

# CENTRAL ARIZONA FIRE AND MEDICAL AUTHORITY

## CONSTRUCTION GUIDELINES FOR CONTRACTORS AND ARCHITECTS

### INTRODUCTION

Pursuant to Section 101 of the International Fire Code, 2018 edition, with local amendments, the following specifications and regulations pertain to the design, construction and installation of built-in fire protection and life safety features required for buildings or property improvements.

These regulations include specifications based on requirements in the International Fire Code (IFC), National Fire Protection Association (NFPA) Standards, as well as other standards referenced by the 2018 IFC.

**These standards are only intended to cover the most frequently asked questions within the code and may not be all inclusive.** Items such as flammable liquids and hazardous material are so specific to the building or complex being constructed that the code must be referenced in order to determine specific requirements.

The Central Arizona Fire and Medical Authority Fire Prevention staff is available to answer your questions or consult on projects Monday-Thursday, 7:00 a.m. to 5:00 p.m. You may call for an appointment or have a phone discussion, (928) 772-7711.

Rick Chase

Fire Marshal

The Central Arizona Fire and Medical Authority provides fire protection to an approximately 365 square mile area surrounding the greater Prescott area to include the following major areas:

- Town of Chino Valley
- Town of Dewey-Humboldt
- Town of Prescott Valley
- Paulden (areas within the Fire Authority)
- Unincorporated Prescott (within the Fire Authority)

The following subdivisions require automatic fire sprinklers regardless of square footage:

- American Ranch- (limited area on Callahan Rd. and Phantom Hill Rd.)
- Avalon Estates
- Chaparral Heights
- Creekside at Prescott- (limited area on Hunter Ridge Rd)
- Granite Mountain Homesites
- Granite Park Ranch
- Meadow Ranch
- Mint Creek Ranch
- North Arrow Ranch
- Preserve at the Ranch
- Ventura Ranch
- Wagon Wheel Ranch

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## ADMINISTRATIVE RULES

The following rules, regulations and standards shall be observed in connection with all property improvements within the Central Arizona Fire and Medical Authority (CAFMA) where fire code enforcement is required.

Applicable sections of the International Fire Code, 2018 Edition, are referenced at each section by the designation "Ref."

## DEFINITIONS

The following definitions shall apply to these rules, regulations and standards:

**"Approved"** shall mean acceptable to the Fire Code Official of the Central Arizona Fire and Medical Authority.

**"Amended construction documents"** shall mean drawings, blueprints, sketches or similar renditions, drawn to scale, that accurately reflect the configurations of equipment or a system as it is installed on the premises.

**"Fire access route"** shall mean any approved road, street, alley, fire lane or similar roadway that is intended for use by Fire apparatus.

**"Fire area"** shall mean the aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or horizontal assemblies of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are included within the horizontal projections of the roof or floor next above.

**"Fire Code Official"** shall mean the Central Arizona Fire and Medical Authority Fire Marshal or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative.

**"Fire flow"** shall mean the quantity and duration of water flow required or available for fire protection in addition to the normal average domestic consumption in the same area.

**"Fire protection system or equipment"** shall refer to any automatic fire sprinklers, standpipes, fire detection and alarm systems, fire extinguishing systems, commercial kitchen suppression systems, and similar equipment designed to detect, control or prevent the spread of fire.

**"GPM"** shall mean a flow rate measured in gallons per minute.

**"NFPA"** shall mean the National Fire Protection Association.

**"PSI"** shall mean pressure measured in pounds per square inch.

**"IBC"** shall mean the latest edition of the International Building Code that has been adopted by the Town of Prescott Valley, Town of Dewey/Humboldt, Town of Chino Valley and/or Yavapai County.

"**IFC**" shall mean the 2018 Edition of the International Fire Code with local amendments that has been legally adopted by the Central Arizona Fire and Medical Authority.

"**UL**" shall mean Underwriters Laboratories.

"**Private Fire Service Mains**" shall mean the piping coming from the private or municipal water supply to the fire sprinkler riser or other sprinkler apparatus such as remote fire department connections, fire pump and tanks, etc.

## SUBMISSION OF PLANS

REF: IFC 105.4

### SEE SPECIFIC SECTIONS FOR FIRE PROTECTION EQUIPMENT

1. Plans for property improvements shall be submitted in accordance with the rules, regulations, and policies of the planning and zoning or building department that has jurisdiction.
  - a. A minimum of three sets of building plans and specifications shall be reviewed by the Fire Authority for compliance with applicable codes and standards. These plans are provided by the building department having jurisdiction. The Fire Authority shall retain one set and the other two shall be returned to the building department having jurisdiction.
  - b. To assist developers, contractors, and/or property owners in designing practical and code compliant buildings, pre-construction meetings should be conducted during the design phase of a project. The purpose of these meetings shall be to clarify code requirements and to find solutions to possible construction problems. These meetings shall be scheduled through the building department having jurisdiction.
  - c. Plans shall be submitted and permits obtained for built-in fire protection systems; four sets of plans shall be submitted directly to the Fire Prevention Division of Central Arizona Fire and Medical Authority. These systems include automatic fire sprinklers, standpipes, fire detection and alarm systems, fire extinguishing systems, commercial kitchen suppression systems, and similar equipment designed to detect, control or prevent the spread of fire.
  - d. Plans shall be submitted and permits obtained for private fire service mains, remote fire department connections, and similar equipment designed to control or prevent the spread of fire. Four sets of plans shall be submitted directly to the Fire Prevention Division of Central Arizona Fire and Medical Authority.
  - e. Applicable fees shall be paid at the time of submission.
2. Site plans for Fire Authority review shall include the following information:
  - a. Location and configuration of the proposed property improvement, showing its relationship to other buildings, property lines, nearest streets, roadways, alleys or Fire access routes;
  - b. Location of existing underground water mains, the diameter of those water mains, fire hydrant locations;
  - c. Location, width, overhead obstructions and construction of all streets, roadways, alleys, bridges, fire lanes or Fire access routes on the site to be improved; Location of any temporary and/or permanent fences, walls, gates, arches, berms or any other security

- or ornamental features that may affect Fire access to and/or on the site during construction and occupancy; and;
- d. Location of any unusual or remarkable topographical features, landscaping, vegetation, or other features that may affect Fire access to and/or on the site during construction and occupancy.

**EXCEPTION:** When a project developer has submitted a preliminary site plan for review by the Fire Code Official, the Fire Code Official may waive any or all of the above requirements.

3. When a site plan is not required for a building permit, the Fire Code Official shall be consulted regarding specifications for built-in fire protection facilities.
4. Plans and specifications (shop drawings and product data) for fixed fire protection systems, including but not limited to, automatic fire sprinkler systems, fire extinguishing systems, fire detection and alarm systems, commercial kitchen suppression systems, fire standpipe systems, private fire service mains, and fire pumps shall be submitted to the Fire Code Official for review and approval **prior** to installation. **All fire protection systems submittals shall be deferred to CAFMA.**
  - a. Plans and specifications shall include at least the information specified in the appropriate chapters of these standards and shall include specifications sheets and manufacturer's catalog displays of all components of the fixed fire protection system and any calculations required.
  - b. A permit or affidavit is required for any installation or modification of a fire protection system. Permit forms can be obtained online at [www.cazfire.gov](http://www.cazfire.gov), or at the CAFMA Administrative Headquarters.
5. Additions to an existing fire protection system in buildings requiring plans shall include the existing system in the plans for the new system.

#### **ACTION FOR APPROVAL BY THE FIRE CODE OFFICIAL**

**REF: IFC 105.4**

1. All plans submitted to the Fire Code Official shall be approved, approved with corrections, or rejected.
  - a. When plans are approved or approved with corrections, the Fire Code Official shall forward a copy of the corrections to the Building Official and the project representative. A copy of the corrections shall be kept on file at the Fire Authority.
  - b. When rejecting a plan, the Fire Code Official shall forward a copy of the decision to the Building Official and project representative, setting forth the reasons for denial. A pre-construction meeting may be conducted to clarify code requirements.



1. Any administrative decision relating to the requirements for fire protection may be appealed in accordance with the latest edition of the International Fire Code as amended by the Central Arizona Fire and Medical Authority.
  - a. Appeals of administrative decisions relating to requirements for fire protection shall be made in writing to the Central Arizona Fire and Medical Authority Board of Appeals or by calling (928) 772-7711 and requesting that a variance request form be mailed, emailed or faxed to you. The Board of Appeals may be contacted at the following address:

Central Arizona Fire and Medical Authority  
Fire Prevention Division, Board of Appeals  
8603 E. Eastridge Drive Prescott Valley, Arizona 86314  
Telephone: (928) 772-7711  
FAX: (928) 772-8800

1. The developer or contractor shall be responsible for notifying the Central Arizona Fire and Medical Authority Fire Prevention Division for inspection of all fire protection requirements. Inspections shall be scheduled by the contractor through CAFMA administration, (928) 772-7711.
  - a. The developer/contractor shall provide at least twenty-four (24) hours notice to the Fire Prevention Division to arrange an inspection.
  - b. In special cases, such as large or unusually complicated fire protection systems, the Fire Code Official may require more than twenty-four (24) hours notice to arrange an inspection.
2. If, when inspecting or witnessing a test of a fire protection system, the Fire Code Official observes a violation of the building code or construction standards, he or she shall promptly notify the appropriate Building Official and the contractor.
3. The Fire Code Official shall not approve the occupancy until he or she is satisfied that the requirements for fire protection have been met, and the actual construction of all fire protection equipment has been completed in accordance with the approved plan, accepted standards, or nationally recognized good practice.
4. When the Fire Code Official has been notified by the Building Official that a temporary or permanent Certificate of Occupancy has been or may be issued; he or she shall arrange to have the premises inspected for compliance with the conditions of the International Fire Code and its related standards.
  - a. If, at the time of this inspection, requirements specified during the plan review are not completed or other fire safety hazards are identified, the Fire Code Official shall issue a notice to the person responsible for the premises. This notice shall specify the necessary corrections and shall set forth a deadline for compliance.

