate indicating the buildings, structures, or locations served.

6.4.5.3.1

6.4.5.3.1 Signs shall have a red background and be professionally engraved with white lettering a minimum of 1 in. (25.4 mm) in height, with a minimum stroke of 1/4 in. Signs shall consist of durable, weatherproof materials, subject to approval by the authority having jurisdiction.

7.2.1

7.2.1 The maximum pressure at any point in the system at any time shall not exceed 350 psi (24 bar), except where components are rated for higher pressures and are approved by an alternative materials and methods report approved by the authority having jurisdiction.

7.2.3.2

7.2.3.2 Where the static pressure at a hose connection exceeds 175 psi (12.1 bar) at a 1½ in. (40 mm) hose connection or exceeds 200 psi (13.9 bar) at a 2½ in. (65 mm) hose connection, an approved pressure-regulating device shall be provided to limit static and residual pressures at the outlet of the hose connection to 100 psi (6.9 bar) for 1½ in. (40 mm) hose connections and 200 175 psi (13.9 bar) (12.1 bar) for other hose connections. The pressure on the inlet side of the pressure-regulating device shall not exceed the device's rated working pressure.

7.2.3.4

7.2.3.4 Where hose valve pressure regulating devices are installed on 2 ½ in. (65 mm) outlets, they shall be field adjustable, capable of being adjusted through the full adjustment range by a 3/8 in. (12 mm) rod with a maximum required torque of 30 foot-pounds (41 nm) while flowing water. Field adjustment shall not require any hose valve disassembly.

7.2.4

7.2.4 Pressure Regulating Devices ~~When system pressure regulating devices are used in lieu of providing separate pumps, multiple zones shall be permitted to be supplied by a single pump and pressure regulating device(s) under the following conditions: The fire code official shall be consulted regarding the use of system pressure regulating devices. When system pressure-regulating devices are used in lieu of providing separate pumps, multiple zones shall be permitted to be supplied by a single pump and pressure-regulating device(s) under the following conditions:~~

- (1) ~~A method to isolate each of the pressure regulating device(s) shall be provided for maintenance and repair by providing control valves on the supply and discharge side of each pressure regulating device, in a manner where only the device being maintained and repaired is out of service.~~ Pressure-regulating device(s) shall be permitted to control pressure in the lower zone(s). When the system configuration results in a pressure-regulating device is the single source of water to a structure, a redundant pressure-regulating device shall be provided in parallel configuration for the full range of anticipated system flow.
- (2) ~~A method to isolate each of the pressure regulating device(s) shall be provided for maintenance and repair by providing control valves on the supply and discharge side of each pressure regulating device, in a manner where only the device being maintained and repaired is out of service.~~
- (3) ~~Regulating devices shall be arranged so that the failure of any single device does not allow pressure in excess of 200 175 psi (13.9 12.1 bar) to not more than two hose connections~~
- (4) ~~An equally sized bypass around the pressure regulating device(s), with a normally closed valve, shall be installed.~~
- (5) ~~Pressure regulating devices and the bypass valve shall be installed not more than 7ft 6in (2.31 m) above the floor. Deleted without substitution refer to base code.~~
- (6) The pressure-regulating device shall be provided with inlet and outlet pressure gauges.
- (7) The Fire Code Official shall be consulted regarding the fire department connection(s) configuration with the standpipe system.

- (8) ~~The pressure-regulating device shall be provided with a pressure-relief valve sized for the full anticipated system flow and capable of maintaining downstream system pressures below the maximum pressure ratings for all system components in accordance with manufacturer recommendations.~~
- (9) ~~Remote monitoring and supervision for detecting high pressure failure of the pressure-regulating device shall be provided in accordance with NFPA 72, National Fire Alarm Code. Such failure shall be detected by providing a flow switch downstream on the pressure relief valve.~~
- (10) A drain sufficient to allow flow of the full anticipated system flow shall be provided adjacent to the pressure-regulating devices. Use of this drain line for discharge from the pressure relief valve shall be permitted.

7.3.2

7.3.2 Class I Systems. Class I systems shall be provided with 2 ½ in. (65 mm) hose connections in the following locations:

- (1) At the main floor landing in exit stairways
- (2) On each side of the wall adjacent to the exit openings of horizontal exits, unless permitted to be omitted by the Fire Code
- (3) In other than covered mall buildings, in each exit passageway at the entrance from the building areas into the passageway
- (4) In covered mall buildings, at the entrance to each exit passageway or exit corridor, and at the interior side of public entrances from the exterior to the mall
- (5) At the highest landing of stairways with stairway access to a roof, and on roofs with a slope of less than 4 in 12 where stairways do not access the roof

7.3.2.2

7.3.2.2 Class I hose systems shall be designed so that all floor areas of the floor or story are protected by hose valve coverage, with 100 feet of hose and 30 feet of stream from each hose valve connection. The length of hose shall be measured along approved walking paths, and the stream distance shall not be expected to turn corners. Where the most remote portion of a ~~nonsprinklered~~ floor or story is not protected with the hose valves already provided in accordance with 7.3.2 subject to these distance limitations, is located in excess of 150 ft (45.7 m) of travel distance from a required exit containing or adjacent to a hose connection, or the most remote portion of a sprinklered floor or story is located in excess of 200 ft (61 m) of travel distance from a required exit containing or adjacent to a hose connection, additional hose connections shall be provided, in approved locations, ~~where required by the local fire department or the authority having jurisdiction.~~

7.3.3.1

7.3.3.1 Class II systems shall be provided with 1 ½ in. (40 mm) hose stations so that all portions of each floor level of the building or area thereof required to be protected are within 130 ft (39.7 m) of a hose connection provided with 1 ½ in. (40 mm) hose or within 120 ft of a hose connection provided with less than 1 ½ in. (40 mm) hose.

7.4

7.4 Number of Standpipes. Separate standpipes shall be provided in each required exit stairway. Scissor stairs having two separate landings on each level shall be provided with a separate hose connection on each stair landing.

7.8.1

7.8.1 Minimum Design Pressure for Hydraulically Designed Systems. Hydraulically designed standpipe systems shall be designed to provide the waterflow rate required by Section 7.10 at a minimum residual pressure of 125 psi (8.6 bar) ~~100 (6.9 bar)~~ at the outlet of the hydraulically most remote 2 ½ in. (65 mm) hose connection and 65 psi (4.5 bar) at the outlet of the hydraulically most remote 1 ½ in. (40 mm) hose station.

