



# CITY OF SAN JOSÉ, CALIFORNIA

---

SAN JOSE FIRE DEPARTMENT

## **FIRE SPRINKLER SYSTEMS** **DESIGN, INSTALLATION, AND PLAN SUBMITTAL REQUIREMENTS**

(DATE OF ISSUE – 12/01/99)

### **1.0 PERMITS**

- 1.1 To acquire an installation permit for the automatic sprinkler system, submit the following to the San Jose Fire Department's Bureau of Fire Prevention (BFP) located at 4 North Second Street, Suite 1100, San Jose, California:
  - 1.1.1 A completed **permit application** – on the space marked DBA, write or type-in the business name (e.g., ABC Company) or if the project is speculative, write or type-in "SPEC." followed by the anticipated occupancy (e.g., SPEC OFFICE, SPEC. WAREHOUSE, ETC.). Check and make sure the permit card (last carbon copy page) is legible, otherwise the permit application may be denied.
  - 1.1.2 A copy of the **San Jose Fire Department Plan Check Comments** – this may be obtained from the general contractor or architect.
  - 1.1.3 A copy of any **approved variance** that is relevant to the project – this may be obtained from the general contractor or architect.
  - 1.1.4 A minimum of three sets of **shop quality plans and calculations** for the proposed automatic sprinkler system – One set of plans and calculations shall be retained by the BFP.
- 1.2 Two plan reviews are provided as covered by the permit fees. These two plan reviews are always the first two performed. Additional plan reviews shall be billed by the amount of time required. Overtime plan reviews may be available (depending on Departmental approval and the plan reviewer's personal time availability) and will be subject to additional fees. **Plans will be disapproved if the criteria stated herein is not followed and depicted in the submittal.**
- 1.3 Normal review time for plans is approximately one month unless the contractor schedules an **Express Plan Review** or **Over the Counter Plan Review**. There are no additional fees required for these services, however, the cost for missed appointments (one-hour) will be billed to the contractor unless proper notice is given. Cancellations require a 24-hour notice.
  - 1.3.1 **Express Plan Review** service is for projects that will require less than 30 minutes to review. This service is generally for Tenant Improvement projects requiring the addition of less than 20 sprinklers or the relocation of less than 100 sprinklers without having to recalculate the existing system. Call (408) 277-4656 and ask the receptionist

to schedule the next available express plan review. Express plan reviews can usually be arranged within one week of contact.

1.3.2 **Over the Counter Plan Review** service is available for all projects that do not qualify for Express Plan Review. Call (408) 277-4656 and ask to speak to one of our plan reviewers to set an appointment. Over the counter reviews can usually be arranged within one week of contact.

1.4 Permits are required for all new life safety and any alteration to or addition to a life safety system. Permits are not required for system maintenance unless requested by the owner. No per sprinkler charge is required for maintenance permits (i.e., when changing sprinklers for the same style due to damage, etc.). When lengthening or shortening a drop, relocating, deleting, adding or exchanging sprinklers for different styles (e.g., standard-response to quick-response; 1/2 inch to 17/32 inch; etc.) the \$1.61 charge per sprinkler shall apply, plus a processing fee of \$229.00.

1.5 **All permit fees will be collected when plans are submitted. Permit fees are non-refundable.**

1.6 All installing contractors shall have a California Contractor's License, a valid Worker's Compensation certificate, and a San Jose Business License. The said license and certificate numbers shall be indicated on the permit application prior to submittal of an installation permit.

**NOTE:** *A Fire Protection Contractor's License (C-16) shall be the only license classification acceptable for installing fire sprinkler systems.*

1.7 **Equipment and piping shall not be installed prior to approval of plans and issuance of permits.**

1.8 The permit card and a San Jose Fire Department approved set of plans must be kept at the project site until final approval of the permit, after which they shall remain in the possession of the owner.

## **2.0 PLANS**

- 2.1 The sprinkler system shall be designed and installed in accordance with the NFPA 13 series (1996 editions); Uniform Building Code (1998 edition); and the San Jose Municipal Code, Chapter 17.12 as modified by Ordinance 25838. Other standards contain system design criteria for fire control and/or suppression of specific hazards. These other standards are listed in NFPA 13, Chapter 10 and shall be followed as they pertain.
- 2.2 All plans shall show the data listed in the San Jose Fire Department's handout on "Fire Sprinkler Data required by 1996 NFPA 13, Section 6-1.1.1".
- 2.3 The plans shall be wet stamped and signed by the designer of record (installing contractor or Fire Protection Engineer). The designer's name shall be clearly printed on the plans -- NO PSEUDONYMS, ACRONYMS, OR ALIASES. Licensed, fully experienced, and responsible persons shall perform the installation work.
- 2.4 The designer of record shall be responsible for the entire system being worked on.
- 2.5 A key plan of the building and/or complex indicating the street location and the area of work within the building shall be provided.

