



Fire Sprinkler Systems Design, Installation, & Plan Submittal Requirements

Effective Date: **07/01/2012**

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):
 - 1.1.1 A completed Fire Protection and Special Systems Installation Permit form (**permit application**) – **for Project/Facility business name**, 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 application is signed and dated; 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** or **alternate means or methods of construction** 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 **See current Fee Schedule.**
- 1.3 **All permit fees will be collected when plans are submitted. Permit fees are non-refundable.**
- 1.4 Normal plan review time is approximately one month unless the contractor schedules an **express plan review** or **over-the-counter plan review**. There are no additional fees for these services; however missed appointments or cancellations within 24 hours of the scheduled plan review time shall be billed to the contractor by the amount of time scheduled.
 - 1.4.1 **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 20,000 square feet. Call (408) 535-7750 and ask the receptionist to schedule the next available express plan review.
- 1.5 Permits are required for all new life safety and any alteration to or addition to a life safety system. Permits are required when (a) lengthening or shortening a drop; (b) relocating, adding or deleting a sprinkler head(s); and (c) exchanging sprinklers for different styles (e.g., standard-response to quick-response; 1/2 inch to 17/32 inch; etc.
- 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.
- 1.9 Plans not conforming to the minimum requirements herein will be returned as incomplete.

2.0 PLANS

- 2.1 The sprinkler system shall be designed and installed in accordance with NFPA 13 or 13D (2010 editions); California Building Code (2010 edition); the San Jose Municipal Code, Chapter 17.12 as modified by Ordinance 28839, and other standards that contain system design criteria for fire control and/or suppression of specific hazards. These other standards are listed in NFPA 13, Appendix F and shall be followed as they pertain.
- 2.2 All plans shall show the data listed in NFPA 13, Section 22.1.3.
- 2.3 The plans shall be wet stamped and signed by the designer of record (installing contractor or Professional Engineer). The designer's name shall be clearly printed on the plans -- **NO PSEUDONYMS, ACRONYMS, and/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 scope of work demonstrating the extent of work to be performed and that this work corresponds to the scope given to the building department to obtain the building permit referenced on this application shall be presented on the cover sheet including the occupancy group as defined by CBC Chapter 3.
- 2.6 A key plan of the building and/or complex indicating the street location and the area of work within the building shall be provided.
- 2.7 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 Δ (delta). Provide a revision list with a symbol, date, description, and initials.
- 2.8 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.
- 2.9 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.
- 2.10 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.*

- 2.11 The location of pipes, sprinklers, sway braces, hangers, and other pertinent devices shall be clearly indicated on the plans.
- 2.12 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 Approved automatic sprinkler systems shall be provided in the locations described in the following:

- a) Throughout existing buildings and structures where an increase is made to the floor area that results in the building exceeding ten thousand square feet.
- b) Throughout existing buildings that are greater than ten thousand square feet wherein a change of occupancy that is more hazardous per the table below.

OCCUPANCY HAZARD CATEGORIES	
RELATIVE HAZARD	OCCUPANCY CLASSIFICATIONS
1 (Highest Hazard)	H
2	I-2, I-2.1, I-3, I-4
3	A, E, I-1, M, R-1, R-2, R-2.1, R-4
4	B, F-1, R-3, R-3.1, S-1
5 (Lowest Hazard)	F-2, S-2, U

- c) Throughout new one- and two-family dwellings and townhouses.
- d) Throughout existing one- and two-family dwellings where an increase of over five hundred square feet is made to the floor area that results in the building exceeding three thousand six hundred square feet.
- e) Throughout buildings and structures that are four or more stories in height, regardless of floor area.
- f) Throughout new buildings and structures that exceed six thousand two hundred square feet.
- g) Throughout new buildings and structures described in CFC Section 903.2.