7.8.1.1

7.8.1.1 Manual standpipe systems shall be designed to provide 125 psi (8.6 bar) ~~100 psi (6.9 bar)~~ at the topmost outlet with the calculations terminating at the fire department connection.

7.9.1.3

7.9.1.3 Where pumps are used in structures with an occupied floor located greater than 250 ft in height above the lowest level of fire department access, a redundant fire pump shall be provided for each required fire pump.

7.11.1.1

7.11.1.1 The drain riser shall be equipped with tees that are of the same size as the discharge outlets of the pressure-regulating devices to be tested with internal threaded swivel fitting having NHS threads, as specified in NFPA 1963, *Standard for Fire Hose Connections*, with plugs, and shall be located ~~on at least every other floor~~ with a hose valve pressure-regulating device. A drain connection shall be provided adjacent to every hose valve pressure-regulating device, even if the pressure-regulating device is not on a vertical standpipe riser.

7.11.1.3

7.11.1.3 Where drain risers are interconnected and run to a common discharge point, all piping shall be sized for the maximum possible combined flow.

7.12.1.1

7.12.1.1 In buildings with multiple pump zones, each zone shall be provided with an express main and fire department connection from the street to each pump zone. ~~The high zone fire department connection(s) shall not be required to be provided where 7.9.3 applies.~~

7.12.2.1

~~7.12.2.1~~ A single connection for each zone shall be permitted where acceptable to the fire department

7.12.3

7.12.3 Fire department connection sizes shall be based on the greater of the sprinkler system demand (if a combined system) or the standpipe system demand and shall include one 2 ½ in. (65 mm) inlet per every 250 gpm (946 L/min)

7.12.3.1

~~7.12.3.1~~ An approved large diameter hose connection of a size to accommodate the required flow shall be permitted.

8.1.1

8.1.1 Plans accurately showing the details and arrangement of the standpipe system shall be furnished to, reviewed, and stamped accepted by the authority having jurisdiction prior to the installation of the system.

8.1.6

8.1.6 Plans shall include the following items:

1. Provide a detailed narrative describing the scope of work to be conducted associated with the plans.
2. Name of owner and occupant.
3. Location, including street address.
4. Name address, phone number, and contractor's license number of sprinkler contractor.
5. Nevada State Fire Marshal registration number.
6. Signature and NICET number, or engineer's seal, of the designer.
7. General notes as required by the AHJ.
8. Point of compass.
9. The plan must show a top view of all areas on a common architectural scale, i.e. 1/8", 3/16", 1/4", etc. All walls and doors need to be shown, and each room must be labeled according to use. The top view must show supply and drain pipe layout, pipe dimensions, attachments, braces, hangers, standpipe hose outlets, hydraulic nodes, and the coverage area from each hose valve to the remote areas of the floor plan. The coverage area shall be shown on plans and be measured along the path of travel from hose valves, around walls and through doors, to the most remote areas of the floor. The 30 feet distance assigned to the hose stream shall not be allowed to bend or turn.
10. The plan must show section views with a riser diagram to describe the locations of mains, lines, and hose valves within the structure. A minimum of one view is required, although additional views may be necessary to determine compliance with NFPA 14. The section view must be drawn to a common architectural scale, i.e. 1/8", 3/16", 1/4", etc. The riser diagram must indicate all components on the riser, including fire department connections; water supply components, including fire pumps and supply

- lines; interconnecting horizontal pipe; all standpipes on the system; control valves at the base of all standpipes; hose valves fed by the standpipes; and, where required for testing of pressure regulating valves, the drain lines.
11. The plans shall include an isometric view showing the entire system in one view.
 12. A graphic representation of the scale used on all plans.
 13. Ceiling construction.
 14. Full height cross section.
 15. Location of fire walls.
 16. Location of horizontal exits.
 17. Location of partitions.
 18. Label and name of each area or room.
 19. General notes shall be provided, as follows:
 - a. Indicate compliance with NFPA 14.
 - b. Indicate the type of system per Section 5.2 and the class of the system per Section 5.3.
 - c. Indicate the minimum and maximum pressure requirements for the system.
 - d. Indicate the minimum flow for the system and for each individual valve.
 - e. Provide a description of hose valves used, detailing the manufacturer, model number(s), and outlet size.
 - f. Manufacturer, schedule and type of piping.
 - g. Manufacturer and type of fittings.
 - h. Type of freeze protection (building heated, dry system, anti-freeze system, heat-trace, etc).
 - i. Indicate the pressure required for the hydrostatic test, being 200 psi or 50 psi above pump churn pressure, whichever is higher.
 - j. Indicate the quantity of hose valves shown on the submittal.
 20. Underground pipe size, length, location with respect to the building, weight, material, and point of connection to city main; type of valves, meters, and valve pits; and depth at which the top of the pipe is laid below grade. Show the locations of fire hydrants used for water supply to the fire department connection(s), indicate the test and flow test results and label the test and flow hydrants.
 21. Provide information regarding the fire pump, as applicable.
 22. Other sources of water supply, including water storage tanks and fire department connections, shall be shown on plans.
 23. Size, location, and piping arrangement of fire department connections, with details of the connection.
 24. Fire Department Connection Signage: A sign shall be provided adjacent to each FDC indicating what systems are being served, what areas of the building are served, and the minimum required pressure and flow at the Fire Department Connection for correct system operation. Provide a detail of this sign on the plan.
 25. Detail of Class I, Class II, or Class III hose valves located in cabinets. The cabinet size, and the placement of items within the cabinet, shall be such to provide a minimum clearance of 6 inches perpendicularly from the face of the valve, a minimum of 1 inch around the circumference of the valve, and a minimum of 6 inches around the circumference of the hose outlet cap.
 26. Type of pipe and fittings.
 27. Pipe type and schedule of wall thickness.
 28. Nominal pipe size with lengths shown to scale.
 29. Type of fittings and joints and the location of all welds and bends.
 30. Type and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable.
 31. Show hanger locations, and provide details of hanger installations.
 32. Seismic bracing information shall be provided, including locations, details, and calculations.
 33. Provide details for penetrations of standpipe piping through walls, floors, and other structural members. Show detail to note clearances around the piping and/or locations of flexible connections.
 34. Provide details for all penetrations in rated walls and floors, providing information regarding the method of maintaining fire rating of the wall or floor.
 35. All control valves, check valves, drain pipes, and test connections.
 36. Make, type, model, and size of alarm or dry pipe valve.
 37. Piping provisions for flushing and for testing.