- 2.6 Plans and all revisions to the plans shall be dated. If utilizing an existing drawing or a portion of a drawing, the area of work shall be highlighted and clouded with an appropriate revision symbol  $\Delta$  (delta). Provide a revision list with a symbol, date, description, and initials.
- 2.7 Plans shall be drawn to limit one building per page, one floor per page, or one system per page. The minimum scale for sprinkler plans shall be  $1/8" = 1'-0"$ . Floor plans shall be fully dimensioned. Sketches shall not be accepted. Match lines shall be clearly identified with corresponding drawing number.
- 2.8 A legend shall be provided and the symbols used shall match the legend. Strike out any "typical" symbols and/or details, which do not pertain.
- 2.9 All equipment and devices shall be indicated on the plan and shall be listed by a nationally recognized testing agency.

**NOTE:** *The Fire Department reserves the right to disallow any listed product due to past performance.*

- 2.10 The location of pipes, sprinklers, sway braces, hangers, and other pertinent devices shall be clearly indicated on the plans.
- 2.11 If technical expertise is unavailable within the Fire Department because of new technology, process, products, facilities, materials and uses attending the design, operation or use of a building or premises, the Fire Department may require the applicant to provide, without charge to the Fire Department, a technical opinion and report, or plan review. The opinion and report or plan review shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the Fire Department and the applicant and shall analyze the design, operation, or use of the building or premises as it relates to required codes and ordinances.

### **3.0 DESIGN**

#### **3.1 General**

##### **3.1.1 Alterations to Existing Systems**

- a) The following shall be stated on the plans:
- A complete description of the existing system design data
  - The building occupancy
  - The hazard to justify the system classification
  - A description of the modifications proposed
  - Justification for the proposed changes
  - The size, type, manufacturer, and location of the existing pipes, sprinklers, hangers, fasteners, and building structural elements to which the system is attached.
- b) All extensions to existing hydraulically calculated systems shall be hydraulically calculated. Pipe scheduled systems may be extended by 5,000 square feet if in accordance with NFPA 13.

- c) The San Jose Fire Department will not approve extra hazard pipe schedule systems. Any alteration or addition to an extra hazard system shall be hydraulically calculated.
  - d) Any design that adds sprinkler heads to the existing system (e.g., two heads split from one outlet or additional heads added by mechanical-T) shall be calculated unless the existing system was designed with a sufficient “buffer zone” (cushion).
  - e) Prefabricated systems (i.e., clean room stations, spray booths, etc.) shall be calculated and balanced to the existing system. Provide all pertinent manufacturing data such as type of sprinkler heads used; water flow demand required in gpm and psi, etc. These auxiliary systems shall have control valves and drains.
  - f) When hydraulic calculations are required, they shall be in accordance with item 3.14 of this handout.
  - g) When replacing or installing sprinkler heads, the following shall be observed:
    - Re-use of sprinkler heads is not allowed.
    - When adding or replacing sprinkler heads, they shall be of the same manufacture, make, model, orifice, and temperature rating.
    - Where the existing shell sprinkler heads become exposed, the new and existing sprinkler heads shall be of the same temperature rating.
    - When it is necessary to change all sprinkler heads in a compartment, representative “new” sprinkler heads shall be added to the sprinkler box along with the proper wrench. Should another box be needed, it shall be supplied.
    - Submit cut sheets of existing and new sprinkler heads.
    - Installing an additional two elbows to extend the existing arm over is not allowed. New drop locations shall be piped from the original branch/main outlet.
  - h) A hydrostatic test shall be witnessed by the San Jose Fire Department when required per item 4.2 of this handout.
- 3.1.2 If any system is designed to accommodate **miscellaneous storage**, the storage conditions shall be indicated on the plans in accordance with NFPA 13, Sections 1-1, 1-4.2, and Table 1-4.7.4.2.
- 3.1.3 Submit an elevation including ceiling and roof types, and any area of special consideration such as trusses (includes lightweight truss, TJI construction), vaulted/cathedral ceilings, etc. Indicate the type and size of structural members and the name of the truss manufacturer, if applicable. Lightweight truss construction includes composite wood joist, wood truss construction using metal connector plates, wood truss construction using steel web and steel bar joist.