3.1.2 **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, section 22.5.
- 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 and/or equivalent length to the existing system (e.g., two heads split from one outlet, additional heads added by mechanical-T, Flexible drops, etc.) shall be calculated unless the existing system was designed with a sufficient “buffer zone” (cushion). If the existing system is designed with sufficient “buffer zone” and is provided with plugged outlets, mechanical tees shall not be allowed.

- e) If system does not have one-inch plugged outlets or all the outlets have been used, only then can mechanical-tees be used. If the existing system is a grid; the mechanical-tee may be installed on the branch line. If the system is a tree, the mechanical-tee shall be installed on the main.
 - f) 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.
 - g) When hydraulic calculations are required, they shall be in accordance with item 3.14 of this handout.
 - h) 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.
 - i) A hydrostatic test shall be witnessed by the San Jose Fire Department when required per item 4.2 of this handout.
- 3.1.3 If any system is designed to accommodate **miscellaneous storage**, the storage conditions shall be indicated on the plans in accordance with NFPA 13, Sections 3.9.1.18, and Table 13.2.1.
- 3.1.4 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 9.1.1.2. A pre-engineered manufacturer's attachment specification showing the proposed fastening arrangement is acceptable in lieu of the above report.*
- 3.1.5 For rooms or areas that are labeled "lab", “testing” 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 California Fire Code, 2010 edition with City of San Jose amendments.
- 3.1.6 Labs, test rooms, R&D, FAB, storage, server, copy, phone, electrical, lunch/break rooms to be designed for ordinary hazard – max. 130 sq. ft. spacing.
- 3.1.7 Corridor sprinkler hydraulic design and layout shall be in accordance with the “worst case” occupancy hazard classification which the corridor serves.

- 3.1.8 Balconies and decks. Sprinkler protection shall be provided for exterior balconies, decks and ground floor patios of dwelling units where the building is of Type V construction, provided there is a roof or deck above. Sidewall sprinklers that are used to protect such areas shall be permitted to be located such that their deflectors are within one inch (25 mm) to six inches (152 mm) below the structural members and a maximum distance of fourteen inches (356 mm) below the deck of the exterior balconies and decks that are constructed of open wood joist construction.
- 3.1.9 Slatted Floors, Walkways, Mezzanines, and Large Platforms:
- a) Slatting of decks or walkways or the use of open grating as a substitute for automatic sprinklers there under 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.
- 3.1.10 When water impinged wall are required the criteria set forth in the SJFD handout “**Water Impinged Wall**”, shall be followed.
- 3.1.11 Where preaction system(s) are installed, the criteria set forth in the SJFD handout “**Preaction Systems**” shall be followed. A separate permit is required for preaction systems.
- 3.1.12 Where fire pump(s) are installed, contact the SJFD for the specific City of San Jose Ordinance 28839 requirements. A separate permit is required for fire pumps.
- 3.1.13 Where standpipe system(s) are installed, the criteria set forth in the SJFD handout “**STANDPIPES - SUPPLEMENTAL DESIGN REQUIREMENTS**” shall be followed. A separate permit is required for standpipe systems.
- 3.1.14 When underground are required the criteria set forth in the SJFD handout “**Underground Fire Service Lines**” shall be followed. A separate permit is required for underground fire service mains.
- 3.1.15 When Cleanrooms are required the criteria set forth in the SJFD handout “**Cleanrooms Fire Suppression and Alarm Systems**” shall be followed.
- 3.1.16 When High-Piled Combustible Storage is present, the criteria set forth in the SJFD handout “**Requirements for the Protection of High-Piled Combustible Storage (HPCS)**” 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 regardless of construction. Branch line piping shall be sized as follows:
- 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).
 - Only standard ½" sprinklers shall be used, extended coverage heads shall not be used.
 - The use of mechanical-tees is not permitted for new construction.

3.3 Speculative Buildings

- 3.3.1 Speculative buildings are defined as:
- A building or portion of a building that is built for lease, or
 - A building built on a leased lot.