1. Permits shall be valid for 180 days. Extensions may be granted if requested in writing prior to the permit expiration date.
  - a. After a period of one year (365 days), a new permit will be required.

**See the Prevention tab at: [www.cazfire.gov](http://www.cazfire.gov)**

## **BUILDINGS UNDER CONSTRUCTION**

### **PERMITS AND APPROVED PLANS**

**REF: IFC 105**

1. A complete set of Fire Authority approved plans, including plans for fire protection systems and private fire service mains, shall be available at the job site for review by the Fire Code Official at the time of the requested inspection.
  - a. Inspections will not be conducted without approved plans on site. If upon arrival, approved plans are not available, a failed inspection will be noted, and may result in additional fees.

### **WATER SUPPLY**

**REF: IFC 507, 3312, APPENDIX B&C**

1. A water source capable of supplying the required fire flow, either temporary or permanent, shall be made available prior to combustible materials being delivered to the construction site.
  - a. Temporary water supply arrangements shall have prior approval of the Fire Code Official. If a municipal or private water service is used, all connections shall have prior approval.
  - b. Fire hydrants shall be placed in service prior to combustible materials being delivered on the building site.
  - c. Hydrants shall be maintained clear and accessible for fire protection equipment to meet requirements set forth in the plan review by the Fire Authority.

### **ACCESS ROADS**

**REF: IFC 503**

1. All-weather access roadways for use of heavy firefighting apparatus shall be provided to the immediate job site at the start of construction.
  - a. The temporary fire access route shall be at least twenty (20') feet in width, shall have an unobstructed vertical clearance of at least thirteen feet, six inches (13' 6"), and shall be capable of supporting the imposed load of fire apparatus weighing up to seventy-five thousand (75,000) pounds.
2. All temporary fire access routes, where required, shall be maintained until all construction is completed. Permanent fire apparatus access routes shall be completed prior to occupancy.
3. Arrangements shall be made to assure immediate Fire access to the site at all times during construction. This may include signage as required by the fire code official.

## PORTABLE FIRE EXTINGUISHERS

REF: IFC 3315

1. A sufficient number of approved portable fire extinguishers, as specified by the Fire Code Official, shall be provided at the construction site.
  - a. The size, type and number of extinguishers shall be based on the relative hazards, the potential for fire spread, and the job site area.
2. When a construction site mobile office is provided, a minimum of one (1) portable fire extinguisher with a minimum UL classification of 2-A:10-B:C shall be available at that location.

## FIRE HAZARD ABATEMENT

REF: IFC 3304

1. Excess debris, wrapping paper, wood packing materials, cardboard, insulation and other loose combustible materials shall not be allowed to accumulate inside any building under construction.
  - a. Debris that is removed from the building shall be piled or stacked not less than fifty (50) feet from the building or in an approved refuse container at least ten (10) feet from the building.

## FLAMMABLE & COMBUSTIBLE LIQUIDS STORAGE AT CONSTRUCTION SITES

REF: IFC 3304, 3305, 5706.2, NFPA 58

1. Flammable or combustible liquid containers, and/or liquefied petroleum gas tanks or cylinders shall be removed from the building at the end of each working day, and stored in a secure, detached location away from the building.
2. Temporary portable heating appliances shall be turned off when unattended. Such temporary heating devices shall be used in accordance with NFPA 58.

**EXCEPTION:** Heaters used for drying newly installed wallboard may be left on provided that all combustibles are located at least ten (10) feet from the unit, and fuel gas cylinders, if used, are adequately secured against tipping over. Heaters used shall be UL listed for this purpose.

3. Bulk flammable or combustible liquid storage at construction sites shall be in accordance with the International Fire Code and shall meet the approval of the Fire Code Official.
4. Approved containers having a capacity of not more than sixty (60) gallons may be used for the storage of flammable and combustible liquids at construction sites.
  - a. Discharge devices shall not be of a type that develops internal pressure on the container. Pumping devices or approved self-closing faucets used for dispensing liquids shall not leak and shall be well maintained. Individual containers shall not be interconnected and shall be kept closed when not in use.

## TEMPORARY TANKS FOR STORAGE AND USE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

REF: IFC 5704

1. Temporary aboveground tanks of between sixty-one (61) and ten thousand (10,000) gallon capacity shall comply with IFC Chapter 57 and with the following:
  - a. Must submit plans, obtain permit and pay applicable fees to CAFMA.
  - b. Tanks shall be adequately safeguarded (fence, barrier posts per Code, etc.) from vehicular damage.
  - c. Tanks shall be adequately safeguarded from tampering when not in use.
  - d. Smoking or open flames within fifty (50) feet of any tank or product distribution point shall be prohibited.
  - e. Tanks and containers for the storage of flammable or combustible liquids aboveground shall be conspicuously marked with the product name and "FLAMMABLE - KEEP FIRE AND FLAME AWAY."
  - f. Tanks shall bear the marking "KEEP 50 FEET FROM BUILDING".
  - g. Flammable liquids such as gasoline shall not be dispensed by gravity. Dispensing shall be accomplished with an approved pumping device permanently attached to the tank. An effective anti-siphoning device shall be included in the pump discharge unless a self-closing nozzle is provided.
  - h. A 2A:20B:C fire extinguisher shall be available within seventy-five (75) feet of the dispensing device.
  - i. Diking capable of containing the entire contents of the tank shall be provided around the tanks or other approved secondary containment shall be provided
  - j. Temporary tanks shall be removed at completion of construction.
2. Temporary electrical wiring may be allowed as long as it is installed in accordance with the National Electric Code and approved by the Building Official or his or her designee.

## WELDING AND OTHER HOT WORK

REF: IFC 3504

1. Open flame cutting, welding, brazing, or soldering operations shall be conducted with due care to prevent sparks or hot metal from starting fires. A hot work permit is required during Stage II fire restrictions; information related to current fire restriction conditions is available at [www.cazfire.gov](http://www.cazfire.gov).
  - a. A fire watch shall be provided during hot work activities and shall continue for not less than 30 minutes after the conclusion of the work.
  - b. The person performing the operation shall have not less than one fire extinguisher with a minimum rating of 2A:20B:C available within 30 feet.
  - c. An appointment to obtain a permit can be made by calling the CAFMA office at 928-772-7711.

1. Asphalt kettles or trailers used in roofing operations shall comply with the following:
  - a. Asphalt kettles shall not be used inside of or on the roof of any building.
  - b. There shall be at least one approved 3A:40B:C fire extinguisher within twenty-five (25) feet of each asphalt kettle during such periods when the kettle is in use, and an additional 3A:40B:C extinguisher shall be available on the roof. Portable fire extinguishers shall remain unobstructed and clearly visible and maintained in an operable condition at all times.

**Note:** Charged garden hoses **shall not** be used to meet this requirement.

- c. Asphalt kettles or trailer shall not be located within 20 feet of any combustible material, combustible building surface or any building opening.

## FIRE AUTHORITY ACCESS TO BUILDINGS

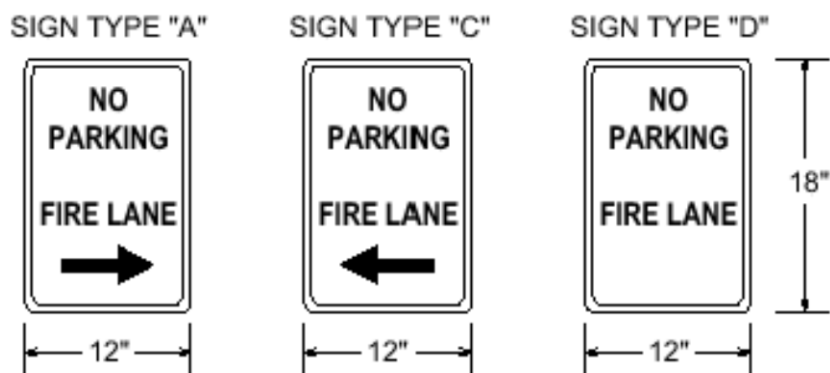
### FIRE APPARATUS ACCESS ROADS

REF: IFC 503, APPENDIX D

1. Every building hereafter constructed shall be accessible to Fire apparatus by way of an approved access roadway with an all-weather driving surface capable of supporting the imposed load of fire apparatus weighing up to seventy-five thousand (75,000) pounds.

**EXCEPTION:** Group R3 and Group U occupancies.

- a. Approved fire apparatus access roads shall be provided when any portion of an exterior wall of the first story of a building is located more than one hundred fifty (150) feet from Fire apparatus access on a public street as measured by an unobstructed route around the exterior of the building.
  - b. More than one fire apparatus access road may be required when it is determined by the Fire Code Official that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.
  - c. The Fire Code Official is authorized to increase the dimension of 150 feet if the building is equipped throughout with an approved automatic sprinkler system.
2. Permanent fire apparatus access routes shall be constructed to meet the standards of the applicable development services department.
    - a. Temporary roads installed during building construction shall comply with the requirements of Chapter 2, of these Standards.
  3. Fire apparatus access roads shall be a minimum of twenty (20) feet in width, except as modified in these standards, and shall have a minimum vertical clearance of thirteen feet, six inches (13' 6").
  4. Dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved area for turning around fire apparatus.
  5. Where required by the Fire Code Official fire apparatus access roads with a width of only twenty (20) feet shall be marked with permanent "NO PARKING -- FIRE LANE -- BY ORDER OF THE FIRE MARSHAL" signs. Signs shall measure twelve by eighteen (12x18) inches, have red letters on a white background.