**NOTE:** *An engineering report shall accompany all systems attached to prefabricated ceiling or roof assemblies such as truss and composite wood joist (TJI) to verify that it can support the weight of the system per NFPA 13, Section 2-6.1. A pre-engineered manufacturer's attachment specification showing the proposed fastening arrangement is acceptable in lieu of the above report.*

- 3.1.4 For rooms or areas that are labeled "lab" or "R&D", the following information shall be provided on the plans:
- a) A brief description of the processes or operations to be conducted in these areas
  - b) The volume of hazardous materials used and/or stored in each area, whether they exceed or do not exceed the exempt amounts for the occupancy classification as delineated in the Uniform Fire Code, 1998 edition.
- 3.1.5 Corridor sprinkler hydraulic design and layout shall be in accordance with the “worst case” occupancy hazard classification which the corridor serves.
- 3.1.6 When enclosed areas on a floor are open to upper floors (e.g., atriums, multi-story lobbies, etc.), the enclosed areas shall be covered by sprinkler piping supplied from the automatic sprinkler system of that floor level and not the ceiling level.
- 3.1.7 Slatted Floors, Walkways, Mezzanines, and Large Platforms:
- a) Slating of decks or walkways or the use of open grating as a substitute for automatic sprinklers thereunder is not acceptable. Openings in grated decks are not adequate to compensate for obstructions to the sprinkler spray pattern; thus, supplemental sprinklers under the deck become necessary.
  - b) Sprinklers installed under open gratings shall be of the intermediate level/rack storage type or otherwise shielded from the discharge of overhead sprinklers. As the shield will also act as a heat collector, the shield shall be sized to be 1 inch wide for each 1 inch the deflector is below the shield. The minimum shield size shall be 3½ inches.
  - c) Sprinklers shall be located in accordance with the rules for obstructed construction.
  - d) Fire will spread readily through grated or slatted floors. Therefore, an area with such divisions must be treated as a single fire area when calculating the pipe size. The system shall be balanced with all sprinklers located within the design area flowing simultaneously.
- 3.1.8 When water impinged wall (WIW) are required the criteria set forth in the SJFD handout “Requirements for Use of Quick-Response Fire Sprinklers and Barriers in Lieu of One-Hour Rated Construction”, shall be followed.
- 3.1.9 Where pre-action system(s) are installed, contact the SJFD for the specific City of San Jose ordinance 25838 requirements.

- 3.1.10 Where fire pump(s) are installed, contact the SJFD for the specific City of San Jose ordinance 25838 requirements.
- 3.1.11 Where standpipe system(s) are installed, contact the SJFD for the specific City of San Jose ordinance 25838 requirements.
- 3.1.12 When underground are required the criteria set forth in the SJFD handout “Underground Fire Service Lines”, shall be followed.
- 3.1.13 When cleanrooms are required the criteria set forth in the SJFD handout “Cleanrooms Fire Suppression and Alarm Systems”, shall be followed.

### **3.2 New Office Areas**

- 3.2.1 For light hazard areas designated for Office use, one inch plugged, threaded outlets shall be provided at each head. Branch line piping shall be sized as follows:
- 3.2.2 The minimum flow shall be 22.5 gpm. The outlet K-factor shall be 5.07 (one-5.6 K-factor head with 10 feet of one-inch pipe, two 90 degree elbows connected to a common branch line outlet by one foot of one inch pipe).
- 3.2.3 Only standard 1/2-inch sprinklers shall be used.

### **3.3 Speculative Buildings**

- 3.3.1 Speculative buildings are defined as any building or portion of a building that is built for lease.

**EXCEPTION:** *New office buildings (for office buildings see Section 3.2)*

- 3.3.2 When a fire sprinkler system is required in buildings of undetermined use with ceilings of 14 feet or less, they shall be installed for an ordinary hazard occupancy with a minimum design density of not less than 0.2 gpm/square feet, with a minimum design area of 3,000 square feet. The system demand, including 250 gpm for hoses, shall be designed at a minimum of 10 percent below the available water supply. One-inch plugged, threaded outlets shall be provided at each head. Where a subsequent occupancy requires a system with greater capability, it shall be the responsibility of the owner and/or occupant to upgrade the system.
- 3.3.3 Buildings of undetermined use with floor to structure height greater than 14 feet, a fire sprinkler system shall be installed for an extra hazard occupancy with a minimum design density of 0.33 gpm/square feet with a minimum design area of 3,000 square feet. The system demand including 500 gpm for hoses shall be designed at a minimum of 10 percent below

the available water supply. One-inch plugged, threaded outlets shall be provided at each head. In addition, a four-inch grooved capped outlet shall be provided on the riser prior to any system control valve. Where a subsequent occupancy requires a system with greater capability, it shall be the responsibility of the owner and/or occupant to upgrade the system.