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

- 3.3.2 When a fire sprinkler system is required in speculative buildings with ceilings of 14 feet or less, they shall be installed for 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. Extended coverage heads shall not be used. The use of mechanical-tees is not permitted for new construction.
- 3.3.3 Speculative buildings with floor to ceilings 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. Extended coverage heads shall not be used. The use of mechanical-tees is not permitted for new construction.

Note: A permanent drop ceiling may be used to limit ceiling height provided the interstitial space created is protected by automatic fire sprinklers. Should this ceiling be removed in the future, as a minimum, the automatic fire sprinkler design criteria for Speculative Buildings required herein shall be met without regard to the proposed use.

3.4 Obstructed / Unobstructed Construction

- 3.4.1 The definition of obstructed and unobstructed construction shall be as provided for in Section 3.7 and A.3.7.1 and A.3.7.2 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 8.6.4.1, 8.7.4.1, 8.8.4.1, 8.9.4.1, 8.10.4.1, 8.11.4.1 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 Sections 8.6.5.2, 8.7.5.2, 8.8.5.2, 8.9.5.2, 8.10.6.2, 8.11.5.2 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 8.6.5.1.2, 8.7.5.1.2, 8.8.5.1.2, 8.9.5.1.2, 8.10.6.1.2, 8.11.5.1.2 as applicable of NFPA 13.
- 3.4.5 Extended coverage heads shall not be installed.
- 3.4.6 Only standard ½ inch sprinklers shall be used under concrete tee construction.

3.5 Sprinklers

- 3.5.1 Indicate the type, size, temperature rating, and manufacturer of the proposed sprinkler head(s). Submit the manufacturer's cut sheet 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 **NOT** be omitted for the following conditions given by NFPA 13, in Section 8.15.1.2: Sections 8.15.1.2.1 & 8.15.1.2.1.1, 8.15.1.2.2 & 8.15.1.2.2.1, 8.15.1.2.9, 8.15.1.2.10, 8.15.1.2.11, 8.15.1.2.12, 8.15.1.2.16, & 8.15.1.2.17 (are **NOT** acceptable for omission)
 - 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.
- 3.5.4 Sprinklers shall be installed under roofs or canopies over areas where combustibles are stored or handled. NFPA 13 (2010 Ed.), Sections 8.15.7.1 through 8.15.7.4 are **NOT** permitted omissions in the City of San Jose.

NOTES:

- a) *Short-term transient storage, such as that for delivered packages, and the presence of planters, newspaper machines, and so forth, **ARE** considered storage or handling of combustibles.*
 - b) *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 8.15.1.2.*
- 3.5.5 Exterior enclosures/structures (trash/recycle/decks/etc.) within 5 feet of the building shall be equipped with fire sprinklers.
 - 3.5.6 Sprinklers installed in utility rooms or closets shall be located in a serviceable location (i.e., not behind equipment).
 - 3.5.7 Sprinklers installed in concealed spaces (e.g., interstitial, etc.) shall be ordinary temperature rated unless allowed by exceptions to NFPA 13, Section 8.3.2.1.
 - 3.5.8 Should baffles be required, they shall be in accordance with Section 8.7.4.1.3 and 8.9.4.1.3 of NFPA 13.

- 3.5.9 Fire sprinklers shall be provided per the SJFD handout on **Cleanrooms - Design, Installation and Submittal Requirements** in ducts that convey the following:
- a) solid particulate, such as refuse, dust, fumes and smoke.
 - b) liquid particulate matter, such as spray residue, mists and fogs.
 - c) vapors, such as vapors from flammable or corrosive liquids.
 - d) noxious and toxic gases.
 - e) air at temperatures exceeding 250°F (121°C).

