



STANDARD 509 RESIDENTIAL FIRE SPRINKLERS

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Supersedes: VCFPD Standard 14.7.1

CHAPTER 1 – ADMINISTRATION

1.1 Purpose. This standard is prepared for the use and guidance of those charged with designing, installing, inspecting, approving or maintaining residential fire sprinklers systems.

1.2 Scope. This standard applies to the design and installation of automatic fire sprinkler systems in one and two-family dwellings and manufactured homes within the jurisdiction of the Ventura County Fire Protection District (VCFPD). This standard shall be used in conjunction with the current adopted editions of the Ventura County Fire Code (VCFC), the California Residential Code (CRC), National Fire Protection Association (NFPA) Standard 13D and any other applicable standards.

1.3 Applicability. This standard shall apply to all automatic fire sprinkler systems installed in one and two-family dwellings and manufactured homes within the jurisdictional boundaries of the Ventura County Fire Protection District.

1.3.1 General. All individuals and companies who intend to engage in the installation or alteration of fire sprinkler systems are subject to the requirements of this standard.

1.3.2 Design and Installation. The design and installation of a fire protection system, excluding an electrical alarm system, for a one and two-family dwelling and outside the dwelling up to the utility meter fore the property may be installed by any of the following:

- (1) A contractor holding a fire protection contractor classification (C-16).
- (2) A contractor holding a plumbing contractor classification (C-36).

- (3) An owner-builder of an owner-occupied, single-family dwelling, if not more than two single-family dwellings on the same parcel are constructed within one year.

1.4 Permits. A construction permit is required for the installation of or modification to a residential automatic fire sprinkler system as required by the VCFC.

1.4.1 Construction permits shall automatically become invalid unless an inspection authorized by such permit is commenced within 12 months of being issued. An inspection shall be required at a minimum of every 12 months thereafter for the permit to remain valid.

1.4.2 Construction permits that have become invalid may be re-issued if all the following conditions are met:

- (1) The permit was issued or an inspection has occurred within the previous 12 months.
- (2) No changes have been made or will be made in the original construction documents.
- (3) Previously approved construction documents shall be submitted to the Fire District.
- (4) Fees equal to one-half the amount for a new permit have been paid.

CHAPTER 2 – DEFINITIONS

Ventura County Fire Code (VCFC). The current adopted VCFPD Ordinance consisting of the current adopted edition of the California Fire Code; portions of the current adopted edition of the International Fire Code; and the VCFPD amendments thereto.

Water Purveyor. A public utility, a mutual water company, a governmental body, or other entity, owning and operating a water system and holding a valid permit to purveyor water from the State Department of Public Health or Ventura County Environmental Health Division. In the case of a public utility, it must also hold a valid “certificate of convenience and necessity” from the California Public Utilities Commission.

CHAPTER 3 – WATER SUPPLY

3.1 General. All fire sprinkler systems, regardless of the water supply source, shall have a single supply main serving both the fire sprinkler system and the domestic water system.

Exception: When required by the water purveyor having jurisdiction, a dedicated line for the fire sprinkler system will be required per Section 3.2.

3.2 Dedicated Fire Line. A dedicated fire line must be connected after the water meter with one main shut-off valve, located in the meter box, painted red, controlling both domestic and fire sprinklers. In such case, the following requirements shall apply.

3.2.1 Dedicated underground fire line shall be Blazemaster CPVC or equivalent.

3.3 Water Supply Source. The following water supply sources shall be considered acceptable:

- (1) A connection to a reliable waterworks system with or without an automatically operated pump.
- (2) An elevated tank.
- (3) A pressure tank designed to American Society of Mechanical Engineers (ASME) standards for a pressure vessel with a reliable pressure source.
- (4) A stored water tank with an automatically operated pump.

3.4 Stored Water. Where stored water is used as the sole source of supply, the required sprinkler demand shall be stored in an aboveground tank. Tanks shall be designed and installed in accordance with current VCFPD standards.