**EXCEPTION:** *For buildings with roof structure heights in excess of 14 feet, a sprinkler system installed for ordinary hazard occupancy with a minimum design density of 0.2 gpm/square feet over a minimum design area of 3000 square feet will be accepted if a letter, on owner's letterhead, is provided. The letter shall indicate that the owner is aware of the sprinkler system being designed for ordinary hazard occupancy. Furthermore, if in the future, the building is used for high-piled storage or extra hazard occupancy, the sprinkler system may have to be upgraded.*

### **3.4 Obstructed / Unobstructed Construction**

- 3.4.1 The definition of obstructed and unobstructed construction shall be as provided for in Section 1-4.6 and A-1-4.6 of NFPA 13.
- 3.4.2 The rules for the location of sprinklers with respect to the floor or ceiling above shall be in accordance with Sections 4-6.4.1, 4-7.4.1, 4-8.4.1, 4-9.4.1, 4-10.4.1, 4-11.4.1 as applicable of NFPA 13.
- 3.4.3 When sprinklers are located within open trusses or are otherwise subjected to vertical obstruction(s), details and/or notes shall be provided on the plans to indicate that the requirements of Section 4-6.5.2, 4-7.5.2, 4-8.5.2, 4-9.5.2, 4-10.5.2, 4-11.5.2 as applicable of NFPA 13 have been complied with.
- 3.4.4 Soffits, cabinets, and other horizontal obstructions against walls such as cable trays or duct work shall be detailed on the drawings and protected in accordance with the formula given in Section 4-6.5.1.2, 4-7.5.1.2, 4-8.5.1.2, 4-9.5.1.2, 4-10.5.1.2, 4-11.5.1.2 as applicable of NFPA 13.

### **3.5 Sprinklers**

- 3.5.1 Indicate the type, size, temperature rating, and manufacturer of the proposed sprinkler head(s). Submit the manufacturers cut sheets for every head to be used. Only new sprinkler heads shall be used. Re-use of sprinkler heads shall not be allowed.
- 3.5.2 Upright sprinkler heads shall be installed with the frame arms parallel to the branch line.
- 3.5.3 Sprinkler heads may be omitted from the following areas and as allowed by NFPA 13, exceptions to Section 4-5.13.1.1:
  - a) Inside safe deposit or other vaults of fire-resistive construction when used for the storage of records, files, and other documents in accordance with NFPA 232
  - b) In skylights or other similar ceiling openings where the cross section of the opening does not exceed 32 square feet and the volume of the opening is

less than or equal to 160 cubic feet and provided proper floor coverage is maintained

- c) Within combustible concealed spaces, additional sprinklers shall not be required below non-combustible ducts provided that the construction below the duct conforms to the definition of non-combustible concealed space
- d) Non-combustible interstitial spaces on the condition that a letter, on owner's letterhead, is provided indicating that the space shall be kept clear of combustibles at all times. All non-plenum rated wiring is considered combustible.

3.5.4 Sprinklers shall be installed under roofs or canopies over areas where combustibles are stored or handled.

**EXCEPTIONS:**

*1) Sprinklers may be omitted where construction is non-combustible and the areas under the roof or canopy are not used for storage or handling of combustibles. A letter on owner's letterhead shall be provided indicating the areas will be maintained clear of combustibles at all times.*

*2) A stucco finish over combustible framing is not considered non-combustible construction. Construction must be rated to be considered non-combustible. Omission of sprinklers within framing shall comply with those allowed per NFPA 13, exception to Section 4-13.1.1.*

3.5.5 Sprinklers installed in utility rooms or closets shall be located in a serviceable location (i.e., not behind equipment).

3.5.6 Sprinklers installed in concealed spaces (e.g., interstitial, etc.) shall be ordinary temperature rated unless allowed by exceptions to NFPA 13, Section 4-3.1.3.

3.5.7 Should baffles be required, they shall be in accordance with Section 4-6.3.4 and 4-8.3.4 of NFPA 13.

3.5.8 Ducting used for conveying the following: solid particulates, such as refuse, dust, fumes and smoke; liquid particulate matter, such as spray residue, mists and fogs; vapors, such as vapors from flammable or corrosive liquids; noxious and toxic gases; and air at temperatures exceeding 250°F (121°C.); shall be provided with fire sprinklers in accordance with the San Jose Fire Department's handout on **Cleanrooms - Design, Installation and Submittal Requirements**.