38. Where the equipment is to be installed as an addition to an existing system, enough of the existing system indicated on the plans to make all conditions clear.
39. A detail of the hydraulic data nameplate.
40. Hydraulic reference points shown on the plan, including the top view, section view, and isometric view, that correspond with comparable reference points on the hydraulic calculation sheets.
41. The total quantity of water and the pressure required noted at a common reference point for each system.
42. Edition year of NFPA 14 to which the standpipe system is designed.
43. Pressure Reducing Valves: For all pressure reducing valves, including direct-acting and pilot-operated valves, which are shown on the plans, indicate the make, model, and setting of the pressure-reducing valve, and provide a detail for each unique installation configuration.
44. Where direct-acting pressure regulating hose valves are provided anywhere in the building, provide a chart on the plans. The chart shall have eight columns, as follows:
 - a. Floor Level – Provide numerical designation for all floor levels in the building.
 - b. Static Pressure, Inlet – Indicate the static pressure at the inlet of the hose valve on all floor levels. Provide a supporting hydraulic calculation at zero flow with churn pressure, providing a node at the hose valve on each floor level to indicate the static pressure at each hose valve.
 - c. Residual Pressure, Full Flow, Inlet – Indicate the residual pressure at the inlet of hose valves on each floor. Provide a supporting hydraulic calculation at full standpipe design flow per NFPA 14 (750 or 1,000 gpm), providing a node on each floor level to indicate the residual pressure at each hose valve.
 - d. Residual Pressure, 250-gpm flow, inlet - Indicate the residual pressure at the inlet of hose valves on each floor while flowing 250 gpm. Provide a supporting hydraulic calculation at 250 gpm flow at the most remote standpipe outlet, providing a node on each floor level of the most remote standpipe to indicate the residual pressure at each hose valve.
 - e. Valve Make and Model – Indicate the manufacturer of the valve on all floors, and the model number for the specific valve. Provide supporting manufacturer specifications.
 - f. Valve Setting – Indicate the hose valve setting or bonnet number proposed for each valve. The setting or bonnet number must be associated with the manufacturer specifications for the valve.
 - g. Residual Pressure, Full Flow, Outlet – Indicate the residual outlet pressure at the outlet of the hose valve under the full-flow condition. For PRV installations, the residual pressure is taken from pressure relation charts provided by the manufacturer. For non-PRV installation, the residual pressure is taken by analysis of the equivalent lengths of the fittings and the hose valve.
 - h. Residual Pressure, 250-gpm flow, Outlet - Indicate the residual outlet pressure at the outlet of the hose valve when flowing 250 gpm. This is necessary to establish the residual pressure expected during field inspection. For PRV installations, the residual pressure is taken from pressure relation charts provided by the manufacturer.

11.5.6.2

11.5.6.2 The system shall deliver a minimum of 250 gpm (946 L/min) at the hose connection within 3 minutes of opening the hose valve. ~~if the system capacity exceeds 750 gal (2480 L)~~

12.7.2

12.7.2 Where temporary standpipes normally contain water, the piping shall be protected against freezing, unless otherwise approved by the authority having jurisdiction.

NFPA 20

3.3.24

3.3.24 High-Rise Building. A building where the floor of an occupiable story is greater than 55 ft (16.8 m) ~~75 ft (23 m)~~ above the lowest level of fire department vehicle access.

4.1.3

4.1.3 Where a pump is used to provide booster pressure supply to multiple structures, a redundant fire pump shall be provided for each required fire pump.

4.10.1.1

4.10.1.1 A liquid-filled pressure gauge having a dial not less than 3.5 in. (89 mm) in diameter shall be connected near the discharge casting with a 0.25 in. (6.25-mm) gauge valve.

4.10.2.1

4.10.2.1 Unless the requirements of 5.10.2.4 are met, a liquid-filled compound pressure and vacuum gauge having a dial not less than 3.5 in. (89 mm) in diameter shall be connected to the suction pipe near the pump with a 0.25 in. (6.25-mm) gauge valve.

4.12.1.1.1

4.12.1.1.1* Fire pump units ~~serving high-rise buildings~~ shall be protected from surrounding occupancies by a minimum of 2-hour fire-rated construction or physically separated from the protected building by a minimum of 50 ft (15.3m).

4.12.1.1.2

4.12.1.1.2 ~~Indoor fire pumps in non-high-rise buildings shall be physically separated or protected by fire-rated construction in accordance with Table 5.12.1.1.2. Standalone dedicated fire pump houses shall have a fire-resistance rating of not less than 2 hours unless the fire pump house is located a minimum of 50 feet away from the building served by the fire pump.~~

Table 4.12.1.1.2

Table 4.12.1.1.2 Equipment Protection

<i>Building(s)</i>		
<i>Pump Room/ House</i>	<i>Exposing Pump Room/House</i>	<i>Required Separation</i>

Not sprinklered	Not sprinklered	2 hour fire rated
Not sprinklered	Fully sprinklered	or
Fully sprinklered	Not sprinklered	50 ft (15.3 m)
Fully sprinklered	Fully sprinklered	1 hour fire rated
		or 50 ft (15.3 m)

4.12.1.3

4.12.1.3 Fire Pump Buildings or Rooms with Diesel Engines. Fire pump buildings or rooms enclosing diesel engine pump drivers and day tanks shall be protected with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

4.12.2.1.1

4.12.2.1.1. Fire pump rooms not directly accessible from the outside shall be accessible through an enclosed passageway from an enclosed stairway or exterior exit. The enclosed passageway and/or stairway shall have a minimum 2-hour fire-resistance rating. The travel distance through the enclosed passageway shall not exceed 50 feet.

4.12.3.1

4.12.3.1 An approved or listed permanently installed (hard-wired for electrically powered devices) source of heat shall be provided for maintaining the temperature of a pump room or pump house, ~~where required,~~ above 40° F (5° C).

4.12.4

4.12.4 Normal Lighting. Artificial permanently installed lighting shall be provided in a pump room or house.

4.14.4.1

4.14.4.1 ~~Where the suction supply is of sufficient pressure to be of material value without the pump, the~~ All pumps supplied by municipal water supply shall be installed with a bypass. (See *Figure A.4.14.4.*)

5.1.1.3

5.1.1.3 Where pumps are used in structures with walking levels greater than 250 ft in height about the lowest level of fire department access, a redundant fire pump shall be provided for each required fire pump.