- a. Signs shall be installed at the entrance to the fire apparatus access route and at intervals determined by the Fire Code Official.
6. Fire apparatus access roads shall not exceed 12 percent grade. The fire code official may permit the access road grade to increase but shall not exceed 15 percent when fire sprinkler protection is installed.
7. The minimum turning radii for all turns shall be twenty-eight (**28**) feet inside turning radius and fifty (**50**) feet outside turning radius.

## BUILDING ACCESS FOR AERIAL FIRE APPARATUS

REF: IFC APPENDIX D105

1. Where the vertical distance between the grade plane and the highest roof surface exceeds 30 feet, approved aerial fire apparatus access roads shall be provided. For purposes of this section, the highest roof surface shall be determined by measurement to the eaves of a pitched roof, the intersection of the roof to the exterior wall, or the top of parapet walls, whichever is greater.
  - a. Access roadways required for ladder operations shall be a minimum of twenty-six (26) feet in width exclusive of shoulders, in the immediate vicinity of any building or portion thereof.
  - b. At least one of the required access roadways meeting this condition shall be located within a minimum of fifteen (15) and a maximum of thirty (30) feet from the building and shall be positioned parallel to one entire side of the building. The side of the building on which the access road is positioned shall be approved by the Fire Code Official.

**Note:** The measurement for this requirement shall be taken from the exterior wall of the building to the nearest edge of the fire apparatus access road.

- c. Overhead utility and power lines shall not be located over the aerial fire apparatus access road or between the aerial fire apparatus road and the building.



1. Dead-end fire apparatus access roads shall meet the requirements of the following Table 3.04:

**REQUIREMENTS FOR DEAD-END FIRE APPARATUS ACCESS ROADS**

LENGTH (feet)	WIDTH (feet)	TURNAROUNDS REQUIRED
0 – 150	20	None required
151-500	20	120-foot Hammerhead, 60-foot “Y” or 96-foot-diameter cul-de-sac in accordance with Figure D103.1
501-750	26	120-foot Hammerhead, 60-foot “Y” or 96-foot-diameter cul-de-sac in accordance with Figure D103.1
Over 750	Special approval required	

- a. Curves and topographical conditions may alter the requirements for turnarounds and the width of access roads.
2. The drawings in Appendix D of these standards illustrate approved fire apparatus access road turnarounds as well as acceptable sizes for cul-de-sacs.

**PERMISSIBLE MODIFICATIONS**

1. When buildings are equipped with an approved automatic sprinkler system, the Fire Code Official **may** authorize modification of the full standard fire apparatus access road and/or turnarounds.
2. When the building or complex of buildings to be served is protected by an approved automatic sprinkler system, the access road may be greater than 150’ in length and the maximum length shall be determined by the Fire Code Official.

**FIRE HYDRANTS ALONG FIRE APPARATUS ACCESS ROADS**

1. An all-weather surface access to fire hydrants shall be maintained to accommodate the necessary firefighting apparatus.
2. Hydrant spacing and distribution along fire apparatus access roads shall be as specified in Appendix C of the International Fire Code.

## **ACCESS TO INDIVIDUAL STRUCTURES OR TENANT SPACES**

**REF: IFC 506**

1. When a property within the Fire Authority is protected by any fire protection system or as required by the Fire Code Official, a KNOX key box shall be installed on the property in a location approved by the Fire Code Official. Such boxes shall contain the following:
  - a. Keys to locked points of egress whether on the exterior or interior of the building.
  - b. The keys to any room in which the fire alarm panel or fire sprinkler system riser may be located.
  - c. Keys to other areas as directed by the Fire Code Official.
  - d. The keys that operate the elevator recall and emergency override systems.
  - e. When electronic locks are employed, the key box shall contain a copy of the appropriate codes that provide access and/or electronic swipe cards or fobs.
2. The Fire Code Official may specify more than one key box be installed on a building. Where factors require multiple key boxes or alternate locations, the Fire Code Official or designee shall approve those locations.
3. Key boxes may be purchased from an approved company as specified in Appendix I. If only one key box is required, it shall be installed adjacent to the main entrance. It shall be clearly visible and mounted at minimum height of five feet (5') from grade or a maximum height of six feet (6') from grade.
4. All keys shall be clearly marked to indicate the door, room, area or lock they serve.
5. Residential property shall be exempt from this requirement.

## **ACCESS TO GATED COMMUNITIES, GATED AREAS, AND MINI-STORAGE FACILITIES**

**REF: IFC 506**

1. All subdivisions, communities and mini-storage and other facilities in the Central Arizona Fire and Medical Authority that install gates or other approved barricade methods to prevent and/or control access shall provide an approved Knox Key System for Fire Authority access. Gates shall be electric and shall be provided with approved preemption controls, a KNOX key switch and a manual release. The emergency key switch shall be mounted on a 5 ½ foot pedestal per Central Arizona Fire and Medical Authority specifications. See Appendix II for detail.
  - a. Key switches, padlocks, and boxes may be purchased from an approved company as specified in Appendix I.

## ADDRESSING

### ADDRESS AND PREMISE IDENTIFICATION

REF: IFC 505

1. Approved address numbers shall be placed on all new and remodeled buildings, including all residential properties, in such a position as to be plainly visible and legible from the road or street fronting the property.

**Note:** Address assignments are made by the appropriate addressing division of each Town or County.

2. New and existing buildings shall have approved address numbers, building numbers or building identification placed in a position that is high on the corner of the structure, plainly legible and visible from any street(s) or road(s) fronting the property. These numbers shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall be a minimum of 6 inches high with a minimum stroke width of 0.5 inch. Address numbers should be proportionate to building size and larger numbers may be required by the fire code official to facilitate emergency response.
  - a. When address numbers are located on clear glazing such as on doors or windows, the numbers shall be white to achieve contrast during all lighting conditions.
3. Where the building is not visible from the street or more than one building is on a site, such as a building on a long driveway or private roadway, provision shall be made to clearly identify which driveway or roadway serves the appropriate address at the entrance to the driveway or roadway.
4. Each suite or unit shall be separately identified and the unit numbers shall be a minimum of six (6) inches high and having a principal stroke of one-half (1/2) inch in width. The numbers shall be prominently displayed at the front and rear access doors. Numbers may be required to be larger as determined by the Fire Code Official.

## WATER SUPPLY AND FIRE FLOWS

### GENERAL SPECIFICATIONS

REF: IFC 507, 903, APPENDIX B

1. Fire Authority hose connections and control valves used in connection with fire protection equipment shall be installed at locations and to the specifications approved by the Fire Code Official.
2. All required fire flows, either temporary or permanent, shall be available at a minimum residual pressure of twenty (20) psi.
3. Per the Tables in Appendix B any building or subdivision in the fire authority shall meet fire flows. The requirement may be met by fire hydrant(s), fire sprinkler system or water tanks in accordance with NFPA 1142 (where municipal water supply is not available). All buildings over 5,000 square feet require a fire sprinkler system. Certain types of occupancies require fire sprinklers at other square footage.

**Exception:** Group U occupancies.

### QUANTITY

REF: IFC APPENDIX B

1. The required quantity of water shall be equal to the calculated fire flow for the greatest hazard or protected risk in the proposed development, and shall be based on a minimum demand as required by the Tables in Appendix B.
2. Where the existing fire flow on a system is inadequate, or a new system is proposed, engineering design calculations to verify fire flow availability shall be provided to the Fire Authority by the developer.
3. Required fire flow for buildings shall be determined by the Fire Code Official using the Tables in Appendix B or NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting.
4. Fire barriers, constructed in compliance with the International Building Code shall be considered as dividing a building into separate fire areas for the purpose of determining required fire flow.
  - a. Area separation walls shall not be allowable in Group R-3 occupancies.
5. The minimum required fire flow for any newly developed area shall be as required in Appendix B.

**Exception:** The Fire Code Official may allow fire flows in isolated residential developments to be met by requiring fire sprinklers in all buildings and residences when fire flows cannot be met by water storage and fire hydrants.

**Exception:** The Fire Code Official is authorized to utilize NFPA 1142 to calculate fire flow requirements in rural areas without municipal water supplies.

**Note:** The required fire flow for any one building or occupancy within that area may exceed these minimums. Care should be taken in designing the water supply system to meet the anticipated demand specified by the Tables in Appendix B of the IFC.

6. The delivery of required fire flows by private water systems is permissible, provided that:
  - a. The design and installation are based on NFPA Standard 24, Edition referenced in the current Fire Code, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".
    - i. The system shall be designed and engineered to meet the required fire flows as established by the Fire Code Official. Engineering calculations to verify the anticipated flows shall be submitted at the time of plan review.
  - b. Provisions shall be made to keep reservoirs and tanks full and in a ready condition at all times utilizing a float system and back-up generators.
  - c. The water supply shall be capable of delivering the required fire flow as required by the Tables in Appendix B.

**B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.**

The minimum *fire-flow* and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.1(1) and B105.1(2).

**TABLE B105.1(1)  
REQUIRED FIRE FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES**

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
0–3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required fire-flow rate
0–3,600	Section 903.3.1.3 of the <i>International Fire Code</i> or Section P2904 of the <i>International Residential Code</i>	500	1/2
3,601 and greater	Section 903.3.1.3 of the <i>International Fire Code</i> or Section P2904 of the <i>International Residential Code</i>	1/2 value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)  
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute) <sup>a</sup>	FLOW DURATION (hours)
Type IA and IB <sup>a</sup>	Type IIA and IIIA <sup>a</sup>	Type IV and V-A <sup>a</sup>	Type IIB and IIIB <sup>a</sup>	Type V-B <sup>a</sup>		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	4
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a.Types of construction are based on the *International Building Code*.

b.Measured at 20 psi residual pressure.