**3.6 Piping**

3.6.1 Indicate the type, size, and C-Factor of the proposed piping. All pipes shall be used in accordance with their approved listing.

3.6.2 The imprint of the welder's stamp shall be visible on the pipe during inspection.

- 3.6.3 Copies of the contractor's or fabricator's certified welding records for the subject project shall be given to the inspector and the owner's representative prior to or during final inspection.
- 3.6.4 On-site welding is not allowed unless a welding permit is obtained from the Fire Department.
- 3.6.5 Where mechanical tees are used, the hole disc (cutout) shall be wired to the mechanical tee.
- 3.6.6 All abandoned pipes shall be removed from the premises. If abandoned pipes cannot be removed, they shall be permanently marked as "abandoned in place" to the satisfaction of the San Jose Fire Department.
- 3.6.7 Bent pipe shall be in accordance with NFPA 13 Section 2-3.6.
- 3.6.8 When using CPVC products the pipe, fittings, and adhesive shall all be compatible.
- 3.6.9 Fire protection supply piping may be installed aboveground provided the installation is first approved by San Jose Fire Department and is compliance with the requirements of NFPA 24. Special labeling shall be required ( see Section 3.13 of this handout ).
- 3.6.10 All sprinkler systems shall have Fire Department Connection(s) as indicated in the San Jose Fire Department handout "Underground Fire Service Lines".

### **3.7 Corrosion Protection**

- 3.7.1 Where corrosive conditions are known to exist due to moisture or fumes from corrosive chemicals or both, special types of fittings, pipes, and hangers that resist corrosion shall be used or a protective coating shall be applied to all unprotected exposed surfaces of the sprinkler system.
- 3.7.2 Types of locations where corrosive conditions are to be considered as in existence includes bleacheiers, dye houses, metal plating processes, animal pens, certain chemical plants, organic food product preparation areas/storage areas/sales areas/coolers/freezers, humid areas, any exterior area (including covered areas such as canopies), boiler rooms, swimming pool maintenance closets, commercial laundries, etc.
- 3.7.3 If corrosive conditions are not of great intensity and humidity is not abnormally high (organic food, exterior canopies, etc.), good results for pipe and hanger protection can be obtained by a protective coating of red lead and varnish or by a good grade of commercial acid-resisting paint. The paint manufacturer's instructions shall be followed in preparation of the surface and in the method of application.
- 3.7.4 Where moisture conditions are severe but corrosive conditions are not of great intensity (humid areas, certain chemical plants, boiler rooms, etc.), copper tube or galvanized steel pipe, fittings, and hangers may be suitable.

- 3.7.5 In instances where the piping is not readily accessible and where the exposure to corrosive fumes is severe, either a protective coating of high quality shall be employed or some form of corrosion-resistant materials shall be used.
- 3.7.6 Steel pipe, where exposed to corrosion (such as weather), shall be externally galvanized or otherwise protected as discussed above. Great care shall be taken to insure that the exposed threads of the steel pipe are properly protected from corrosion and any chips or mars to the corrosion-resistant finish are repaired after installation.
- 3.7.7 Where copper tube is to be installed in moist areas of other environments conducive to galvanic corrosion, copper hangers or ferrous hangers with an insulating material shall be used.
- 3.7.8 When systems are installed using soldered copper piping, all pendent and sidewalk sprinkler outlets shall be systematically flushed to eliminate any residual flux from the piping.
- 3.7.9 Corrosion-resistant (i.e., stainless steel, wax coated, etc.) sprinkler heads shall be installed in corrosive environments such as those specified above. All corrosion-resistant sprinkler heads shall be thermo-sensitive glass bulb style.

**EXCEPTION:** *Wax-coated sprinklers may be of the fusible link style. The sprinkler manufacturer shall apply wax coating.*

### **3.8 Earthquake Bracing**

- 3.8.1 The building structure shall be capable of supporting the required seismic loads. A letter and calculations may be required from the project structural engineer or from a professional structural engineer indicating the following:
  - a) The building structure is capable of supporting the required seismic loads.
  - b) The method of attachment of the sprinkler system to the building structure is acceptable.
- 3.8.2 Provide complete details of seismic bracing with attachments and fasteners verified by load calculations. Include the following:
  - a) The seismic load: use NFPA 13, Table 4-14.4.3.5.3 or use the actual weight of the pipes to be braced (area of influence);
  - b) Type, length, and vertical angle of brace;
  - c) Orientation of connecting surface: choose from figures shown in Table 4-14.4.3.5.6, NFPA 13;
  - d) Method of attachment to the building structure: include size of the structural member; and
  - e) The type and size of fastener.
- 3.8.3 Longitudinal and lateral braces shall be located near the center of the distance to be braced.