9.3.1

9.3.1 ~~Except for an arrangement described in 9.3.3,~~ At least one alternate source of power shall be provided when the requirement of 9.3.3 is not satisfied. ~~height of the structure is beyond the pumping capacity of the fire department apparatus.~~

9.3.4

9.3.4 When provided, the alternate source of power shall be supplied from one of the following sources:

- (1) A generator installed in accordance with Section 9.6.
- (2) One of the sources identified in 9.2.2(1), 9.2.2(2), 9.2.2(3), or 9.2.2(5) where the power is provided distinctly independent of the normal source of power. Any connections to the public utility shall be considered a single source of power and subsequently cannot be utilized as both normal power and the alternate (backup) power.

10.2.1

10.2.1 Controllers shall be located as close as is practical to the motors they control and shall be within sight of the motors. Additionally, the controllers shall be readily accessible by locating controllers near the entrance to the room, and shall comply with clearance requirements from the National Electrical Code.

10.4.7.1.1

10.4.7.1.1 Where the fire pump serves a building equipped with a Fire Command Center, the signal(s) required remote from the controller shall be indicated both on a dedicated panel provided by the fire pump manufacturer and on the fire alarm control panel.

12.2.1

12.2.1 Controllers shall be located as close as is practical to the motors they control and shall be within sight of the motors. Additionally the controllers shall be readily accessible by locating controllers near the entrance to the room and shall comply with clearance requirements from the National Electrical Code.

12.4.2.1.1

12.4.2.1.1 Where the fire pump serves a building equipped with a Fire Command Center, the signal(s) required remote from the controller shall be indicated both on a dedicated panel provided by the fire pump manufacturer and on the fire alarm control panel.

NFPA 22

5.1.1.1

5.1.1.1 Steel tanks shall be designed in accordance with AWWA D100, *Welded Steel Tank for Water Storage*, 1996, or AWWA D103, *Factory-Coated Bolted Steel Tanks for Water Storage*, 1997.

14.4.1

14.4.1 A permanent ~~pipe connected~~ connection to a an approved water supply shall be provided to fill the tank. Where the tank serves as a break tank between the city supply and fire pump(s), the fill shall be through automatic fill valves that are tied to water level sensors, and a bypass line of equal size with a normally closed control valve shall be provided.

14.4.2

14.4.2 The means to fill the tank shall be sized to fill the tank in a maximum time of 8 hours. Where the tank serves as a break tank between the city supply and building fire pump(s), the means to fill the tank shall be automatic and shall provide supply flow equal to 150% of the fire pump rated flow.

14.5.5

14.5.5 Discharge The overflow pipe shall discharge water to a drain with flow capacity equal to or greater than the fill line supply flow, or to an approved exterior location subject to approval by the authority having jurisdiction.

14.8.1

14.8.1 Provisions shall be made for the installation of sensors in accordance with NFPA 72 for two critical water temperatures and two critical water levels.

14.8.1.1 Where the water storage tank acts as a break tank between the city supply and fire pump(s), water level sensors shall be provided. A minimum of three sensor levels shall be provided. Two sensor levels shall activate the turn-on/turn-off of the fill valve. The third sensor level shall indicate a low level alarm. The sensor that opens the fill control valve shall be set 5 inches (127 mm) below normal (full) level, or at 90% of the normal (full) volume, whichever leaves the greater volume in the tank. The sensor that closes the fill control valve shall be set at normal (full) level. The sensor that signals a low alarm shall be set 12 inches (300 mm) below normal (full) level, or at 70% of the normal (full) volume, whichever leaves the greater volume in the tank. The low level alarm shall be transmitted to a constantly attended location to initiate response to the fill control bypass valve

NFPA 24

6.5.2

6.5.2 A sectional valve shall be provided at the following locations:

- (1) On each bank where a main crosses water
- (2) Outside the building foundation(s) where a main or a section of a main runs under a building
- (3) On the underground line where there are two sources of water, after every 2 fire hydrants or building fire sprinkler connections

NFPA 72

3.3.7.2

3.3.7.2 False Alarm. Activation or reporting of an alarm for which no such alarm condition, fire or emergency actually exists. Additionally, False Alarm is the willful and knowing initiating or transmission of a signal, message or other notification of an event of fire when no such danger exists.

3.3.95.4.2

3.3.95.4.2 Dedicated Function Fire Alarm System. A protected premises fire alarm system installed specifically to perform fire safety function(s) where a building fire alarm system is not required. Such systems include, but are not limited to sprinkler monitoring systems and elevator recall systems. (SIG-PRO)

10.5.5.1

10.5.5.1 Dedicated Branch Circuit. A dedicated branch circuit ~~of one of the following:~~ shall supply primary power from a commercial light and power source.

- ~~(1) Commercial light and power.~~

Exceptions:

- (1) When approved by the AHJ, an engine-driven generator or equivalent in accordance with 10.5.10.2, where a person specifically trained in its operation is on duty at all times may be used for a specified period of time.
- (2) When approved by the AHJ, an engine-driven generator or equivalent arranged for cogeneration with commercial light and power in accordance with 10.5.10.2, where a person specifically trained in its operation is on duty at all times may be used.

10.15

10.15* Protection of Fire Alarm System. In areas that are not continuously occupied, automatic smoke detection shall be provided at the location of each fire alarm control unit(s), notification appliance circuit power extenders, and supervising station transmitting equipment to provide notification of fire at that location.

Exception No. 1: Where ambient conditions prohibit installation of automatic smoke detection, automatic heat detection shall be permitted.

Exception No. 2: Dedicated function fire alarm systems shall not have smoke detectors installed above the dedicated function fire alarm control unit.

10.16.1

10.16.1 Alarm Annunciation. The location of an operated initiating device shall be displayed by an alphanumeric display at the fire alarm control unit. Unless otherwise approved, the alphanumeric display shall show the device type, floor level (if applicable), device address (if applicable), and a descriptive location for the operated device(s). The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances. Alarm annunciators shall comply with all of the following:

1. If a building has a main entrance/foyer, a remote annunciator shall be provided inside the building at the main entrance/foyer.
Exception: When the fire alarm control unit is located inside the building at the main entrance/foyer, a remote annunciator is not required at the main entrance/foyer.
2. If a building has a fire riser room with an exterior door, a remote annunciator shall be provided within the fire riser room.
Exception: When the fire alarm control unit is located within the fire riser room, a remote annunciator is not required within the fire riser room.
3. The location of an operated initiating device shall be displayed by alphanumeric display at the annunciator.
4. The alphanumeric display shall state the device type, the floor level (if applicable), the device address and a descriptive location for the operated device(s).
5. The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.