**B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.**

The minimum *fire-flow* and flow duration for buildings other than one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.2 and B105.1(2).

TABLE B105.2  
REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the <i>International Fire Code</i>	25% of the value in Table B105.1(2) <sup>a</sup>	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the <i>International Fire Code</i>	25% of the value in Table B105.1(2) <sup>b</sup>	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a.The reduced fire flow shall be not less than 1,000 gallons per minute.

b.The reduced fire flow shall be not less than 1,500 gallons per minute.

**B105.3 Water supply for buildings equipped with an automatic sprinkler system.**

For buildings equipped with an *approved automatic sprinkler system*, the water supply shall be capable of providing the greater of:

- 1.The *automatic sprinkler system* demand, including hose stream allowance.
- 2.The required *fire flow*.

1. The Fire Code Official may increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall be not more than twice that required for the building under consideration.
  - a. The Fire Code Official may reduce the fire-flow requirements for an isolated building or group of buildings in rural areas or in small communities where the development of full fire flow requirements is impractical. NFPA 1142 shall be utilized to determine methods for providing fire flows.
2. Due to fluctuating water tables, an assured water source is required for all residential sprinkler systems. This shall be supplied by a storage tank and listed pump.

## **FIRE HYDRANTS**

### **GENERAL SPECIFICATIONS**

**REF: IFC 507, TABLE C102.1**

1. Fire hydrants shall be installed in accordance with the Fire Authority requirements and NFPA 24 in conjunction with the local water authority requirements.
2. Fire hydrant placement and quantity shall be determined and approved by the Fire Code Official.

### **PROTECTION**

**REF: IFC 507, 312**

1. When required by the Fire Code Official, fire hydrants that are exposed to vehicular damage shall be protected by appropriate guard posts or other approved means. Acceptable protection shall consist of guard posts installed in the following manner:
  - a. Guard posts shall be constructed of steel not less than four (4) inches in diameter and shall be concrete filled.
  - b. Guard posts shall be set not less than three (3) feet deep in a concrete footing of not less than a fifteen (15) inch diameter.
  - c. Guard posts shall be set with the top of the posts not less than three (3) feet above ground.
  - d. Guard posts shall be located a minimum of three (3) feet from the hydrant and shall be located no more than four (4) feet apart.
  - e. Guard posts shall not interfere with the use or operation of the fire hydrant. The number of posts provided shall be sufficient to adequately protect the hydrant.
2. Barriers other than guard posts as specified above that are designed to resist, deflect or visually deter vehicular impact commensurate with an anticipated impact scenario may be permitted when approved by the Fire Code Official.

### **MARKING AND CLEARANCE**

**REF: IFC 503.3**

1. When required by the Fire Code Official, paved areas within the vicinity of a hydrant shall be permanently marked by painting the curb red, striping, or signage.
2. When special circumstances occur, the Fire Code Official may specify a minimum "NO PARKING" perimeter to be permanently marked around a hydrant.

### **HYDRANT SPACING AND DISTRIBUTION**

**REF: IFC APPENDIX C**

1. Fire hydrants shall be installed per fire flow and spacing requirements specified for the type of development and in accordance with Table C102.1 unless otherwise modified by the Fire Code Official or designee:



**TABLE C102.1  
REQUIRED NUMBER AND SPACING OF FIRE HYDRANTS<sup>h</sup>**

<b>FIRE-FLOW REQUIREMENT (gpm)</b>	<b>MINIMUM NUMBER OF HYDRANTS</b>	<b>AVERAGE SPACING BETWEEN HYDRANTS<sup>a, b, c, f, g</sup> (feet)</b>	<b>MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT<sup>d, f, g</sup></b>
1,750 or less	1	500	250
1,751–2,250	2	450	225
2,251–2,750	3	450	225
2,751–3,250	3	400	225
3,251–4,000	4	350	210
4,001–5,000	5	300	180
5,001–5,500	6	300	180
5,501–6,000	6	250	150
6,001–7,000	7	250	150
7,001 or more	8 or more <sup>e</sup>	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

- a.Reduce by 100 feet for dead-end streets or roads.
- b.Where streets are provided with median dividers that cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis.
- c.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 for transportation hazards.
- d.Reduce by 50 feet for dead-end streets or roads.
- e.One hydrant for each 1,000 gallons per minute or fraction thereof.
- f.A 50-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.
- g.A 25-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.2 or 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*.
- h.The fire code official is authorized to modify the location, number and distribution of fire hydrants based on site-specific constraints and hazards.

## **FIRE HYDRANTS ALONG PARKWAYS AND ARTERIALS**

**REF: IFC APPENDIX C**

1. Notwithstanding the hydrant spacing requirements of this chapter, when a project site is located across a parkway or primary arterial, hydrants shall be located on the same side of the parkway or arterial as the project if required by the Fire Code Official.

## **PRIVATE FIRE HYDRANTS**

**REF: IFC 507, NFPA 24**

1. Private fire hydrants shall be installed and maintained according to the International Fire Code (IFC), National Fire Protection Association Standard (NFPA) 24, and the local water authority having jurisdiction.

## AUTOMATIC FIRE SPRINKLER AND STANDPIPE SYSTEMS

### STANDARDS ESTABLISHED

REF: IFC 903, 905

1. All automatic fire sprinkler systems and standpipe systems shall be designed, installed, and tested in accordance with the 2018 International Fire Code with local amendments, the NFPA Standards referenced by the 2018 IFC; and as specified in the following subsections of this standard.
2. Appropriate provisions shall be made to prevent contamination of potable water supplies by installing appropriate back flow devices on the fire protection service line as required and approved by the local water authority having jurisdiction.
3. Automatic sprinkler systems are required in the following occupancies:
  - a. Group A occupancies:
    1. Any Group A occupancy with a fire area 5,000 square feet or greater and as specified in Chapter 9 of the IFC, i.e. A-2 occupancy requires an occupancy load of 100.
  - b. Group B occupancies:
    1. All Group B occupancies with a fire area 5,000 square feet or greater **or** exceed two stories in height.
  - c. Group E occupancies:
    1. The fire area is 5,000 square feet or greater. (Group E occupancies without a fire sprinkler system shall have an automatic fire alarm system installed. See 907.2.3)
  - d. Group F occupancies:
    1. All woodworking facilities with a fire area 2,500 square feet or greater that generate finely divided waste or combustible materials.
    2. Any other Group F with a fire area 5,000 square feet or greater **or** exceeds two stories in height.
    3. Any Group F-1 occupancies used for manufacture of upholstered furniture or mattresses with a fire area 2,500 square feet or greater.
  - e. Group H occupancies:
    1. All Group H occupancies.
  - f. Group I occupancies:
    1. In all Group I occupancies.

**Exception:** An automatic sprinkler system is not required where day care facilities are at the level of exit discharge, where every room where care is provided has a least one exterior exit door and where the fire area is less than 5,000 square feet.

- g. Group M occupancies:
  1. In all Group M occupancies with a fire area 5,000 square feet or greater **or** exceeds two stories in height. The area of mezzanines shall be included in determining square footage.
  2. In all Group M occupancies where storage of merchandise is in high-piled or rack storage arrays.
- h. Group R occupancies:
  1. All Group R occupancies.

**Exception:** Group R-3 less than 5,000 square feet unless more than two stories above grade. The calculated area shall include all livable and unfinished space, the area of any attached garage, and concealed or accessible spaces intended for storage use and/or future living space. All attached roofs and overhangs greater than 4 feet in width are included in the calculated area.

2. Separation of buildings into fire areas as defined in 901.4.3 shall not be allowable in Group R-3 occupancies.
  - i. Group S occupancies:
    - a. Any Group S occupancy with a fire area 5,000 square feet **or** exceeds two stories in height.
    - b. Any group S-1 occupancy used for storage of upholstered furniture or mattresses with a fire area that exceeds 2,500 square feet.
4. Automatic sprinkler systems are required in the following **existing** occupancies (Ref: IFC 1103):
  - a. Building Addition. A sprinkler system is required when any addition increases the total fire area to 5,000 square feet or greater.
  - b.

**Exception:** R-3 Occupancies.

- c. Change of Use. A sprinkler system is required when any change of use or occupancy occurs to a portion of the building to a more hazardous occupancy or as determined by the Fire Code Official.
- d. Group A-1, A-3, and A-4 Addition. A sprinkler system is required throughout the building when any addition to existing assembly occupancies increases the occupant load to more than 300.
- e. Group A-2 Addition. A sprinkler system is required throughout the building when any addition to existing assembly occupancies increases the occupant load to more than 100.
- f. A sprinkler system is required throughout the building when any addition to a Group E occupancy increases the total fire area to 5,000 square feet or greater. (Group E occupancies without a fire sprinkler system shall have a fire alarm system installed. See 907.2.3 of the CAFMA IFC amendments)
- g. Vacant Buildings. A sprinkler system is required throughout the building when any A, E, or I occupancy that has been vacant for more than 18 months requests to resume as the same or equally hazardous occupancy classification.
- h. Fire Wall Breach. A sprinkler system is required throughout the building when any modification or alteration to an existing building, with a total floor area of 5,000 square feet or greater, breaches or removes a required fire rated wall assembly.

## SUBMISSION OF FIRE SPRINKLER AND STANDPIPE PLANS

REF: IFC 901, NFPA 13, 13D, 13R, 14

**Plans and specifications shall be submitted and a permit obtained; plans shall be submitted directly to the Prevention division of the Central Arizona Fire and Medical Authority for review and approval prior to installation. The plan review fee shall be paid at the time plans are submitted. This fee includes appropriate inspections as specified.**

1. Plans for all sprinkler and standpipe systems shall be submitted for review as specified in Chapter 1 of these standards and shall include the information specified in these standards and at [www.cazfire.gov](http://www.cazfire.gov).
  - a. Fire sprinkler plans and hydraulic calculations shall require an engineer's stamp of approval or a minimum NICET Level III stamp of approval prior to being submitted for review.