- 3.8.4 The four-way brace at the top of the riser shall be located above the flexible coupling and shall be attached to the roof unless it can be shown that there are extenuating installation difficulties. When attached to the wall, all joints of the fitting above the brace shall be grooved and installed with flexible couplings.
- 3.8.5 Pipe used as seismic bracing shall have a wall thickness of not less than schedule 40.
- 3.8.6 Hangers with all-threaded-rod (ATR) down to pipe that is longer than 8 feet shall not be considered as a branch line restraint. The length of ATR shall be measured from the fastening point to the centerline of the pipe.
- 3.8.7 When hangers with short rods are used in lieu of seismic bracing, the distance between centerline of the pipe and the fastening point at the structure shall be less than 6", otherwise earthquake braces are required.
- 3.8.8 Sprig-ups 4' or longer shall be restrained against lateral movement.
- 3.8.9 Through bolts for seismic braces shall have a regular washer on both sides of the member and a lock washer between the flat washer and the nut. The diameter of the hole shall not be greater than 1/16 inch of the bolt diameter.
- 3.8.10 Lag screws, C-clamps, toggle bolts, and eye nuts (i.e., TOLCO #38, #57, or #307), are not permitted to be used for attaching seismic braces.
- 3.8.11 Fasteners of seismic braces shall not extend through gypsum, particleboard or similar frangible material.
- 3.8.12 U-hooks or short hangers that are attached to trapeze hangers are not considered as seismic bracing.
- 3.8.13 In multistory buildings, riser supports shall be provided at the lowest level, at each alternate level above, above and below offsets, and at the top of the riser. Supports above the lowest level shall also restrain the pipe to prevent movement by an upward thrust where flexible fittings are used. Where risers are supported from the ground, the ground support constitutes the first level of support. Where risers are offset or do not rise from the ground, the first ceiling level above the offset constitutes the first level of riser support.

### **3.9 Hangers**

- 3.9.1 Submit an armover detail (if applicable) for new systems and alterations to existing systems. Armovers using 4 elbow swing joint drops shall require a hanger if the length of the armover plus both horizontal lengths of the swing joint equal or exceed 24 inches (i.e., 12 inch armover + 6 inch top horizontal + 6 inch bottom horizontal = 24 inches, therefore hanger is required).
- 3.9.2 A hanger shall be required on armovers that extend off the unsupported length of the end of branch lines when the unsupported length plus the length of the armover exceed the length allowed by NFPA 13, section 4-14.2.3.3.
- 3.9.3 Wall-mounted sidewall sprinklers shall be restrained to prevent inward movement.

- 3.9.4 Branch line hangers shall not restrain the branch line from longitudinal movement in case of an earthquake.
- 3.9.5 C-type clamps (including beam and large flange clamps) used to attach hangers to the building structure shall be equipped with a retaining strap. The retaining strap shall be listed for use with a C-type clamp, or shall be a steel strap of not less than 16 gauge thickness and not less than 1 inch wide for pipe diameters 8 inches or less and not less than 14 gauge thickness and not less than 1-1/4 inches wide for pipe diameters greater than 8 inches. The retaining strap shall wrap around the beam flange not less than 1 inch. A lock nut on the C-type clamp shall not be used as a method of restraint. A lip on a "C" or "Z" purling shall not be used as a method of restraint.
- 3.9.6 Powder-driven studs shall not be used.
- 3.9.7 Ten percent of all hangers using welding studs as fasteners shall be tested. The test locations shall be in different locations of the building. A minimum of three hangers shall be tested. All tested studs shall be painted fluorescent orange. Representative samples of the building structure into which studs are being attached shall be tested to determine that the studs will hold a minimum load of 750 LB for 2" or smaller pipe, 1000 LB for 2-1/2" or 3" pipe, and 1200 LB for 4" pipe.
- 3.9.8 Wood blocking nailed in place by the system installer and/or nails in general are not permitted to be used to support sprinkler piping unless the project structural engineer or a professional engineer provides a certificate in accordance with the **exception to** Section 2-6.1 of NFPA 13.
- 3.9.9 When using trapeze hangers, the type of trapeze member and its available section modulus shall be indicated and shall equal or exceed the section modulus required per NFPA 13, Sections 2-6.1.5, A-2-6.1.5 and Table 2-6.1.5(a). For trapeze members not listed in NFPA 13, Table 2-6.1.5(b), submit a cut sheet that indicates the available section modulus.
- 3.9.10 Wood trapeze hangers are not permitted unless the project structural engineer or a professional engineer provides a certificate in accordance with the **exception to** Section 2-6.1 of NFPA 13.
- 3.9.11 When fastening to the bottom chord of a wood structural member, the requirements of NFPA 13, Section 2-6.4 shall be complied with.
- 3.9.12 When fasteners extend through a layer of gypsum, particleboards, or similar material to the structure, add the thickness of the material to the required fastener.
- 3.9.13 Toggle hangers are not permitted for use with gypsum wallboard or other less substantial types of ceiling materials. Sprinkler piping must be supported from the building structure with the exception of 1-1/2 inches and smaller pipes which may be supported under ceilings of hollow tile or metal lath and plaster with toggle hangers.
- 3.9.14 Sprinkler system hangers shall be utilized solely for the support of sprinkler piping. All hangers shall be attached directly to the building structure and may not be shared with other trades.
- 3.9.15 Threaded sections of rods shall not be formed or bent. The rod must be in pure vertical position once it is connected between the structure and the pipe.