CHAPTER 4 – AUTOMATIC BOOST PUMPS

4.1 General. Where a pump is the source of pressure for the water supply, it shall be for both the fire sprinkler system and the domestic system.

4.2 Activation. The pump must be activated automatically upon system demand.

4.3 Priming. The pump must be of self-priming type.

4.4 Listing. The pump must be listed or approved for electrical safety by a recognized testing laboratory.

4.5 Exposure. When a pump is used, provisions shall be made to protect the pump from exposure to freezing and/or brush fires.

CHAPTER 5 – SYSTEM COMPONENTS

5.1 Main Control Valve. Each system shall have a main control valve located on the system side of the water meter or pump. The main control valve shall be of indicating type such as an O.S.&Y. or ball valve. The valve shall control both domestic water system and the automatic fire sprinkler system. The main control valve shall be readily accessible and above grade.

Exception: When approved by the authority having jurisdiction, the main control valve may be placed in the meter box. In such case, a sign shall be posted by the riser to indicate its location.

5.2 Domestic Valve. A separate shut-off valve for the domestic shall be provided.

5.3 Check Valve. A check valve **listed for residential fire sprinklers** shall be installed on the system side of the main control valve.

5.4 Signage. All valves shall have an all-weather sign affixed to them, which indicate their purpose.

5.5 Relief Valve. For systems with normal operating pressure in excess of 100 psi, a listed pressure relief valve shall be installed on the riser.

5.6 Overhead Piping. Overhead piping shall be in accordance with the California Plumbing Code for potable water supplies. No steel or galvanized piping shall be permitted.

CHAPTER 6 – OVERHEAD SPRINKLER DESIGN

6.1 Sprinklers. Only new residential sprinklers shall be installed.

6.2 Garages. Attached garages shall be protected with residential sprinklers.

6.3 Design Criteria. For situations not meeting one of the conditions listed in NFPA 13D, Sections 10.2 “Number of Design Sprinklers”, the number of sprinklers in the design area shall include all sprinklers within a compartment, to a maximum of three (3) sprinklers that require the greatest hydraulic demand. See Exhibit B for further details.

CHAPTER 7 – PLAN SPECIFICATIONS

7.1 Specifications. Specifications for residential automatic fire sprinkler systems shall be drawn with care by a trained person.

7.2 Size and Scale. Plans shall be drawn on a minimum of 24” x 36” paper and shall be drawn to an indicated scale of not less than 1/8 inch = 1 foot.

7.3 Plans. The following items shall be included in all residential automatic fire sprinkler system plan specifications:

- (1) Scope of work for the project.
- (2) Name of owner and/or occupant.
- (3) Location of the project, including the assessor’s parcel number (APN), address number, street name and city.
- (4) Name of the water purveyor if applicable.
- (5) Name of sprinkler installer, address, phone number, type of license and license number.
- (6) Plot plan showing tank, pump, structures, underground pipe size and type, point of supply connections, depth of bury, type and size of any valve or meters.
- (7) Piping plan showing tank, pump, and structure elevations as they relate to each other.
- (8) Full height cross-section showing building construction types, sloped, and beamed ceiling locations.
- (9) Riser detail showing system split, pressure gauge, check valve, main control valve, relief valve (where applicable), main drain and domestic shut-off valve.

- (10) Indicate the manufacturer, model, type and pump curve of the booster pump (where applicable).
- (11) Detailed calculations.
- (12) Sprinkler head spacing.
- (13) Show clearly all non-sprinklered areas.
- (14) Indicate manufacturer, style, model, orifice size and “K” factor of each sprinkler used.
- (15) The main drain shall be a minimum ½ inch.
- (16) Type and size of each pipe.
- (17) Hanger detail.
- (18) Indicate type of fitting used.
- (19) The main control valve shall be located above grade and readily accessible.
- (20) Use of each room.
- (21) Location of heat sources.
- (22) Water flow information including: flow location, static pressure (psi), residual pressure (psi), flow (gpm), date, time and who conducted the test or supplied the information.
- (23) Manufacturer and model type of listed residential fire sprinkler check valve installed.