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, per NFPA 13 Section 6.5.2.6 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 San Jose Fire Department approved for use, 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 6.3.7.
- 3.6.8 When using CPVC products the pipe, fittings, and adhesive shall all be compatible, and used per approved listing.
- 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 13 and 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 Areas where corrosive conditions are considered to be in existence include bleachers, open garages, (w/o Mechanical Ventilation) dye houses, metal plating processing, animal pens, certain chemical plants, organic food product preparation areas/storage areas/sales areas/coolers/freezers, trash environments, 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 corrosive-resistant finish are repaired after installation. Open garages (not mechanically ventilated), and canopies are examples of locations where pipes are exposed to corrosion due to the weather.
- 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 sidewall sprinkler outlets shall be systematically flushed to eliminate any residual flux from the piping.
- 3.7.9 Corrosion-resistant (i.e., stainless steel, Teflon coated, factory 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 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 figure 9.3.5.9.1, NFPA 13;
 - d) Method of attachment to the building structure: include size of the structural member; and
 - e) The type and size of fastener.

- f) See the SJFD Handout Titled “Sway Brace Design - Seismic Coefficients by Zip Code for San Jose California” to comply with NFPA 13, 2010 edition, 9.3.5.6.2
- 3.8.3 Sway brace components other than pipes, angles, flats and rods shall be listed. The listed loads of brace fittings that attach to the pipe and the building structure shall be reduced in accordance with Table 9.3.5.10.3 when the brace assembly is configured at less than 90 degrees from vertical.
- 3.8.4 Longitudinal and lateral braces shall be located near the center of the distance to be braced.
- 3.8.5 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.
- 3.8.6 Pipe used as seismic bracing shall have a wall thickness of not less than schedule 40.
- 3.8.7 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.
- 3.8.8 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.
- 3.8.9 Sprig-ups 4’ or longer shall be restrained against lateral movement.
- 3.8.10 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.
- 3.8.11 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.
- 3.8.12 Fasteners of seismic braces shall not extend through gypsum, particleboard or similar frangible material.
- 3.8.13 U-hooks or short hangers that are attached to trapeze hangers are not considered as seismic bracing.
- 3.8.14 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 four 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 9.2.3.4.1.
- 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" purlin shall not be used as a method of restraint.
- 3.9.6 Powder-driven studs are **NOT** permitted unless the project structural engineer or a professional engineer provides a certificate and they are in accordance with Section 9.1.3.9 of NFPA 13.
- 3.9.7 Welding studs and the tools for installing these devices shall be listed. Pipe size, installation position, and construction material into which they are installed shall be in accordance with individual listings.
- 3.9.8 Ten percent of all hangers using welding studs as fasteners shall be load tested by a certified testing agency. 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.
- 3.9.9 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 Section 9.1.1.2 of NFPA 13.
- 3.9.10 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 9.1.1.6, A.9.1.1.6 and Table 9.1.1.6.1 (a). For trapeze members not listed in NFPA 13, Table 6-1.1.3(b), submit a cut sheet that indicates the available section modulus.
- 3.9.11 Wood trapeze hangers are not permitted unless the project structural engineer or a professional engineer provides a certificate in accordance with Section 9.1.1.2 of NFPA 13.
- 3.9.12 When fastening to the bottom chord of a wood structural member, the requirements of NFPA 13, Section 9.1.5 shall be complied with.
- 3.9.13 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.
- 3.9.14 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.
- 3.9.15 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.
- 3.9.16 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.
- 3.9.17 Sammy screws min. 3/8" shank diameter are accepted only for CPVC and 1" steel pipe.

3.10 Control Valves

- 3.10.1 All sprinkler systems shall have indicating type control 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 and flow switch in accordance with San Jose City Ordinance 28839. In multi-family residential buildings where the sprinkler system in each dwelling unit is independent of the other units (e.g. townhomes), a control valve and flow switch shall be provided in each dwelling unit in lieu of floor control valves and flow switches.
- 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.
- 3.10.7 Any auxiliary system shall be provided with its own control valve (i.e., gas cabinets, mezzanines, under floor systems, etc.).
- 3.10.8 Fire sprinkler system risers or other controls shall not be located in electrical rooms.
- 3.10.9 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 7.1.1, 8.16.2.4, and pressure gauges shall be installed at each main drain valve in accordance with NFPA 13, Figures 8.16.2.4. (a & b).
- 3.11.2 All systems shall be provided with a main drain in accordance with NFPA 13, Section 8.16.2.4.2.
- 3.11.3 All systems shall be provided with a remote inspector's test valve.