~~**10.16.1.1** Where required by other governing laws, codes or standards, the location of and operated initiating device shall be annunciated by visible means.~~

~~**10.16.1.1.1** Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout or other approved means.~~

~~**10.16.1.1.2** The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.~~

12.2.4

12.2.4* The installation of all pathway wiring, cable and equipment shall be in accordance with *NFPA 70, National Electric Code* and the applicable requirements of 12.2.4.1 through 12.2.4.5. In all occupancies, other than residential two stories or less, all wiring, including optical fiber cables, shall be in enclosed metallic conduit or shall be MI, MC, or AC cable. (SIG-FUN)

17.5.3.1

17.5.3.1 Total (Complete) Coverage. Where required by laws, codes, or standards, and unless otherwise modified by 17.5.3.1.1 through 17.5.3.1.5, total coverage shall include all rooms, halls, storage areas and basements, Attics, lofts, spaces above suspended ceilings, and other subdivisions and accessible spaces; and the inside of all closets, elevator shafts, enclosed stairways, dumbwaiter shafts, and chutes shall also have detectors if required by the authority having jurisdiction or to satisfy performance design criteria. Inaccessible areas may not be required to be protected by detectors.

17.5.3.1.6

17.5.3.1.6 When area detectors are installed instead of duct smoke detectors to comply with the Uniform Mechanical Code total coverage is defined as the area served by the air-moving equipment.

17.6.3.5.2

~~**17.6.3.5.2*** The minimum spacing of heat detectors shall not be required to be less than 0.4 times the height of the ceiling.~~

17.7.3.1.3

17.7.3.1.3 If the intent is to protect against a specific hazard, and the detectors are not otherwise required by this code or other applicable codes, the detector(s) shall be permitted to be installed closer to the hazard in a position where the detector can intercept the smoke.

17.12.2

17.12.2 Activation of the initiating device shall occur within ~~90~~ 60 seconds of waterflow at the alarm-initiating device when flow occurs that is equal or greater than that from a single sprinkler of the smallest orifice size installed in the system.

18.3.2.4

18.3.2.4 Voltage drop calculations shall be performed using one of the following methods:

- (1) The lump sum calculation method, which shall be calculated as follows:
 - (a) Calculate the voltage drop using one of these formulas:
 - i. $V_D = I * ((R * 2 * L) / 1,000)$ **OR**
 - ii. $V_D = (2 * K * I * L) / CM.$

- (b) Subtract this calculated voltage drop from 20.4 volts (V_s) in order to get the voltage value at the end of the circuit ($V_s - V_D = V_{EOL}$). The value for V_{EOL} shall be a minimum of 16 volts (the minimum operating voltage required for a listed 24 vdc notification device).
- (2) The point-to-point method, which requires a math-intensive approach where the voltage drop between each notification appliance is reiterated. This method is best done by utilizing a spreadsheet program. The calculated voltage at the last device on the circuit shall be a minimum of 16 volts (the minimum operating voltage required for a listed 24 vdc notification device).

Where:

V_D = Voltage Drop

V_s = Starting voltage (20.4vdc, or the end of useful battery life)

V_{EOL} = Voltage at the end-of-line resistor

I = Total load of the circuit in amperes utilizing current draws for each notification appliance @ 16vdc (the UL maximum draws at the minimum listed voltage).

R = Resistance in ohms per 1,000 feet, with respect to conductor

K = 10.64 ohms (the constant representing the mil-foot resistance of copper wire)

L = length of circuit in feet (distance from panel to end-of-line resistor for class B circuits)

CM = circular mill of wire, with respect to conductor.

V_{SOURCE} = voltage calculated at the previous device

<u>Wire</u>	<u>R</u>	<u>CM</u>
<u>No 18</u>	<u>7.95</u>	<u>1,620</u>
<u>No 16</u>	<u>4.99</u>	<u>2,580</u>
<u>No 14</u>	<u>3.14</u>	<u>4,110</u>
<u>No 12</u>	<u>1.98</u>	<u>6,530</u>

18.4.1.4

18.4.1.4 Audible notification appliances for alert and evacuation signal tones shall meet the requirements of ~~18.4.1.5, 18.4.3 (Public Mode Audible Requirements), 18.4.4 (Private Mode Audible Requirements), 18.4.5 (Sleeping Area Requirements), or 18.4.6 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), as applicable.~~

18.4.1.5

18.4.1.5 Voice messages shall ~~not~~ be required to meet the audibility requirements of 18.4.1.7 ~~18.4.3 (Public Mode Audible Requirements), 18.4.4 (Private Mode Audible Requirements), 18.4.5 (Sleeping Area Requirements), or 18.4.6 (Narrow Band Tone Signaling for Exceeding Masked Thresholds)~~, but and shall meet the intelligibility requirements of 18.4.10. ~~where voice intelligibility is required.~~

18.4.1.7

18.4.1.7* The minimum sound level for alarm signals shall be 80 decibels, or a minimum of 15 decibels above ambient, whichever is greater, in all occupied areas for all occupancies. One of the two methods below shall be utilized to ensure that a minimum of 80 decibels, or a minimum of 15 decibels above ambient, whichever is greater, will be achieved:

- (1) Audible notification devices shall be installed in each occupied area, including but not limited to spaces such as bathrooms, walk-in closets, storage rooms, and walk-in coolers/freezers.
- (2) In lieu of providing audible notification devices within certain spaces, calculations may be performed in order to prove that the alarm signals from the proposed adjacent audible devices will achieve a minimum of 80 decibels, or a minimum of 15 decibels above ambient, whichever is greater, inside and throughout that space, where doors or other barriers between the space and the adjacent audibility device(s) are closed.

A.18.4.1.7

A.18.4.1.7 In terms of this context, occupied areas are spaces capable of having occupancy and of such size to reasonably allow a person inside the space.

18.4.1.8

18.4.1.8 One- and Two-Family Dwellings are not required to meet the requirements of Section 18.4.1.7.

18.4.1.9

18.4.1.9 Critical care areas of health care facilities shall be allowed to have visible notification appliances in lieu of audible notification appliances when approved by the authority having jurisdiction.