7.4 Hydraulic Calculations. The following information shall be contained in the hydraulic calculations:

- (1) Calculations must conform to manufacturer’s specifications.
- (2) “K” factors for all sprinklers.
- (3) “C” values for the type of pipe used.
- (4) A pump curve or city supply curve, where the total demand point is clearly plotted.

CHAPTER 8 – VERBATIM NOTES

8.1 Verbatim Notes. The following notes shall be completed and placed verbatim on the working sprinkler plans.

8.1.1 Construction permits shall automatically become invalid unless an inspection authorized by such permit is commenced within 12 months of being issued.

8.1.2 Construction permits shall require an inspection at a minimum of every 12 months or such permit shall become invalid.

8.1.3 This residential sprinkler system shall be designed and installed as per the current adopted edition of NFPA 13D or the CRC and Ventura County Fire Protection District standards.

8.1.4 Only listed and approved devices shall be installed in this system (except tanks).

Exception: Unless approved by a licensed engineer.

8.1.5 Only new listed residential sprinklers shall be employed in the installation of this sprinkler system.

8.1.6 All piping shall be provided with hangers and shall be supported per code and manufacturer's specifications.

8.1.7 All piping shall be hung from structural members.

8.1.8 All CPVC piping shall be installed by persons who have been certified by the manufacturer for installation of CPVC piping.

8.1.9 All valves shall have a permanently affixed sign indicating its function per the VCFPD plan submittal sheet (See Exhibit C)

8.1.10 Underground mains and lead-in connections shall be flushed before connection is made to overhead sprinkler piping.

8.1.11 Dedicated underground mains and lead-in connections shall be visually inspected under normal system operating pressure by the Ventura County Fire Protection District's Fire Prevention Bureau prior to the pipe being buried.

8.1.12 A flush of dedicated underground mains and lead-in connections shall be witnessed by the Ventura County Fire Protection District's Fire Prevention Bureau prior to connecting to the overhead fire sprinkler system.

8.1.13 The residential sprinkler system shall be tested and inspected at both rough and final stages by the Ventura County Fire Protection District's Fire Prevention Bureau, prior to occupancy being granted. Call one working day in advance to schedule all inspections.

8.1.14 A listed residential check valve per Section 5.3 shall be installed on the system side of the main control valve.

CHAPTER 9 – ACCEPTANCE TESTING

9.1 Rough Inspection. The sprinkler system shall be field tested and inspected at the rough plumbing stage (i.e. exposed pipe and fitting stage) by the Fire Prevention Bureau. All systems shall be hydrostatically tested (not pneumatic) for leakage at the normal system operating pressure at the rough stage.

9.2 Underground. All systems shall have an underground flush completed at the time of hydrostatic test prior to connecting the underground to the overhead piping.

9.3 Bucket Test. A functional test (bucket test) shall be conducted at the rough stage from the hydraulically most demanding heads, when the overhead system is connected to the underground and the water meter is in place. The system shall meet the required flow. Exhibit A indicates how to assemble the test equipment. Sprinkler heads used for the bucket test must be of the same model and manufacturer listed on the head legend of the approved plans.

9.4 Final Inspection. The sprinkler system and all related components shall be tested and inspected by the Fire Prevention Bureau at the final inspection stage, prior to occupancy being granted.

CHAPTER 10 – MANUFACTURED HOMES

10.1 New. The Department of Housing and Community Development is responsible for plan approval, in-plant inspection, testing and installation of fire sprinkler systems installed in new manufactured housing units and multi-unit manufactured housing with two dwelling units for sale in California. Prior to shipment of a home containing a fire sprinkler system, the factory is required to affix a “Fire Sprinkler System Information and Installer Certification” label inside the unit that provided detailed information for the on-site installer and homeowner use. The label is required to be affixed on an inside wall or door of the water heater compartment.