**Exception:** Fire Sprinkler Plans for high-piled combustible storage occupancies shall require a registered fire protection engineer stamp

**Exception:** High-piled storage occupancies shall submit a plan showing the location of the different classifications of commodities.

**Exception:** High-piled storage areas shall require identification of High Piled Storage Sprinkler System Capabilities and Limitations.

2. Fire sprinkler systems, standpipe systems, and underground piping shall only be installed by trained, qualified, and licensed contractors.
3. All equipment, devices, piping, fittings, etc. shall be listed or approved by Underwriters Laboratories, and/or Factory Mutual and shall be approved for the purpose for which they are intended. Equipment not required by the NFPA Standard to be listed is exempt from this requirement. No person shall perform any type of modification to any system which would void its listing.
4. The International Fire Code requires that all fire hydrant systems, fire-extinguishing systems (including automatic sprinklers), wet and dry standpipes, basement inlet pipes and other fire-protection systems and appurtenances thereto shall meet the approval of the Fire Authority as to installation and location and shall be subject to such periodic tests as required by the Fire Code Official or designee.

## REQUIRED PLAN SUBMITTAL INFORMATION

REF: IFC 901.2

1. Sprinkler systems shall be designed and installed according to the edition of NFPA 13, 13D, and 13R referenced by the 2018 IFC. The following is required to obtain a construction permit for a sprinkler system:
  - a. A completed Fire Protection Permit application can be obtained at [www.cazfire.gov](http://www.cazfire.gov). Provide all required information in legible form.

- b. A minimum of four (4) sets of shop quality plans and a complete submittal package for review. One set of plans shall be kept by CAFMA and one set shall be forwarded to appropriate building department. Two sets shall be returned to the contractor.
  - c. Fee shall be paid at time of submission. See [cazfire.gov](http://cazfire.gov) for current fee schedule.
  - d. The permit applicant shall be the installing contractor. All installing contractors shall have an Arizona Registrar of Contractors license for the system being installed as well as a business license for the area where the installation will take place.
2. **Installation shall not commence prior to the issuance of permit and approval of the plans. Installations without approval are subject to an unpermitted work fee.**
3. The approved plans shall be kept at the project site until final approval of the installation. Inspections will not be conducted without approved plans on site. If upon arrival, approved plans are not available, a failed inspection will be noted and may result in additional fees.
4. The plan shall be drawn to scale and shall include all essential details including, but not limited to:
- a. Business or building owner name.
  - b. Job site address.
  - c. Contractor's name, address, telephone number, and license number.
  - d. Engineer's stamp or NICET Level III certification.
  - e. Ceiling construction.
  - f. Full height cross section of building.
  - g. Location of fire walls.
  - h. Location of partitions.
  - i. Intended occupancy of each area or room.
  - j. Any questionable small enclosures in which no sprinklers are installed.
  - k. Size of city water main and current flow test results; flow test results shall be valid for one year.
  - l. Size of water meter for 13D and 13R residential systems.
  - m. Alternate sources of water supply, with pressure or elevation.
  - n. Make, type and nominal orifice size of sprinklers.
  - o. Temperature rating and location of high temperature sprinklers.
  - p. Detail of riser diagram. (May not be installed in an exterior wall)
  - q. Total area protected by each system on each floor.
  - r. Number of sprinklers on each riser per floor.
  - s. Make, type, model and size of alarm or dry-pipe valve.
  - t. Make, type, model and size of pre-action or deluge valve.
  - u. Type and location of alarm bell.
  - v. Total number of sprinklers on each dry-pipe system, pre-action system, combined dry-pipe/pre-action system or deluge system.
  - w. Capacity in gallons of dry-pipe systems.
  - x. Pipe material type and schedule of wall thickness.
  - y. Nominal pipe size and center-to-center pipe length dimensions.
  - z. Type and locations of hangers and sleeves.
  - aa. All control valves, check valves, drains, and test valve connections.
  - bb. Size and locations of hand hose outlets and related equipment.
  - cc. Underground pipe size, length, location, material and point of connection to city/town main; type of valves and meters.
  - dd. Provision for flushing the sprinkler system.

- ee. When the equipment is to be installed as an addition to an existing system, the existing system shall be indicated on the plans to make all conditions clear.
  - ff. For hydraulically designed systems, the materials used are to be included on the hydraulic data nameplate.
  - gg. Details of freeze protection.
  - hh. Design area.
  - ii. Remote Inspectors test valve. (May not be installed in an exterior wall)
5. Hydraulic calculation summary sheets must contain the minimum following information:
- a. Date.
  - b. Location.
  - c. Name of owner and occupant.
  - d. Building address or other identification.
  - e. Description of hazard.
  - f. Name and address of contractor and designer.
  - g. System design requirements.
    - 1. Design area of water application in square feet.
    - 2. Minimum rate of water application (density) in gpm per square foot.
    - 3. Area per sprinkler in square feet.
  - h. Total water requirements as calculated including allowance for inside hose and outside hydrants.
6. Hydraulic calculation worksheets must contain the following information:
- a. Sheet number.
  - b. Sprinkler description and discharge coefficient (K factor).
  - c. Hydraulic reference points.
  - d. Flow in gpm.
  - e. Pipe size.
  - f. Pipe lengths, center-to-center of fittings.
  - g. Equivalent pipe lengths for fittings and devices.
  - h. Friction loss in psi per foot of pipe.
  - i. Total friction loss between reference points.
  - j. Elevation head in psi between reference points.
  - k. Required pressure in psi at each reference.
  - l. Velocity pressure and normal pressure if included in calculations.
  - m. Notes to indicate starting points, reference to other sheets, or to clarify data shown.
  - n. Sketch to accompany gridded system calculations to indicate flow quantities and directions for lines with sprinklers operating in remote area.
  - o. Manufacturer's specification sheets for all devices shall be provided.

## SPRINKLER SYSTEM INSPECTIONS

REF: IFC 901

1. All inspections shall be requested by the permitted contractor.
2. All inspections shall be requested at least 24 hours in advance.
3. Inspections requiring a hydrostatic pressure test shall be scheduled for a minimum of 2 hours.
4. Approved plans must be on site.

5. All inspections require a permitted contractor representative on site.
6. Final approval of Sprinkler System:
  - a. Provide all NFPA contractor material and test certificates.
  - b. Submit a set of amended construction documents and calculations for all changes made in the system during construction prior to requesting a final inspection.
  - c. Final shall not be granted until all flow and alarm tests are completed.

#### **CONTROL VALVE AND RISER ROOM SIGNAGE**

**REF: NFPA 13**

1. When the sprinkler or wet standpipe system riser is located in a room, closet or other enclosed space, the outside of the door shall have a sign that reads "Fire Sprinkler Control" or Standpipe Control." Letters shall be at least one (1) inch in height and shall contrast to their background.

#### **DRY PIPE PERFORMANCE**

**REF: NFPA 13**

1. Regardless of system piping capacity, dry pipe sprinkler systems shall be capable of delivering water to the inspector's test valve within sixty (60) seconds of the valve being opened. Approved quick opening devices may be used to meet this requirement.

#### **HYDRAULICALLY ENGINEERED SPRINKLER SYSTEMS**

**REF: NFPA 13**

1. The water data for hydraulic calculations shall be based upon 85 percent of the available water supply as determined by flow test information.

#### **SPRINKLER SYSTEM SUPERVISION**

**REF: NFPA 13**

1. Automatic sprinkler systems having more than twenty (20) sprinklers shall be supervised in an approved manner for water flow and against tampering.
2. Tamper switches shall be installed on all main and auxiliary controlling valves located in a building or outdoors.

**Exception:** Control valves located outside a building and in an underground vault or pit need not be electronically supervised provided they are locked in the "open" position in a manner approved by the Fire Code Official.

3. When electronic supervision is not required, valves may be supervised by one of the following methods:
  - a. Locking the valves open with 3/15-inch plated or galvanized chain or 5/16-inch 7x19 stainless or galvanized wire rope. The chain or wire rope shall be threaded through the valve wheels so they may not turn more than one-quarter (1/4). Chain or wire rope shall be locked with a padlock.

- b. Sealing valves in the open position with approved weekly recorded inspections when the valves are within locked enclosures.

## PRIVATE FIRE SERVICE MAINS

REF: IFC 507, NFPA 24

1. Private fire service mains shall be designed and installed according to the edition of NFPA 24 referenced in the adopted Fire Code. Plans shall be submitted, and a permit obtained prior to installation; plans shall be submitted directly to the Prevention division of CAFMA. Permit and fee schedule available at [www.cazfire.gov](http://www.cazfire.gov).
2. The plan shall be drawn to scale and shall include all essential details including, but not limited to:
  - a. Business or building owner name.
  - b. Job site address.
  - c. Size and location of water supply.
  - d. Size and location of all underground piping, length, material type.
  - e. Size, type, and location of valves, meters, and regulators.
  - f. Size and location of hydrants, showing size and number of outlets.
  - g. Sprinkler and standpipe risers to be supplied with the system.
  - h. Location of fire department connections.
  - i. Thrust blocks (kickers) locations.
3. A visual inspection and 2 hour/200 lb. hydrostatic test shall be required prior to covering the underground line. Full orifice flushing of the pipe is also required and shall be witnessed by Central Arizona Fire and Medical Authority prior to acceptance. NFPA "Contractor's Material and Test Certificate for Underground Piping" certificates shall be submitted to Central Arizona Fire and Medical Authority for the underground piping upon completion of the private fire system main installation.