18.4.1.10

18.4.1.10 Where occupants are incapable of evacuating themselves because of age, physical or mental disabilities, or physical restraint, the private mode as described in NFPA 72, National Fire Alarm Code, shall be

permitted to be used when allowed by the AHJ. Only the attendants and other personnel required to evacuate occupants from a zone, area, floor, or building shall be required to be notified when allowed by the AHJ. The notification shall include means to readily identify the zone, area, floor, or building in need of evacuation.

18.5.4.3.2

18.5.4.3.2 Visible notification appliances shall be installed in accordance with Table 18.5.4.3.1(a) or Table 18.5.4.3.1(b) using one of the following:

- (1) A single visible notification appliance
- (2) Two visible notification appliances located on opposite walls
- (3)*Two groups of visible notification appliances, where visual appliances of each group are synchronized, in the same room or adjacent space within the field of view. This shall include synchronization of strobes operated by separate systems
- (4) More than two visible notification appliances or groups of synchronized appliances in the same room or adjacent space within the field of view that flash in synchronization

Exception: Where a portion of a room or space is remodeled and new or existing strobes are within the area of the remodel, such strobes are required to synchronize with each other, but are not required to synchronize with existing strobes in the field of view if the existing strobes are outside of the remodel area and were installed prior to the adoption of the 1996, or later, edition of NFPA 72.

18.5.4.5.2

18.5.4.5.2 Documentation provided to the authority having jurisdiction shall be stamped by a licensed engineer and shall include the following:

- (1) Inverse Square Law calculations using each of the vertical and horizontal polar distribution angles in ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*, or equivalent.
- (2) The calculations shall account for the effects of polar distribution using one of the following:
 - a. The percentages from the applicable table(s) in ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*, or equivalent.
 - b. The actual results of laboratory tests of the specific appliance to be used as recorded by the listing organization.

18.5.6

18.5.6 In rooms and areas used for exhibition purposes, or in rooms and areas where racks or shelving that exceed 5' in height are expected to be installed, or in rooms and areas where wall-mounted devices may become obstructed, ceiling-mounted visual appliances may ~~shall~~ be provided or when approved by the Authority having jurisdiction, wall mounted appliances may be installed above the visible obstruction height.

- (1) When approved by the Authority Having Jurisdiction, visible notification appliances installed in accordance with the requirements of the approved design documents (Fire Protection report), and the manufactures instruction to achieve the required performance objective may be installed.

21.3.5

21.3.5* A lobby smoke detector shall be located on the ceiling within 21 ft (6.4 m) of the centerline of each elevator door within the elevator bank under control of the detector.

Exception: For lobby ceiling configurations exceeding 15 feet (4.6 m) in height or that are other than flat and smooth, detector locations shall be determined in accordance with Chapter 17.

21.7.2

21.7.2* If connected to the fire alarm system serving the protected premises, all detection devices used to cause the operation of HVAC systems smoke dampers, fire dampers, fan control, smoke doors, and fire doors shall be monitored for integrity in accordance with Section 10.17. Duct detectors connected to fire alarm systems shall be 24 vdc system-type detectors that are powered by the fire alarm system.

Exception: When duct detectors are installed in locations such as rooftops or other similar areas where extreme temperatures are to be expected, 120 vac duct detectors that are listed for the expected temperatures may be allowed to be installed when approved by the code official, as long as the duct detectors are powered from the same power source as the unit, is capable of generating a trouble signal to the FACU if the power is lost, and is capable of generating a supervisory signal to the FACU when the duct detector is activated.

21.7.4

21.7.4 Smoke detectors mounted in the air ducts of HVAC systems shall initiate ~~either an alarm signal at the protected premises or~~ a supervisory signal at a constantly attended location or supervising station.

23.2.2.4

23.2.2.4 A permit is required prior to making any changes, except for room label changes.

23.7.4

23.7.4 Emergency Voice/Alarm Communication Notification Appliance Circuits. Emergency voice/alarm communication notification appliance circuits shall be capable of full-load operation with a wiring power loss not to exceed 12.5% (0.5dB) as determined in accordance with Sections 23.7.4.1, 23.7.4.2 or 23.7.4.3.

23.7.4.1 Power Loss Calculations. A calculation for each circuit shall be provided to the authority having jurisdiction demonstrating simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB). Power loss calculations similar to the following shall be used:

$$P_{Loss} = 10 * \log [1 - ((2 * RL) / (2 * RL + (V_{Line}^2 / P_{Rated})))]$$

$$RL = (R_{Ref} / 1000) * D$$

With variables defined as follows:

D = length of wire used (in feet)

PLoss = power loss (in dB)

PRated = power driven on line from the amplifier (in watts)

RL = wire gauge resistance (in ohms)

RRef = wire resistance based on gauge of wire used (in ohms/ft.)

VLine = voltage on line (typically 25 volts or 70 volts)

Alternatively the distance may be calculated using a calculation similar to:

$$D = (61 / RRef) * (VLine squared / PRated)$$

23.7.4.2 Power Loss Tables. To ensure circuits are capable of simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB), wiring shall be limited to the distance allowed in Tables 23.7.4.2.a and 23.7.4.2.b.

Table 23.7.4.2.a, 25 V Circuit

Loudspeaker Distribution Cable Length (in feet) and Gauge for 0.5-dB Loss

Wire Gauge (AWG)	18	16	14	12	10
Cable Ohms*	16.9	10.6	6.5	4.1	2.6
Amplifier Power					
200	11	18	29	47	74
150	15	24	39	62	99
100	23	36	58	93	148
75	30	48	78	124	197
60	38	60	97	155	246
50	45	72	117	186	296
40	56	90	146	233	369
30	75	120	195	310	493
25	90	144	234	372	591

Table 23.7.4.2.b, 70 V Circuit

Loudspeaker Distribution Cable Length (in feet) and Gauge for 0.5-dB Loss

Wire Gauge (AWG)	18	16	14	12	10
Cable Ohms*	16.9	10.6	6.5	4.1	2.6
Amplifier Power					
200	90	144	234	372	591
150	120	192	312	496	788
100	180	288	468	744	1182
75	241	384	624	992	1576
60	301	480	780	1240	1970
50	361	576	935	1488	2364
40	451	721	1169	1859	2955
30	601	961	1559	2479	3940
25	722	1153	1871	2975	4728

*Cable Ohms is expressed in ohms per 1000 feet (2008 NEC Ch.9 Table 8, coated, stranded copper)

The length represented accounts for both wires in the circuit.