10.2 Existing. The installation of a fire sprinkler system in an existing manufactured home or multi-unit manufactured home with two dwelling units requires prior design approval from the Department of Housing and Community Development and inspection approval of the installation prior to the installer covering the piping material with finished wall or ceiling materials. Only the occupant homeowner; a fire protection contractor holding a valid C-16 license; or a plumbing contractor holding a valid C-36 license may install a fire sprinkler system in an existing manufactured home or multi-unit manufactured home with two dwelling units.

10.3 Homeowner Responsibility. The homeowner is responsible for the following:

10.3.1 Underground water supply line shall be flushed before connection is made to the sprinkler system.

10.3.2 Ensure that the available water supply will meet the demand indicated on the “Fire Sprinkler System Information and Installer Certification.”

10.3.3 Hydrostatically test the sprinkler system at the maximum system pressure for 2 hours.

10.3.4 Pay inspection fees prior to scheduling a final inspection.

EXHIBIT A

Bucket Test Equipment Setup

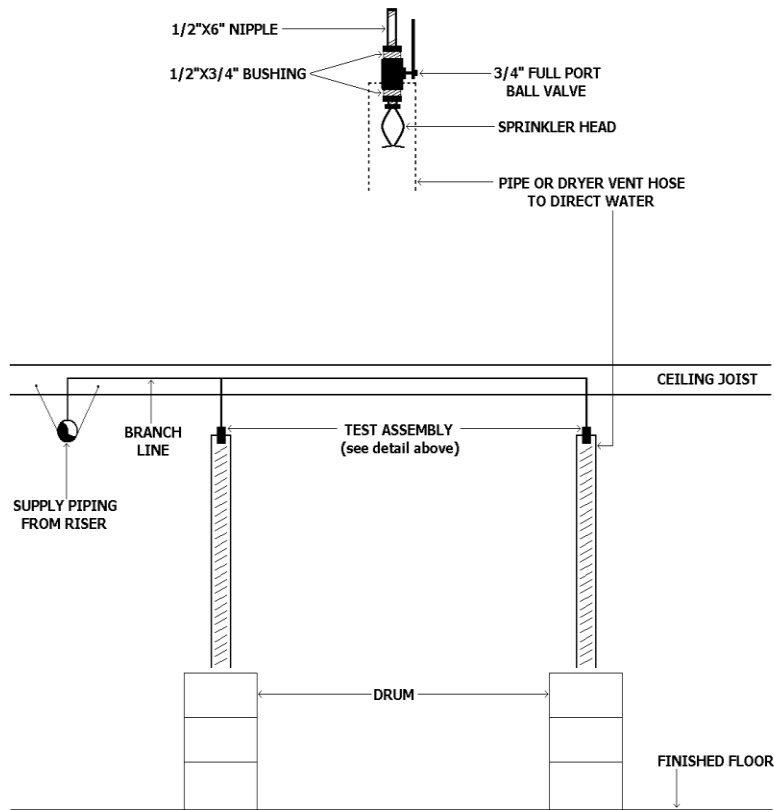
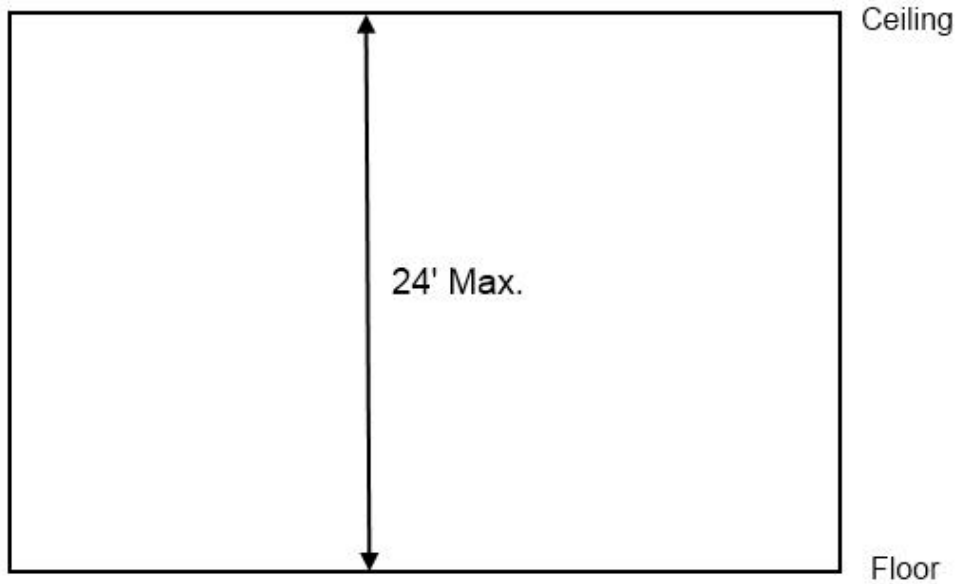