### **3.10 Control Valves**

3.10.1 All sprinkler systems shall have Post Indicator type control valves.

**EXCEPTION:** *PIV may be omitted for cause upon approval of the San Jose Fire Department. If the San Jose Fire Department allows the omission of the PIV, the sprinkler riser control valve(s) shall be located on the exterior of the building where no frangible or glazing materials are located above or within 5 feet on either side of the valves.*

3.10.2 When the sprinkler system control valve(s) is/are located inside the building, the room housing the control valves shall be a minimum one-hour construction with a labeled exterior access door within 3 feet of the control valve(s). The Fire Department shall first approve a riser room located elsewhere in the building.

3.10.3 Each floor and basement level of a building shall be provided with at least one control valve in accordance with San Jose City Ordinance 25838.

3.10.4 When located within multi-story buildings, control valves shall be installed in rated stairwells having exterior ground floor access.

3.10.5 Control valves shall be operable from 7'0" or less above the finished floor.

3.10.6 All control valves shall be provided with a tamper switch and shall be locked in the open position.

3.10.6 Any auxiliary system shall be provided with its own control valve (i.e., gas cabinets, under floor systems, etc.).

3.10.7 Fire sprinkler system risers or other controls shall not be located in electrical rooms.

3.10.8 Only PRV's which are designed to "fail open" (pilot activated) shall be installed.

### **3.11 Gauges**

3.11.1 Pressure gauges shall be provided in accordance with NFPA 13, Sections 3-1.1, 4-14.3.4, and 4-15.3.2. Pressure gauges shall be installed at each main drain valve in accordance with NFPA 13, Figure 4-14.3.4.

### **3.12 Drains**

3.12.1 Drains shall discharge to a paved area so that landscaping is not damaged and shall also be aimed so that discharge will not be directly at passersby. Gutter stones may be allowed if acceptable to the building owner.

3.12.2 Main drain and inspector's test valves shall be operable from 7'0" or less above the finished floor.

### **3.13 Signs**

3.13.1 In addition to the requirements of NFPA 13, Section 8-5, for hydraulic information signage, the following permanent signs shall be provided at the riser:

- a) A *key plan* indicating the location of each area controlled by each control valve, inspectors test valves, all auxiliary control valves, and all auxiliary drain valves.
  - b) Any special design criteria used to determine the system design, i.e., rack storage limitations; high piled storage limitations, etc. These criteria shall be shown on the key plan.
- 3.13.2 Fire sprinkler flow alarm signage as described by Section A-4-15.1.1 shall be installed at both the interior and exterior alarm devices.
- 3.13.3 Conspicuous sign(s) shall be posted directing the Fire Department to all interior control valves, auxiliary control valves, inspector's test location(s) and drain valves.
- 3.13.4 All signage as required by NFPA 13 shall be installed. A common requirement that is missed is from section 3-6.1.5: Caution signs shall be attached to all valves controlling sprinklers. The caution signs shall be worded as follows: "This valve controls fire protection equipment. Do not close until after fire has been extinguished. Use auxiliary valves when necessary to shut off supply to auxiliary equipment.  
**CAUTION:** Automatic alarm will be sounded if this valve is closed".
- 3.13.5 Abandoned fire sprinkler piping or aboveground private fire service supply piping shall be permanently marked as "abandoned fire sprinkler piping-do not tap" or "aboveground private fire service supply piping -do not tap" to the satisfaction of the San Jose Fire Department. Labeling shall be permanent, distinctive, and spaced no more than 10 feet apart.