23.7.4.3 Manufacturers Power Loss Calculator. When allowed by the authority having jurisdiction manufacturers calculations showing circuits are capable of simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB) are acceptable.

23.8.4.8

23.8.4.8* Fire Extinguisher Electronic Monitoring Devices and Systems. ~~Signals from a fire extinguisher electronic monitoring device or fire extinguisher monitoring system transmitted to a fire alarm system shall be permitted to be supervisory signals.~~ When in an off-normal condition, a fire extinguisher electronic monitoring control unit shall send one, and only one, supervisory alarm signal to a building's fire alarm control unit.

23.8.5.1.2

23.8.5.1.2* Where connected to a supervising station, fire alarm systems employing automatic fire detectors or waterflow detection devices shall include a manual fire alarm box to initiate a signal to the supervising station. The fire alarm box shall be located adjacent to the fire alarm control unit.

Exception: Fire alarm systems dedicated to elevator recall control and supervisory service as permitted in Section 21.3 or fire sprinkler monitoring systems.

23.8.5.9.1

23.8.5.9.1 Where fire pumps are required to be monitored and a building fire alarm system is installed, a pump running signal shall be ~~permitted to be a supervisory or alarm~~ signal.

23.8.5.9.3

23.8.5.9.3 Where fire pumps are required to be monitored and a building fire alarm system is installed, the fire alarm system shall monitor all fire pump signals required at a constantly attended location in accordance with NFPA 20.

23.8.5.9.4

23.8.5.9.4 Where fire pumps are required to be monitored and a sprinkler monitoring system is installed, then the sprinkler monitoring system shall monitor all fire pump signals required at a constantly attended location in accordance with NFPA 20.

23.8.6.2

23.8.6.2* Notification Appliances in Exit Stair Enclosures, Exit Passageways, and Elevator Cars. In buildings required to be provided with emergency voice/alarm communications systems ~~Notification~~ appliances shall ~~not~~ be required in exit stair enclosures, exit passageways, and elevator cars in accordance with 23.8.6.2.1 through 23.8.6.2.4.

23.8.6.2.3

23.8.6.2.3 The evacuation signal shall not be required to automatically operate in exit stair enclosures and exit passageways. Manually activated speakers shall be provided in exit stair enclosures and exit passageways in buildings required to have Emergency Voice/Alarm Communication systems in accordance with Section 24.4.

23.8.6.2.4

23.8.6.2.4 The evacuation signal shall not be required to automatically operate in elevator cars. Manually activated speakers shall be provided in elevator cars in buildings required to have Emergency Voice/Alarm Communication systems in accordance with Section 24.4.

23.8.6.3.2

23.8.6.3.2 The boundaries of notification zones shall be coincident with building outer walls, fire walls, fire barriers, or fire-resistance rated horizontal assemblies. ~~building fire or smoke compartment boundaries, floor separations, or other fire safety subdivisions.~~ Sprinkler systems serving a notification zone shall not cross over into another notification zone. For high-rise buildings, alarms shall activate on the floor of, floor below, and floor above the floor of incidence. For all other buildings, alarms shall activate throughout the notification zone of incidence.

24.4.1.8.3

24.4.1.8.3 ~~Where provided, S~~peakers in each enclosed stairway, each exit passageway, and each group of elevator cabs within a common shaft shall be connected to ~~a separate notification zones~~ for manual paging only.

24.4.1.9.4

24.4.1.9.4 The boundaries of notification zones shall be coincident with building outer walls, fire walls, fire barriers, or fire-resistance rated horizontal assemblies. Sprinkler systems serving a notification zone shall not cross over the notification zone boundary. For high-rise buildings, alarms shall activate on the floor of, floor below, and floor above the floor of incidence. For all other buildings, alarms shall activate throughout the notification zone of incidence.

26.4.5.4

26.4.5.4* Retransmission Means. ~~The means of transmission shall be accepted by the Authority Having Jurisdiction and shall be in accordance with 26.3.6.1.6, 26.5.4.4 or Chapter 27.~~ Two means of retransmission shall be provided. The primary means of retransmission shall be a land-line telephone. The secondary means of retransmission shall be a dedicated cellular telephone.

Exception: Secondary power supply capacity shall be as required in Chapter 10.

26.4.6.1.1

26.4.6.1.1 A written log of all fire alarm signals shall be maintained in the Fire Command Center including:

1. the investigating person's name
2. the device address
3. the type of alarm
4. the date and time of receipt of fire alarm signals
5. the cause and disposition of fire alarm signals

26.6.3.1.4.3

26.6.3.1.4.3 Internet Protocol Technology

When utilizing network interface (Internet Protocol) signal transmission equipment, the supervising station shall regularly communicate (poll) with the transmitter at least once every 75 seconds and be allowed 15 seconds for the acknowledgment of such signals. Retry shall be 3 seconds between each communications attempt. A Secondary transmission means shall be provided per Section 26.6.3.2.1.4. The use of VOIP technology is not permitted.

29.8.2.2

29.8.2.2 The interconnection of smoke or heat alarms shall comply with the following:

- (1) Smoke or heat alarms shall not be interconnected in numbers that exceed the manufacturer's published instructions.
- (2) In no case shall more than 18 initiating devices be interconnected (of which 12 can be smoke alarms) where the interconnecting means is not supervised.
- (3) In no case shall more than 64 initiating devices be interconnected (of which 42 can be smoke alarms) where the interconnecting means is supervised.
- (4) Smoke or heat alarms shall not be interconnected with alarms from other manufacturers unless listed as being compatible with the specific model.
- (5) When alarms of different types are interconnected, all interconnected alarms shall produce the appropriate audible response for the phenomena being detected or remain silent.
- (6) For applications that require supervision, a listed control unit shall be installed.

NFPA 86

6.2.5.1(A) Manual Shutoff Valves.

(A) Individual manual shutoff valves for equipment isolation shall be provided for shutoff of the fuel to each piece of equipment. Valves for fuel supply lines shall be located within 6 feet (1829 mm) of the appliance served.

Exception: When approved and the valve is located in the same general area _____ as the appliance served.