Exhibit B

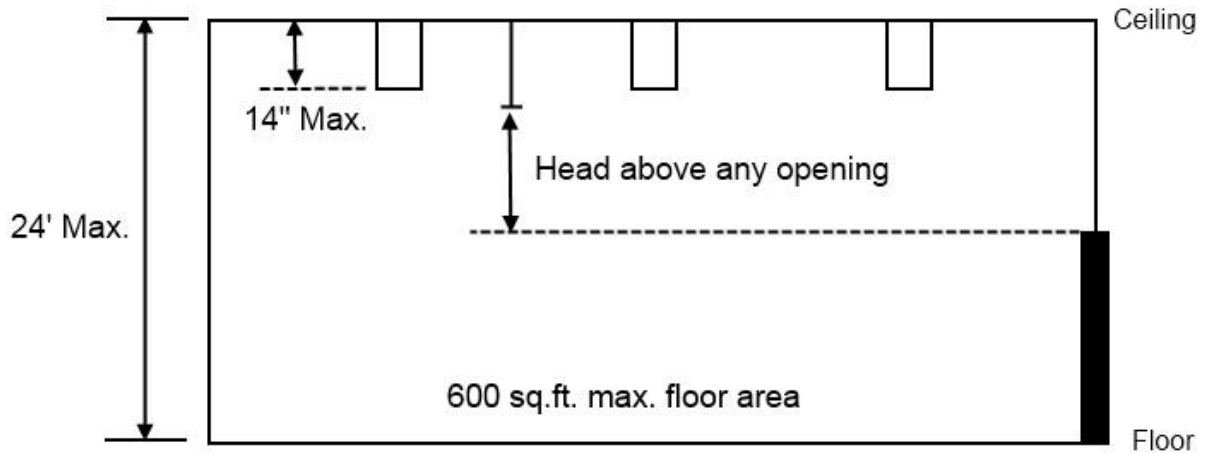
**Number of Design Sprinklers
Diagrams for NFPA 13D Section 10.2**

For each of the following situations, the number of sprinklers in the design area shall be all the sprinklers within a compartment, up to a maximum of two sprinklers that require the greatest hydraulic demand.