### **3.14 Hydraulic Calculations**

- 3.14.1 The design criteria shall be set at 10% below the hydraulic curve drawn from the available water supply.
- 3.14.2 All hydraulic calculations shall include a copy of the letter from the Water Company that states the water-flow data verified within six months of the submittal date. Water-flow data may be obtained from the San Jose Water Company at (408) 279-7808. If San Jose Water Company does not serve your area of installation, contact the San Jose Fire Department at (408) 277-4656. A \$110.00/man-hour fee will be assessed by the San Jose Fire Department to perform a water-flow test and provide the water-flow data.
- 3.14.3 The minimum operating pressure shall be 7 psi, regardless of the provisions in NFPA 13 to allow use of sprinklers in accordance with their listing.
- 3.14.4 Refer to San Jose Fire Department's handout on "**Hydraulic Calculation Forms and Water Supply Information.**"
- 3.14.5 In accordance with the suggestion of the NFPA 13 Handbook, 1996 Edition, a maximum flow velocity of 20 feet/second shall not be exceeded when providing calculation based on the Hazen-Williams formula.
- 3.14.6 The area of operation may **not** be reduced as allowed by NFPA 13, section 5-2.3.2.4, where quick-response sprinklers are installed.

- 3.14.7 The area of operation shall be increased by 30% as required by NFPA 13, sections 5-2.3.2.5 and 5-2.3.2.6, for pitched roofs ( > 2" in 12" ) where SSU, SSP, HSW, and Large Drop sprinklers are used, and for dry pipe or gas charged pre-action systems.

### **3.15 Alarms**

- 3.15.1 When system alarms are required the criteria set forth in the SJFD handout "Fire Alarm Systems", shall be followed.
- 3.15.2 Valves on connections to water supplies, sectional control valves, and other valves in supply pipes to sprinklers shall be supervised open the following methods:
- (a) Central station, proprietary, or remote station signaling service through the Fire Alarm Control Panel (FACP).
  - (b) Valves locked in the open position.
- 3.15.3 Floor control valves in high-rise buildings and valves controlling flow to sprinklers in circulating closed loop systems shall comply with (a) or (b) above.

**EXCEPTION:** *Supervision of underground gate valves with roadway boxes shall not be required.*

### **4.0 INSPECTIONS**

- 4.1 Field inspections can be scheduled only after a permit has been issued. The installing contractor shall schedule all tests and inspections **only**. For inspection scheduling or for general information, please call (408) 277-4656. ***Allow at least two weeks notice when requesting any inspection.***

#### **NOTE:**

- a) *When scheduling an inspection it is the contractor's responsibility to request sufficient time to complete a thorough inspection of the work performed. Inspections are booked in increments of one hour. This time includes travel and completion of Record of Inspection form.*
  - b) *Missed inspections or inspections cancelled within 24 hours shall be billed as an inspection for the amount of time booked.*
  - c) *Two inspections are provided as covered by the permit fees. These two inspections are always the first two inspections performed. Additional inspections shall be billed by the amount of time required*
  - d) *Overtime inspections may be available depending on Departmental approval and Inspector's personal time availability. Overtime inspections must be arranged directly with the Inspector. A minimum callback fee equal to three hours shall be applied to the time required for the inspection.*
- 4.2 A hydrostatic test is required for all new systems and any alteration work involving 2-1/2 inch or larger piping or new piping where nine or more sprinklers are added to a single branch line.

New work is required to be isolated and tested to 200 psi for two hours whenever possible. If new work cannot be isolated, the entire system shall be tested for two hours at 150-psi minimum or 50 psi above static pressure, whichever is greater.

4.3 System acceptance shall be in accordance with NFPA 13, Chapter 8.

4.4 As-built drawings are to be submitted at the time of final inspection when there are deviations from the approved plan(s).

4.5 Instructions:

4.5.1 Prior to final acceptance of new systems, the contractor shall provide the owner with:

- a) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.
- b) The publication titled NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

4.5.2 Prior to final acceptance of all work, the contractor shall provide the owner with:

- a) Copies of the Contractor's Certified Welding Records, if applicable (See item 3.6.3 of this handout).
- b) Copies of the Welding Studs Pull Test Certificate, if applicable (See item 3.9.6 of this handout).

## **5.0 DOCUMENT REVISIONS**

5.1 This document is subject to revisions. For general information and to be sure that you are reading the most current document, please call (408) 277-4656, and ask for the current version date.