NFPA 160

5.5.1(3)

5.5.1(3) An approved fire watch according to IFC Section 901.7 ~~capable of directing the operation of all fire protection and life safety systems installed in the building is present.~~

7.1.4

7.1.4 The separation distance between the flame effect and the audience shall be such that the incident thermal radiation received does not exceed that calculated by the following equation:

$$T = [35 / q] ^ {1.33}$$

Where:

T= time in seconds

q = incident thermal flux in kW/ m ²

The value of q can also be taken from Figure A7.1 of NFPA 160.

When applying the preceding equation to an effect with a duration of 4 seconds or less, the time used in calculating the maximum acceptable level of incident thermal flux shall correspond to the root mean squared (RMS) value of the peak incident thermal flux.

The incident radiation should not cause the surface temperature of the exposed skin of a member of the audience to exceed 111° F (44.0) °C. Incident radiation shall be measured with a radiometer. Skin temperature may also be measured with an infrared surface temperature thermometer or other equivalent means.

8.1.3

8.1.3 The operator shall be licensed in accordance with NRS 477 and NAC 477.

NFPA 385

9.2.3

9.2.3 ~~During transfer of Class I liquids, n~~ Motors of tank vehicles or motors of auxiliary or portable pumps shall be shut down during the making and breaking of hose connections.

9.2.3.1

9.2.3.1 Where loading or unloading is done without requiring the use of the motor of the tank vehicle, the motor shall be shut down throughout the transfer operations. ~~of Class I liquids.~~

9.3.3

9.3.3 Fire extinguishers shall be kept in good operating condition at all times and shall be located in an accessible place on each tank vehicle. During unloading of the tank vehicle, the portable fire extinguisher shall be out of the carrying device on the vehicle and shall be 15 feet (4572 mm) or more from the unloading valves.

NFPA 407

5.3.4

5.3.4 Emergency fuel shutoff systems shall be operationally checked at intervals not exceeding ~~6~~ 3 months. Each individual device shall be checked at least once during every 12-month period.

5.10.1

5.10.1 Aircraft fuel servicing (also called aircraft fuel-transfer operations) shall be performed outdoors. Aircraft fuel servicing incidental to aircraft fuel system maintenance operations shall comply with the requirements of NFPA 410.

Exception: In aircraft hangers built in accordance with the provisions of the International Building Code for Group F-1 occupancies, aircraft fuel transfer operations are allowed where:

1. Necessary to accomplish aircraft fuel-system maintenance operations. Such operations shall be performed in accordance with nationally recognized standards; or
2. The fuel being used has a flash point greater than 100 degrees F.

5.12.3

5.12.3 Parking brakes shall be set on all fuel servicing vehicles or carts before operators begin the fueling operations. At least two chock blocks not less than 5 inches by 5 inches by 12 inches (127 mm by 127 mm by 305 mm) in size and dished to fit the contour of the tires shall be utilized and positioned in such a manner as to preclude movement of the vehicle in any direction.

5.13.4

5.13.4 Where the open-hose discharge capacity of the fueling system is not more than 200 gallons per minute, a minimum of two listed portable fire extinguishers having a minimum rating of 20-B:C shall be provided. Where the open hose discharge capacity of the aircraft fueling system or equipment is more than 200 gpm (750 L/min) but not more than 350 gallons per minute, at least one listed wheeled extinguisher having a rating of not less than 80-B:C and a minimum capacity of 125 lb (55 kg) of agent shall be provided. Where the open hose discharge capacity of the fueling system is more than 350 gallons per minute, a minimum of two listed wheeled extinguishers having a minimum rating of 80 B:C each and a minimum capacity of 125 lb of agent shall be provided.

NFPA 1126

8.1.6.1

8.1.6 Fire Detection and Life Safety Systems.

8.1.6.1 Indoor pyrotechnic displays shall only be permitted in venues provided with automatic sprinklers throughout.

8.1.6.2

8.1.6.2 Portions of fire detection and life safety systems specific and limited to the pyrotechnic effects shall be permitted to be interrupted, bypassed, only as required to prevent a nuisance alarm during the operation of temporarily installed pyrotechnic effects when the following conditions are met:

- (1) Approval of the authority having jurisdiction and as defined on the permit application.
- (2) Approval by the owner, venue operator ~~owner's or their agents.~~
- (3) Presence of an approved fire watch capable of directing the operation of all fire detection and life safety systems installed in the building.
- (4) Waterflow switches and fire alarm notification systems shall not be permitted to be disabled or bypassed.
- (5) System bypass shall only be performed by a licensed fire alarm contractor or an owner's representative as approved by the authority having jurisdiction.

NFPA 2001

5.1.1

5.1.1 Specifications. Specifications for total flooding and local application clean agent fire extinguishing systems shall be prepared under the supervision of a person fully experienced and qualified in the design of such systems and with the advice of the AHJ. Starting on January 1, 2012, plans for clean agent extinguishing system installations shall have a wet signature of a minimum NICET Level II designer for Special Hazards Suppression Systems. The specifications shall include all pertinent items necessary for the proper design of the system, such as the designation of the AHJ, variances from the standard to be permitted by the AHJ, design criteria, system sequence of operations, the type and extend of the approval testing to be performed after the installation of the system, and owner training requirements.

5.1.2.2 (23)

5.1.2.2(23) Complete step-by-step description of the system sequence of operations, including, but not limited to, the operation of all applicable initiating devices, the operation of audible and visual pre-discharge and post-discharge alarms, functioning of abort and maintenance switches, delay timers, and emergency power shutdown.

5.1.2.2 (28)

5.1.2.2(28) Pressure relief vent area, or equivalent leakage area, for the protected enclosure to prevent development, during system discharge, of pressure difference across the enclosure boundaries that exceeds a specified enclosure pressure limit. For clean agent systems that utilize inert gases as the extinguishing agent, an analysis prepared by a licensed engineer that provide vent area calculations shall be submitted and approved.

5.3.6

5.3.6 The protected enclosure shall have the structural strength and integrity necessary to contain the agent discharge. If the developed pressures present a threat to the structural strength of the enclosure, venting shall be provided to prevent excessive pressures. Designers shall consult system manufacturer's recommended procedures relative to enclosure venting. [For pressure relief vent area or equivalent leakage area, see 5.1.2.2(28)]. For clean agent systems that utilize inert gases as the extinguishing agent, a licensed engineer shall provide a report which includes the pressure relief vent area calculations and includes the design of the overall

ventilation system serving the enclosure(s) in order to ensure that the ventilation system will prevent over-pressurization and potential structural damage to the enclosure(s).