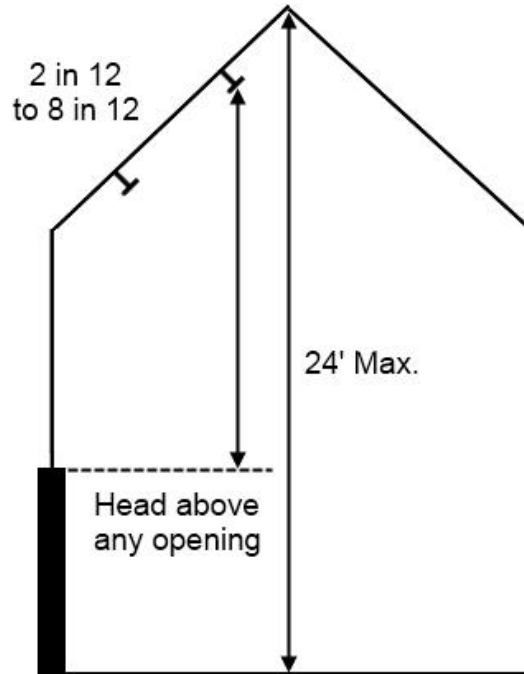
Situation #1



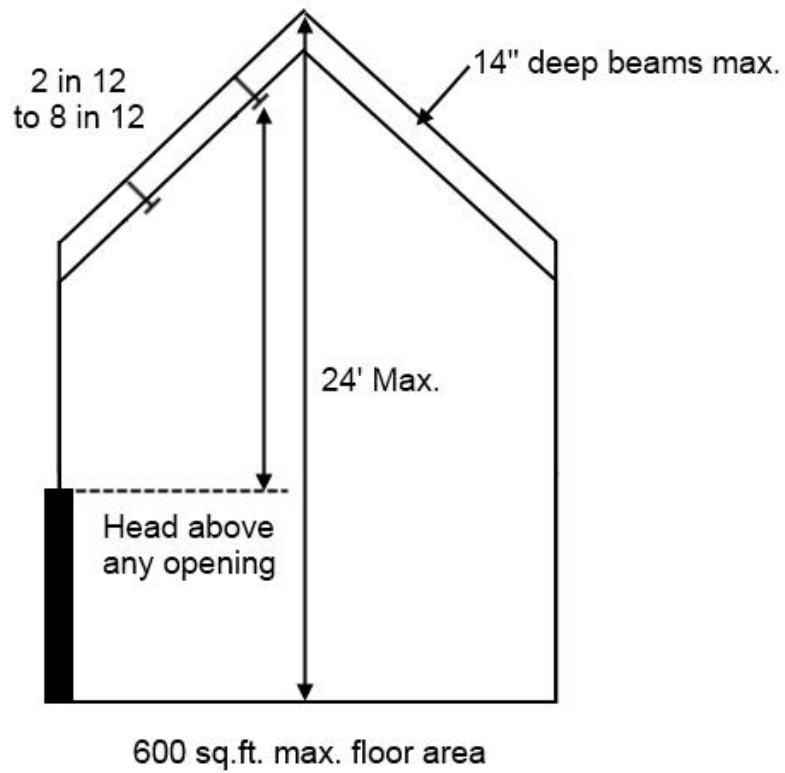
Situation #2



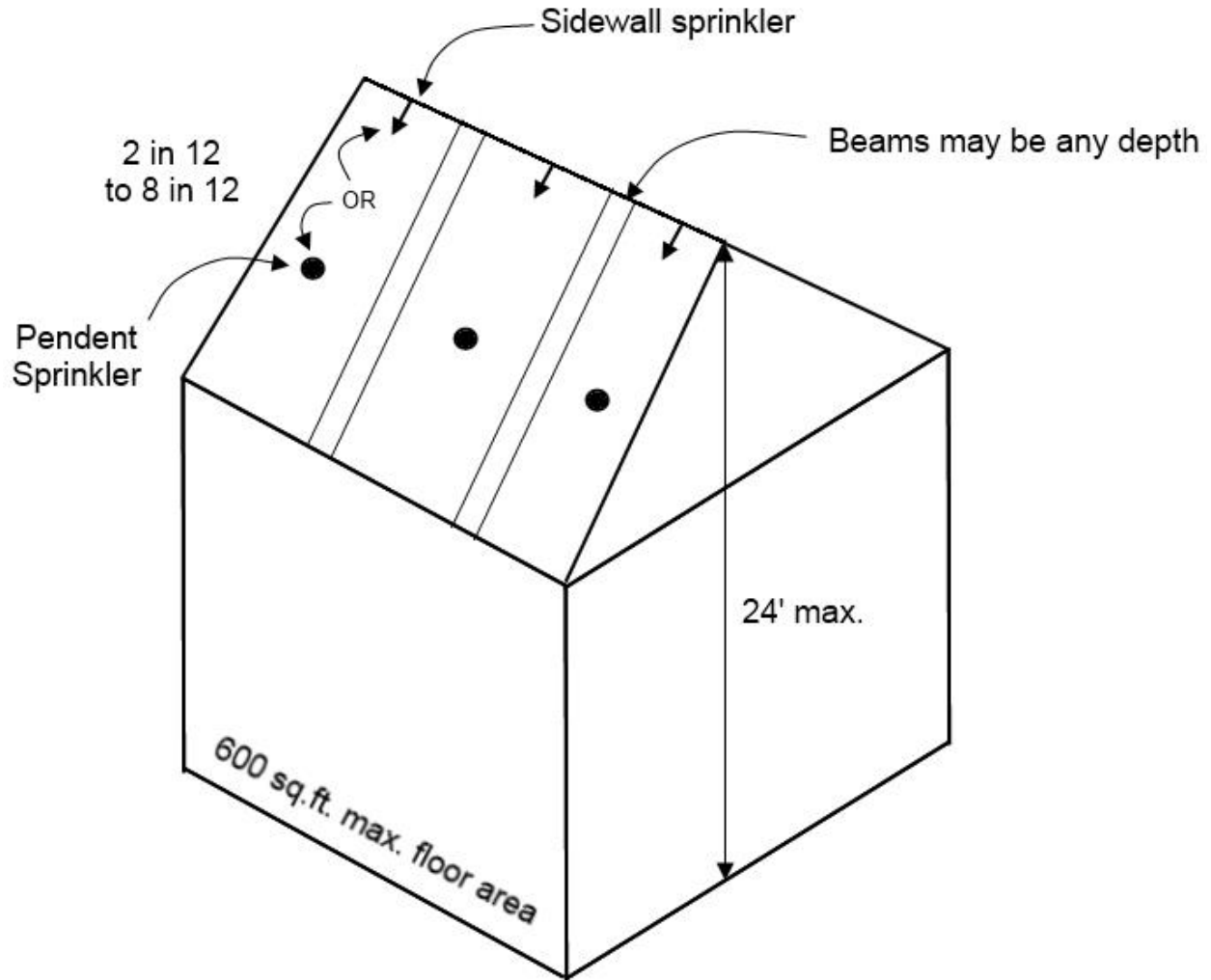
Situation #3



Situation #4



Situation #5



Notes:

- For situations not meeting one of the conditions listed above, then use residential sprinklers listed for use in the specific ceiling configuration.
- For situations not meeting one of the conditions listed above and there are no residential sprinklers listed for the specific ceiling configuration, the number of sprinklers in the design area shall include all sprinklers within a compartment, to a maximum of three (3) sprinklers that require the greatest hydraulic demand.