## FIRE DEPARTMENT CONNECTIONS (FDC)

REF: IFC 912; NFPA 13, 13R

1. The fire department connection (FDC) shall be outfitted with female swivel couplings sized appropriately for the system with **National Standard** threads.
2. The FDC shall be arranged to face the street, driveway or fire access route as specified by the Fire Code Official. A working space of not less than 36 inches in width, 36 inches in depth and 78 inches in height shall be provided and maintained in front of and around FDC.
3. Fire department connections shall be arranged so the lowest point on the inlet connection is between twenty-four (24) and forty-two (42) inches above finished grade at its location.
4. Locking FDC caps shall be required. IFC Section 912.4.1
5. For remote FDCs signage noting "Fire Department Connection" or "FDC" shall be located at the FDC. This sign shall be mounted on a 2-inch square steel tube post at 72 inches in height and shall note the address in a complex with more than one FDC.
6. Where fire department hose connections are subject to obstruction or vehicular damage, they shall be protected by guard posts as follows:
  - a. Guard posts shall be constructed of steel pipe not less than four (4) inches in diameter and shall be concrete filled.



- b. Guard posts shall be set not less than three (3) feet deep in a concrete footing of not less than a fifteen (15) inch diameter.
  - c. Guard posts shall be set with the top of the posts not less than three (3) feet above ground.
  - d. Guard posts shall be located a minimum of three (3) feet from the fire department hose connection and shall not interfere with operation of the threaded swivel connections. The number of posts provided shall be sufficient to protect the hose connection
  - e. Guard posts shall be spaced no more than four (4) feet apart.
7. All fire department hose connections shall be outfitted with a clapper or check valve for each hose connection.
  8. When a building is served by multiple fire department connections, each connection shall be provided with an approved sign detailing the area of the building served by each connection.

## FIRE DETECTION AND ALARM SYSTEMS

### STANDARDS ESTABLISHED

REF: IFC 907

1. All automatic and manual fire detection and alarm systems shall be designed, installed, tested and maintained as specified in the 2018 International Fire Code with local amendments, NFPA Standards referenced by the 2018 IFC and as specified in the following subsections of this standard.
2. Automatic fire alarm systems are required in all occupancies protected by an automatic fire sprinkler system and as required for other special uses and conditions in 2018 IFC Section 907 with local amendments.

**Exception:** R-3 buildings that do not contain more than two dwelling units.

**Exception:** Group R-2 dwelling units that fit the exceptions listed in 2018 IFC Section 907.2.9.1

### SUBMISSION OF PLANS

REF: IFC 907

**Plans and specifications shall be submitted and a permit obtained; plans shall be submitted directly to the Prevention division of the Central Arizona Fire and Medical Authority for review and approval prior to installation. The plan review fee shall be paid at the time plans are submitted. This fee includes appropriate inspections as specified.**

1. Plans for all automatic and manual fire detection and alarm systems shall be submitted for review as specified in Chapter 1 and 8 of this standard and shall include the information specified at: [www.cazfire.gov](http://www.cazfire.gov).

### GENERAL REQUIREMENTS

REF: IFC 901, NFPA 72

1. Fire alarm systems shall only be installed by trained and qualified fire alarm installers.
2. All equipment, devices, and wiring shall be listed or approved by Underwriters Laboratories, and/or Factory Mutual and shall be approved for the purpose for which they are intended. No person shall perform any type of modification to any device which would void its listing.
3. All wiring shall be done in compliance with the current National Electrical Code as referenced in the 2018 IFC, pertaining to Fire Alarm Signaling Circuits, and any other applicable article of that code.
4. The fire alarm remote annunciator(s) and pull station(s) shall be installed in an area which is normally staffed during the hours the building is occupied.

1. The following minimum information shall be required to be included with all drawings submitted to the Fire Authority for review.
  - a. Written narrative providing intent and system description
  - b. Riser diagram
  - c. Floor plan layout showing locations of all devices, control equipment, and supervising station and shared communications equipment with each sheet showing the following:
    - d. Point of compass (north arrow)
    - e. A graphic representation of the scale used
    - f. Room use identification
    - g. Building features that will affect the placement of initiating devices and notification appliances
    - h. Sequence of operation in either an input/output matrix or narrative form
    - i. Equipment technical data sheets
    - j. Manufacturers' published instructions, including operation and maintenance instructions
    - k. Battery capacity and de-rating calculations (where batteries are provided)
    - l. Voltage drop calculations for notification appliance circuits
    - m. Mounting height elevation for wall-mounted devices and appliances
    - n. Where occupant notification is required, minimum sound pressure levels that must be produced by the audible notification appliances in applicable covered areas
    - o. Pathway diagrams between the control unit and the supervising station and shared communications equipment
    - p. Completed record of completion
    - q. For software-based systems, a copy of site-specific software, including specific instructions on how to obtain the means of system and software access (password)
    - r. Record (as-built) drawings
    - s. Records, record retention, and record maintenance.
    - t. Completed record of inspection and testing.
    - u. System design documents shall identify the name and contact information of the system designer.
2. All fire alarm drawings shall use symbols described in [NFPA 170](#) or other symbols acceptable to the authority having jurisdiction.
3. Shop drawings shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor.
4. Shop drawings for fire alarm and emergency communications systems shall provide basic information and shall provide the basis for the record (as-built) drawings.
5. Shop drawings shall include the following information:
  - a. Name of protected premises, owner, and occupant (where applicable)
  - b. Name of installer or contractor
  - c. Location of protected premises
  - d. Device legend and symbols in accordance with [NFPA 170](#), or other symbols acceptable to the authority having jurisdiction
  - e. Date of issue and any revision dates

6. Floor plan drawings shall be drawn to an indicated scale and shall include the following information, where applicable for the particular system:
  - a. Floor or level identification
  - b. Point of compass (indication of North)
  - c. Graphic scale
  - d. All walls and doors
  - e. All partitions extending to within 15 percent of the ceiling height (where applicable and when known)
  - f. Room and area descriptions
  - g. System devices/component locations
  - h. Locations of fire alarm primary power disconnecting means
  - i. Locations of monitor/control interfaces to other systems
  - j. System riser locations
  - k. Type and number of system components/devices on each circuit, on each floor or level
  - l. Type and quantity of conductors and conduit (if used) for each circuit
  - m. Identification of any ceiling over 10 ft (3.0 m) in height where automatic fire detection is being proposed
  - n. Details of ceiling geometries, including beams and solid joists, where automatic fire detection is being proposed
  - o. Where known, acoustic properties of spaces
7. System riser diagrams shall be coordinated with the floor plans and shall include the following information:
  - a. General arrangement of the system in building cross-section
  - b. Number of risers
  - c. Type and number of circuits in each riser
  - d. Type and number of system components/devices on each circuit, on each floor or level
  - e. Number of conductors for each circuit
8. Control unit diagrams shall be provided for all control equipment (i.e., equipment listed as either a control unit or control unit accessory), power supplies, battery chargers, and annunciators and shall include the following information:
  - a. Identification of the control equipment depicted
  - b. Location(s) of control equipment
  - c. All field wiring terminals and terminal identifications
  - d. All circuits connected to field wiring terminals and circuit identifications
  - e. All indicators and manual controls
  - f. Field connections to supervising station signaling equipment, releasing equipment, or emergency safety control interfaces, where provided
9. Typical wiring diagrams shall be provided for all initiating devices, notification appliances, remote indicators, annunciators, remote test stations, and end-of-line and power supervisory devices.
10. A narrative description or input/output matrix of operation shall be provided to describe the sequence of operation.
11. System calculations shall be included as follows:

- a. Battery calculations
- b. Notification appliance circuit voltage drop calculations
- c. Other required calculations, such as line resistance calculations, where required

## SYSTEM MONITORING

REF: IFC 907, NFPA 72

1. All required fire alarm systems shall be supervised by an approved central, proprietary or remote station service or a local alarm which will give an audible signal at a constantly attended location.
2. A dedicated phone line or approved alternate communication device shall be required for all systems.
3. Document Accessibility. With every new fire alarm installation, a documentation cabinet shall be installed at the system control unit or other approved location at the protected premises. All record documentation shall be stored in the documentation cabinet.
  - a. The documentation cabinet shall be labeled SYSTEM RECORD DOCUMENTS

## FIRE ALARMS FOR EXISTING BUILDINGS

REF: IFC 1103.7 AMENDED

1. **Group E.** Group E educational facilities with an occupant load of 11 or more persons and less than 5,000 square feet are required to have an automatic fire alarm system in accordance with NFPA 72 and the 2018 IFC. An exterior exit is required from each classroom where fire sprinkler systems are not installed.
2. **Non-Monitored Sprinkler System.** An automatic fire alarm system shall be installed throughout the building when an existing, non-monitored fire sprinkler system is modified by 20 or more heads.
3. **Newly Installed Sprinkler System.** An automatic fire alarm system is required to be installed when an existing building is retrofitted with a fire sprinkler system per requirements in IFC 1103.7.9 Amended.

**GENERAL REQUIREMENTS****REF: IFC 904**

1. Commercial kitchen hood extinguishing systems installed within the Fire Authority shall comply with the UL 300 Standard. Systems not in compliance with this standard shall be prohibited from being installed, modified, expanded, or moved into a building within the Fire Authority.
2. Class K fire extinguishers are required as referenced in 2018 IFC 906.4.
3. On-site inspection by Central Arizona Fire and Medical Authority is required for approval of the hood extinguishing system.