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 24.5, 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 in NFPA 13, Section A.8.17.1 shall be provided for 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 frequently missed is from section 7.7.1.5: 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 pressure cushion for hydraulic calculations shall be the greatest of 10% of the water supply data or 8 psi.
- 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, San Jose Municipal Water Company or Great Oaks Water. If you wish, San Jose Fire Department can perform a water-flow test and provide the water-flow data at an hourly rate (3 hours minimum). However, this test will not take the place of the water company declaration.
- 3.14.3 The backflow prevention requirements for each water company are unique. San Jose Water Company and Great Oaks Water Company require an additional check valve after their meter. San Jose Municipal Water Company requires a "Lead Free Dual Check Valve Backflow Device (or equivalent)". We will need verification that the correct devices have been represented in the calculations.
- 3.14.4 The minimum operating pressure shall be as listed for the sprinkler head but in no case shall it be less than 7 psi, regardless of the provisions in NFPA 13 to allow use of sprinklers in accordance with their listing.
- 3.14.5 A maximum flow velocity of 20 feet/second shall not be exceeded when providing calculation based on the Hazen-Williams formula. See SJFD Handout Titled "20 FPS CHART"
- 3.14.6 The area of operation may **not** be reduced as allowed by NFPA 13, sections 11.2.3.1.4 & 11.2.3.2.3.1, where quick-response sprinklers are installed.
- 3.14.7 The area of operation shall be increased by 30% as required by NFPA 13, sections 11.2.3.2.4 and 11.2.3.2.5, 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.
- 3.14.8 Provide documentation for all pipe length equivalents used to develop your calculations. As an Example, Tyco CPVC fittings are "special" in that they get reduced equivalent lengths (for 90° elbow) compared to other manufacturers, you need to provide note on plans and in the calculations that only Tyco CPVC fittings will be used. We will check these in the field, so, the fittings must be readily identified as Tyco CPVC fittings. If not, then you will need to revise your calculations to reflect the "normal" equivalent lengths.

3.15 **Alarms**

- 3.15.1 When the sprinkler system is required to be monitored, the criteria set forth in the SJFD handout "**Fire Sprinkler Monitoring System**", 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” using both of the following:
- (a) Central station, proprietary, or remote station signaling service through the Fire Alarm Control Panel (FACP).
 - (b) Valves locked in the open position.

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. Only the installing contractor shall schedule all tests and inspections. To schedule an inspection, call (408) 535-3555 at least 3 days before the desired inspection date.

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 the Record of Inspection form.*
 - b) *Missed inspections or inspections cancelled less than 24 hours before the scheduled date shall be billed as an inspection for the amount of time booked.*
 - c) *Inspections are provided as covered by the permit fees. Additional inspections shall be billed by the amount of time required.*
- 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 200 psi minimum or 50 psi above static pressure, whichever is greater.
- 4.3 System acceptance shall be in accordance with NFPA 13, Chapter 24.
- 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 SJFD and 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*.
 - c) The Contractor’s Material and Test Certificate(s) per NFPA 13, Chapter 24.
- 4.5.2 Prior to final acceptance of all work, the contractor shall provide SJFD and 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 3.9.8 of this handout).
 - c) The Contractor’s Material and Test Certificate(s) per NFPA 13, Chapter 24.

5.0 DOCUMENT REVISIONS

- 5.1 This document is subject to revisions. For general information and to verify that you have the most current document, please call (408) 535-7750, and request the current version date.