Exhibit C

<p>CONSTRUCTION PERMITS SHALL AUTOMATICALLY REQUIRE MAINTENANCE OF UNDERGROUND SPRINKLER SYSTEMS TO BE COMPLETED WITHIN 12 MONTHS OF BEING ISSUED.</p> <p>CONSTRUCTION PERMITS SHALL REQUIRE AN INSPECTOR AT 1.1. ANNUAL OR EVERY 12 MONTHS OR SUCH PERMIT SHALL BECOME INVALID.</p> <p>THIS RESIDENTIAL SPRINKLER SYSTEM SHALL BE DESIGNED AND INSTALLED AS PER PART 920 OF THE CALIFORNIA RESIDENTIAL CODE AND VENTURA COUNTY FIRE SAFETY DEPARTMENT RESOLUTIONS.</p> <p>ALL LISTED RESIDENTIAL SPRINKLERS SHALL BE EMPLOYED IN THE INSTALLATION OF THIS SPRINKLER SYSTEM.</p> <p>EXCEPTION: UNLESS APPROVED BY AN ENGINEER.</p> <p>ALL PERMITS SHALL BE PROVIDED WITH HANDS AND SHALL BE SUPPORTED FOR CODE AND MANUFACTURER SPECIFICATIONS.</p> <p>ALL PERMITS SHALL BE HAND IN WITH STRUCTURAL MEMBERS.</p> <p>ALL CONCEPTS SHALL BE INSTALLED BY PERSONS WHO HAVE BEEN CERTIFIED BY THE MANUFACTURER FOR INSTALLATION OF CONCEPTS. ALL VALUES SHALL HAVE A PERMANENT MARKED SIGN INDICATING ITS FUNCTION.</p> <p>UNDERGROUND MAINS AND LEAKS IN CONNECTIONS SHALL BE ELIMINATED BEFORE CONNECTION MADE TO OVERHEAD SPRINKLER PIPING.</p> <p>DESIGNATED UNDERGROUND MAINS AND LEAKS IN CONNECTIONS SHALL BE REPAIRABLE WITHOUT NECESSITY TO DISCONNECT TO THE OVERHEAD FIRE SPRINKLER SYSTEM.</p> <p>A FLUSH OF QUALIFIED UNDERGROUND MAINS AND LEAKS IN CONNECTIONS SHALL BE WITNESSED BY THE VENTURA COUNTY FIRE SAFETY DEPARTMENT INSPECTOR AT THE TIME OF CONNECTION TO THE OVERHEAD FIRE SPRINKLER SYSTEM.</p> <p>THE RESIDENTIAL SPRINKLER SYSTEM SHALL BE TESTED AND INSPECTED AT EACH HOURLY MAINTENANCE FROM OCCUPANCY THROUGH REMOVAL.</p>	<p>7 WARNING SIGN</p> <p>WARNING: THE WATER SYSTEM FOR THIS HOME SPRINKLER SYSTEM IS NOT TO BE USED FOR ANY OTHER PURPOSES. PRESSURES IN THE WATER SYSTEM MAY EXCEED THE DESIGN PRESSURE OF THE SYSTEM. THE SYSTEM IS NOT TO BE USED FOR ANY OTHER PURPOSES WITHOUT THE APPROVAL OF THE FIRE SPRINKLER SYSTEM MANUFACTURER. DO NOT REMOVE THIS SIGN.</p> <p>NOTE: SIGN AT DOMESTIC FIRE SPRINKLER SHARED SYSTEM ONLY.</p>	<p>6 SIGN AT SINGLE CONTROL VALVE</p> <p>A FIRE SPRINKLER MAIN CONTROL</p> <p>B FIRE SPRINKLER SHUT OFF AT WATER METER</p>	<p>5 FIRE SPRINKLER UNDERGROUND</p> <p>WATER PARFLOORS CITY OF CARROLL CITY OF SANTA PALMA</p>	<p>4 FIRE SPRINKLER UNDERGROUND</p> <p>WATER PARFLOORS CITY OF CARROLL CITY OF SANTA PALMA</p>	<p>3 FIRE SPRINKLER UNDERGROUND</p> <p>WATER PARFLOORS CITY OF CARROLL CITY OF SANTA PALMA</p>	<p>2 FIRE SPRINKLER W/ DEDICATED UNDERGROUND</p>	<p>1 FIRE SPRINKLER & DOMESTIC INRISER</p>	<p>VPFD STAMPS</p> <p>VPFD RECORD NUMBER:</p> <p>PROJECT ADDRESS:</p> <p>C-16 CONTRACTOR:</p> <p>VPFD RESIDENTIAL SPRINKLER STD EXHIBIT A</p>
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[Click here to open a full-size version of Exhibit C](#)