**PERMIT, PLAN SUBMITTAL AND PLAN REVIEW FEES****REF: IFC 901**

**Plans and specifications shall be submitted and a permit obtained; plans shall be submitted directly to the Prevention division of the Central Arizona Fire and Medical Authority for review and approval prior to installation. The plan review fee shall be paid at the time plans are submitted. This fee includes appropriate inspections as specified.**

**SUBMITTAL INFORMATION****REF: IFC 901**

1. The following information shall be included on all plans submitted:
  - a. General Information
    1. Name of project owner and occupant.
    2. Job site address.
    3. Submitting contractor's name, address and license number.
    4. All plans shall bear a clearly marked scale or provide all measurements and pipe volume.
  - b. Fire Extinguishing System
    1. Make, model, and type of fire extinguishing system.
    2. Cylinder mounting location.
    3. Size of hood, plenum, and duct.
    4. Type, size, and configuration of discharge piping.
    5. Location and configuration of all ells, tees, and distributors.
    6. Location and configuration of system actuating tubing.
    7. Location and configuration of duct, plenum and surface discharge nozzles.
    8. Location and number of flow points, restricting or balancing devices.
    9. Location, type and size of cooking appliances.
    10. Height, location and orientation of surface nozzles above cooking appliances.
    11. Location and temperature rating of fusible links.
    12. Manual pull station location.
    13. Type and location of system notification device, if applicable.
    14. Type of automatic fuel shut-off device.

2. Acceptance Testing: The following items will be tested at final.
  - a. Cooking appliances are sized and located as per approved plans
  - b. Pressure gauge indicator is in operable range.
  - c. All system piping and mechanical tubing is properly mounted and secure.
  - d. All surface, duct and plenum nozzles are properly located.
  - e. All protective grease caps are free to move.
  - f. All fusible links properly located, in good condition and have current date
  - g. Fusible link installed correctly with proper temperature rating.
  - h. System release cables are free to move and there is adequate clearance
  - i. Pull station location approved.
  - j. Class K Fire Extinguisher has current service tag and is installed within 30 feet of cooking equipment.
  - k. All appliances with wheels are secured in place.
3. System Test:
  - a. System tested from terminal link.
  - b. System tested from remote manual pull.
  - c. System operation disconnects fuel supply or heat source.
  - d. System operation shuts off make up air.
  - e. System nozzles and piping free of obstructions.
  - f. System left in ready condition.
  - g. System activates Fire Alarm if applicable.

## SPRAY BOOTH CONSTRUCTION

REF: IFC SECTION 2404

1. Spray rooms, spray booths and spray spaces shall be constructed in compliance with the International Building Code and Section 2404.3 of the 2018 International Fire Code. Electrical and mechanical components of spray booths shall be approved by the appropriate building department prior to construction.
2. **Plans and specifications shall be submitted and a permit obtained; plans shall be submitted directly to the Prevention division of the Central Arizona Fire and Medical Authority for review and approval prior to installation. The plan review fee shall be paid at the time plans are submitted. This fee includes appropriate inspections as specified.**

## ABOVEGROUND FUEL TANK INSTALLATIONS

### GENERAL

REF: IFC CHAPTER 57

1. All aboveground tanks used for storing and/or dispensing flammable or combustible liquid/gasses shall be approved and inspected by the Fire Prevention Division of the Central Arizona Fire and Medical Authority according to the 2018 International Fire Code and as specified in the following subsections of this standard.
2. The contractor or property owner proposing the installation of aboveground fuel tanks shall check with the appropriate planning and zoning department to determine if the local zoning laws allow aboveground fuel tanks at the proposed site.

**Note:** **Underground Fuel Storage and Dispensing:** Any plans for underground fuel tanks used for storing and dispensing flammable or combustible fuels shall be submitted to both the Arizona Department of Environmental Quality (ADEQ) and the Fire Prevention Division of the Central Arizona Fire and Medical Authority. Central Arizona Fire and Medical Authority has jurisdiction over all aboveground piping and devices.

### SUBMISSION OF PLANS

**Plans and specifications shall be submitted and a permit obtained; plans shall be submitted directly to the Prevention division of the Central Arizona Fire and Medical Authority for review and approval prior to installation. The plan review fee shall be paid at the time plans are submitted. This fee includes appropriate inspections as specified. The CAFMA Aboveground Fuel Tank Permit shall be utilized.**

1. Plans shall be submitted for approval prior to installation. The plans shall be drawn to scale and shall include all essential details, including but not limited to:
  - a. Business owner's name, address, and telephone number.
  - b. Job site address.
  - c. Contractor's name, address, and telephone number.
  - d. Types and quantities of liquids to be stored or dispensed.
  - e. Method of storage and dispensing.
  - f. Overfill prevention method.
  - g. Spill containment method.
  - h. Specification sheets for all tanks, equipment, piping, and appliances used in the installation.
  - i. Site plan indicating:
    1. Vehicle access
    2. Aboveground tank location(s).
    3. Vehicle impact protection for tanks & dispensers.
    4. Emergency controls location.
    5. Distances from tanks and/or dispensers to property lines, buildings, and ignition sources.
    6. Secondary containment.



7. Other aboveground or below ground flammable or combustible liquids tanks, LP-gas or CNG storage vessels and distances
8. Fire suppression appliances or equipment.
9. Electrical system.
10. Above and below grade piping, to include dispensing devices and filling devices.
11. Signage
12. Overfill protection
13. Venting
14. Other information as required by the Fire Code Official.

The Central Arizona Fire and Medical Authority has adopted appendices A-N. Below are some of the frequently used appendices. Please refer to the 2018 International Fire Code for the complete set of appendices.

## APPENDIX A

**Section A101.2 Membership** is amended as follows:

The membership of the board shall consist of five voting members having the qualifications established by this section and reside within the boundaries of the Central Arizona Fire and Medical Authority. In the event that it is not practical to find members as required by this section, the Fire Code official reserves the right to relax the qualifications as to create a valid professional board to serve this jurisdiction. Prospective members shall apply to the Fire Marshal of the jurisdiction, subject to confirmation by a majority vote of the Central Arizona Fire and Medical Authority Fire Board. Members shall serve without remuneration or compensation and shall be removed from office prior to the end of their appointed terms only for cause.

**Section A101.3 Terms of Office** is deleted.

**Section A101.3.1 Initial Appointments** is deleted.

**Section A101.5 Secretary of Board** is amended as follows:

The fire code official or designee shall act as Secretary of the Board and shall keep a detailed record of all its proceedings, which shall set forth the reasons for its decisions, the vote of each member, the absence of a member, and any failure of a member to vote.

## APPENDIX B

**Table B105.1 (2) REFERENCE TABLE** is amended by adding Footnote c as follows:

*Footnote c: In special circumstances, where the municipal or rural water supply will not provide the required 1,500 gpm, the fire code official may accept a lesser amount. This amount shall never be less than 1,000 gpm.*

## APPENDIX D

**Section D103.2 Grade** is amended as follows:

Fire apparatus access roads shall not exceed 12 percent grade.

The exception is deleted and replaced as follows:

Exception: The fire code official may permit the access road grade to increase but shall not exceed 15 percent if fire sprinkler protection is installed.

**Section D103.3 Turning Radius** is amended as follows:

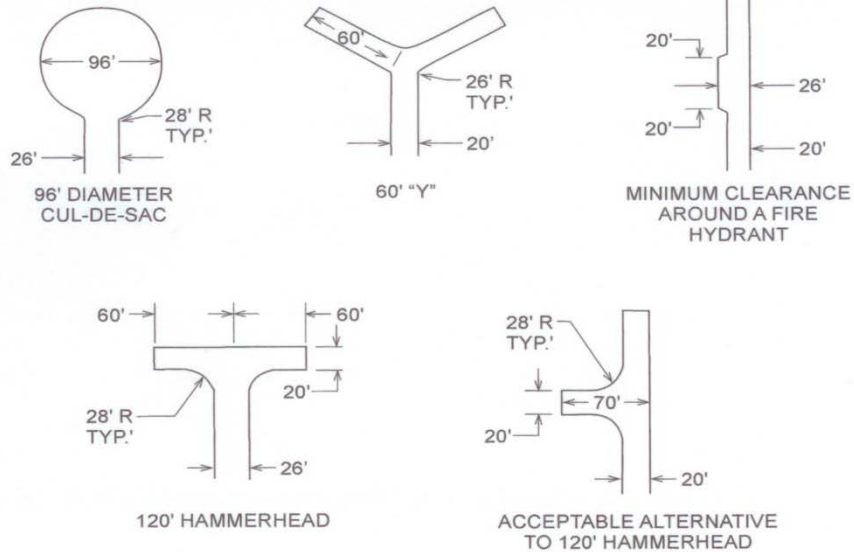
The minimum turning radius shall be 28' (twenty-eight feet) inside and 50' (fifty feet) outside diameter for all fire department access roads and parking lots.

**Table D103.4** is amended to read as follows:

In lieu of the required 96-foot diameter, a cul-de-sac with an 82-foot diameter drivable surface with no parking signs posted throughout may be allowed if approved by the fire code official.

**Appendices I and J are adopted by CAFMA.**

### APPROVED FIRE ACCESS TURNAROUNDS



## APPENDIX I

### APPROVED LOCKING DEVICES

#### **KEY BOXES**

Approved key box: KNOX BOX manufactured by The Knox Company

#### **LOCKING FDC CAPS**

Approved Fire Department Connection (FDC) locking caps: Knox FDC caps manufactured by The Knox Company.

#### **LOCKING KEYPADS AND/OR PADLOCKS FOR GATED COMMUNITIES, GATED AREAS, AND MINI-STORAGE FACILITIES**

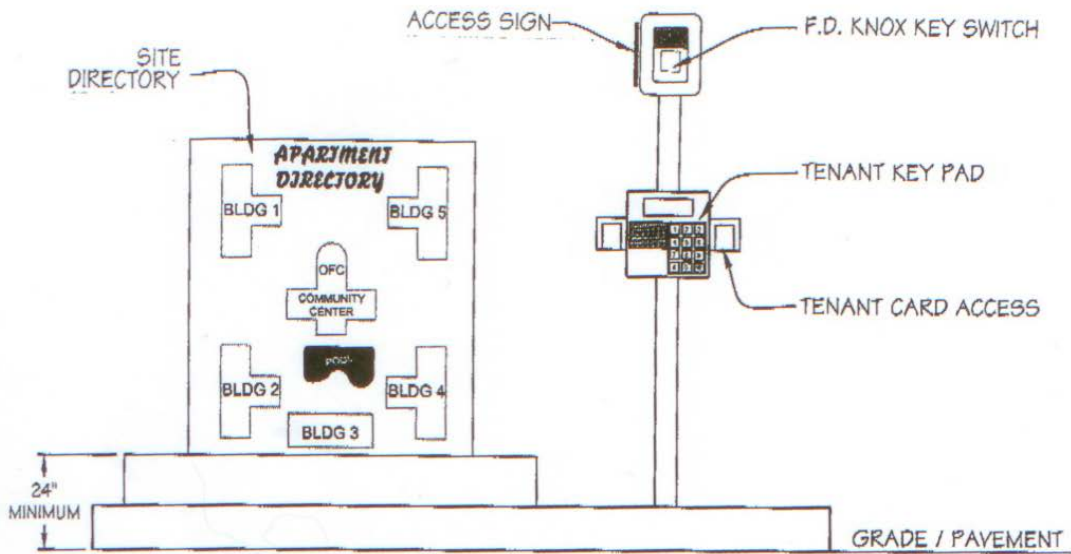
Approved key switch for locking keypads: Knox key switch manufactured by The Knox Company.

Approved padlock: Knox padlock manufactured by The Knox Company.

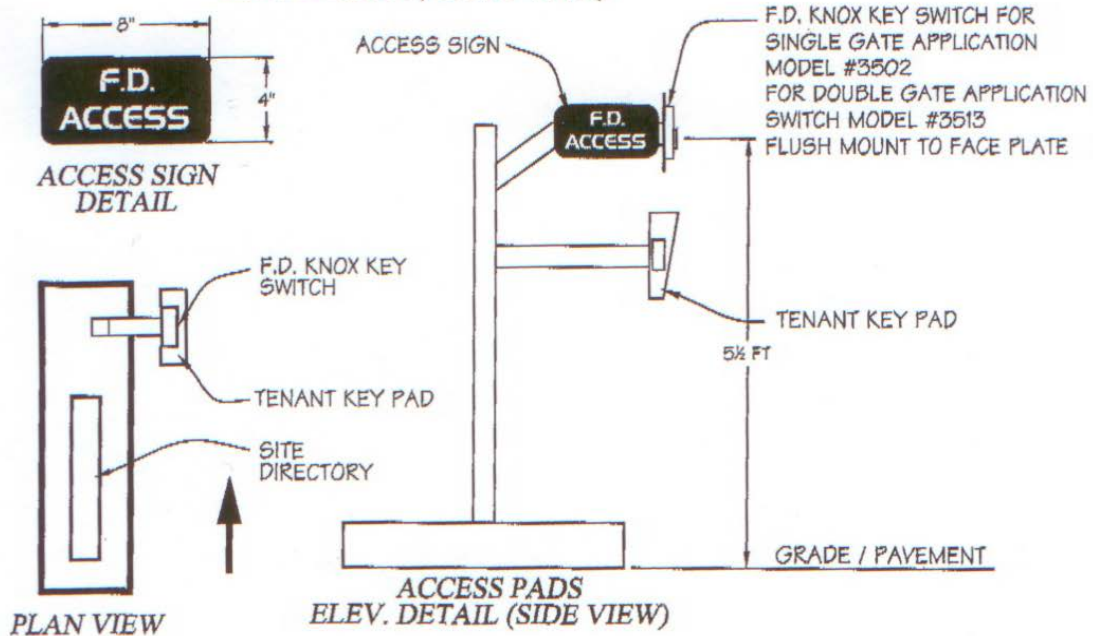
#### **All Knox products shall be ordered online from:**

Approved distributor: Knox Company  
1601 W. Deer Valley Road  
Phoenix, AZ 85027  
1-800-552-5669  
[www.knoxbox.com](http://www.knoxbox.com)

GATE KEY SWITCH AND POST DETAIL

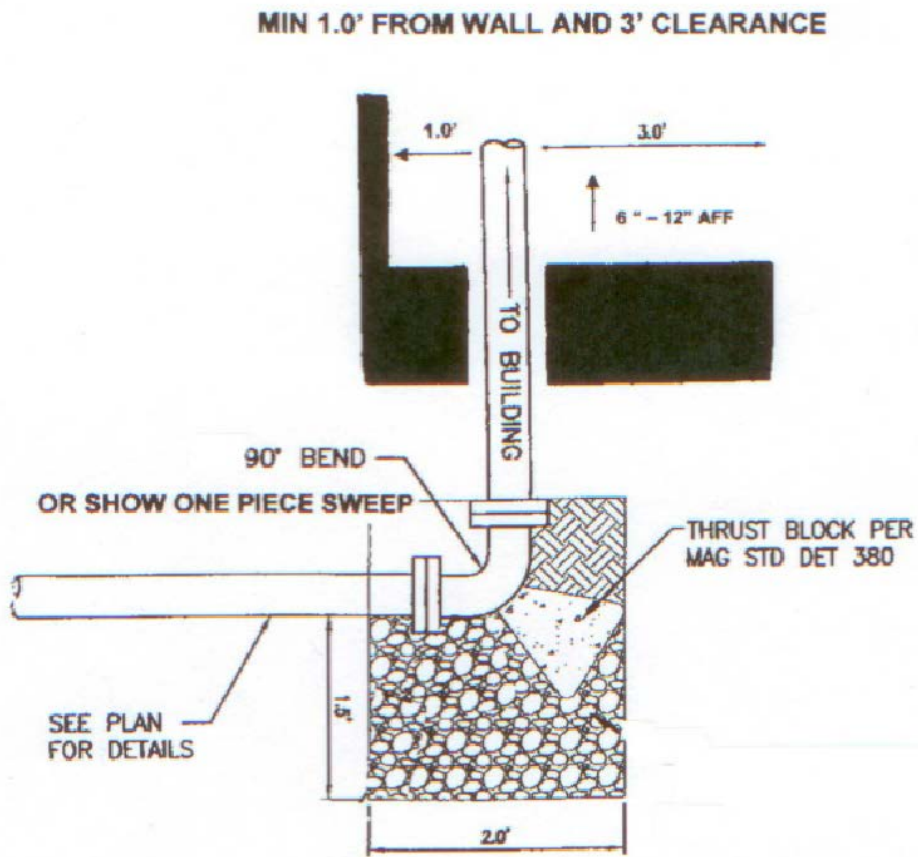


ENTRANCE ISLAND  
ELEV. DETAIL (FRONT VIEW)

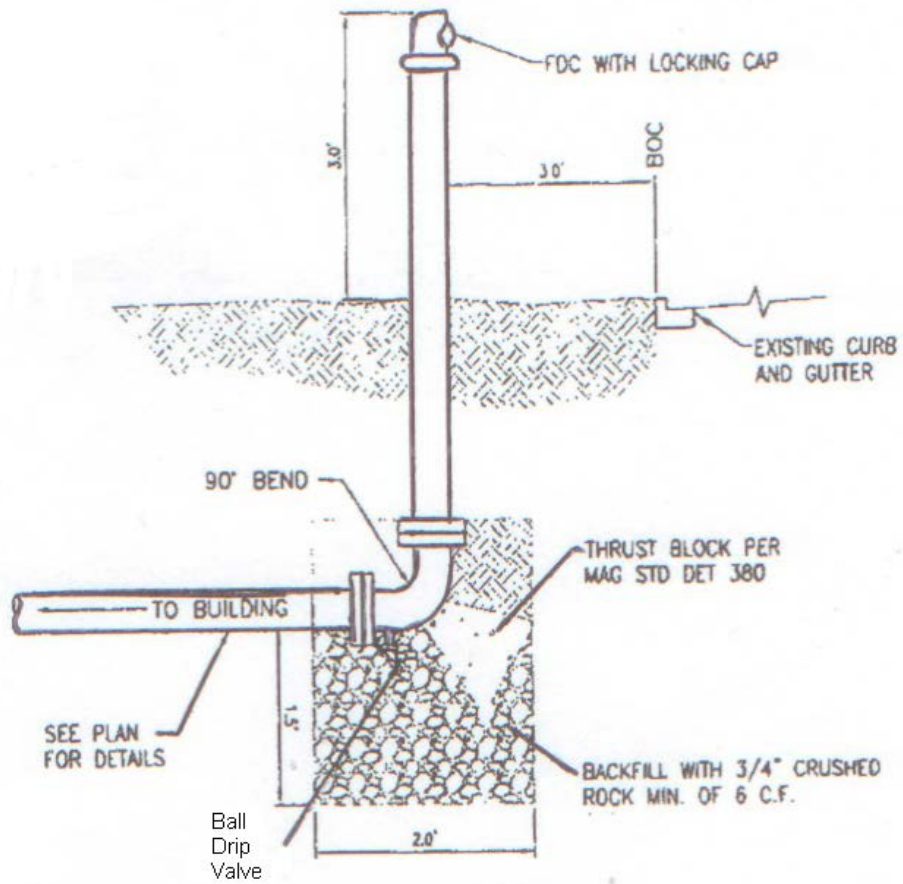


APPENDIX III

FIRE RISER AND REMOTE FDC DETAIL



**FIRE SPRINKLER SUPPLY LINE**  
**SWEEP INTO BUILDING**



**FIRE DEPARTMENT CONNECTION (FDC) DETAIL**