



Fire Sprinkler Systems Design, Installation, and Plan Submittal Requirements

Effective Date: January 1, 2020

1.0 PERMITS

- 1.1 We no longer accept paper plans. Plans are to be submitted using the SJePlans system. Uploaded files must be correctly named. See “**Fire SJePlans File Naming Convention**”. 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 To apply for fire and hazardous materials systems permits, please schedule an appointment and complete your application submittal using SJePlans.
 - 1.1.2 A completed Fire Protection and Special Systems Installation Permit form (permit application) – for project/facility business name, if the project is speculative, type-in “SPEC.” followed by the anticipated occupancy (e.g., SPEC OFFICE, SPEC. WAREHOUSE, ETC).
 - 1.1.3 The approved San Jose Fire Department Plan Check Directives – this may be obtained from the general contractor or architect.
 - 1.1.4 All approved variances or alternate means or methods of constructions that are relevant to the project – these may be obtained from the general contractor or architect.
 - 1.1.5 Shop quality plans, calculations and supporting documents for the proposed automatic sprinkler system.
- 1.2 See current **Fee Schedule**.
- 1.3 Initial permit fees will be collected when plans are submitted. Permit fees are non-refundable.
- 1.4 **Regular plan review** time is approximately one month unless the contractor schedules an **express plan review** (over-the-counter). The fee for express plan review is 1.5 times the hourly plan check rate. 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.

Express plan review service is for projects that will require less than 1 hour to review. This service is generally for tenant improvement projects requiring the addition of less than 20,000 square feet. See “**Express Review Requirements for Fire Suppression Systems**” for further instructions.
- 1.5 Permits are required for any new life safety system 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 fire sprinkler; and (c) exchanging sprinklers for different styles (e.g., standard-response to quick-response; K-factor of 5.6 to 8.0; 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 required for the application for the Fire Sprinkler permit.*
- 1.7 Equipment and piping shall not be installed prior to approval of plans and issuance of permits.
- 1.8 The permit 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, 13R or 13D (2019 editions); California Building Code (2019 edition); the San Jose Municipal Code, Chapter 17.12 as modified by Local Ordinance, 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 Annex F and shall be followed as they pertain.
- 2.2 All plans shall show the relevant data listed in NFPA 13, Chapter 27.
- 2.3 The plans shall be 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 the California Building Code 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 new buildings and structures described in Sections 903.2.1 through 903.2.20 as modified herein.
 - b) Throughout existing buildings and structures where an increase is made to the floor area that results in the building exceeding 10,000 square feet or the proposed change in use or contents of the building creates a higher risk as indicated in Section 102.3 of the California Fire Code.(See Annex A-pages 15-17)
 - c) Throughout existing one- and two-family dwellings where an increase of over 500 square feet is made to the floor area that results in the building exceeding 3,600 square feet.

- d) Throughout new one- and two-family dwellings and townhouses.
- e) Throughout buildings and structures that are four or more stories in height, regardless of the floor area.
- f) Throughout new buildings and structures that exceed 6,200 square feet.

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 up to an additional 5,000 square feet when designed in accordance with NFPA 13, section 27.5 and 29.4, to a maximum of 400 sprinklers.
- 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 fire sprinklers and/or equivalent length to the existing system (e.g., two sprinklers split from one outlet, additional sprinklers added by mechanical-T, flexible sprinkler hose fittings, etc.) shall be calculated unless the existing system was designed with a sufficient “buffer zone” (cushion). If the existing system is designed with enough “buffer zone” and is provided with plugged outlets, mechanical tees shall not be allowed.
- e) Renovations requiring modification to an existing sprinkler system designed in accordance with the San Jose requirements for “**New Office Buildings**” (item 3.2 herein) or “**Speculative Buildings**” (item 3.3 herein) shall use the provided plugged outlets to supply the distribution piping for sprinklers being added and/or relocated as required for the ceiling below. The existing upright sprinklers are to remain in place even if no longer needed to protect the space per 2019 NFPA 9.2.1. Spacing to accommodate new obstructions need not be considered if the now concealed space is otherwise compliant with 2019 NFPA 9.2.1.
- f) 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.
- g) Prefabricated systems e.g., clean room stations spray booths, etc.) shall be calculated and balanced to the existing system. Provide all pertinent manufacturing data such as type of sprinklers used; water flow demand required in gpm and psi, etc. These auxiliary systems shall have control valves and drains.
- h) When hydraulic calculations are required, they shall be in accordance with item 3.14 of this handout.
- i) When replacing or installing sprinklers, the following shall be observed:
 - Re-use of sprinklers is not allowed.
 - When adding or replacing sprinklers, they shall be of the same manufacture, make, model, orifice, and temperature rating.

- Where the existing shell sprinklers become exposed, the new and existing sprinklers shall be of the same temperature rating and thermal sensitivity.
 - When it is necessary to change all sprinklers in a compartment, representative “new” sprinklers shall be added to the spare sprinkler cabinet along with the proper wrench. Provide additional cabinets, as needed.
 - Submit data sheets of existing and new sprinklers.
 - 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.
 - Relocating an existing sprinkler with a flexible sprinkler hose fitting is allowed without replacing the sprinkler if the relocation can be properly installed per the manufacturer’s limitations.
- j) 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 4.3.1.4 and as discussed in A.4.3.1.4; and Table 4.3.1.7.1.
- 3.1.4 Submit an elevation plan/detail that includes 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 17.1.2 and 17.1.4... 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, 2019 edition with City of San Jose amendments.
- 3.1.6 Labs, test rooms, R&D, FAB, storage, server, copy, electrical, lunch/break rooms shall be designed for ordinary hazard – maximum 130 sq. ft. spacing.
- 3.1.7 Corridor sprinkler 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 buildings which have an automatic fire sprinkler system, 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 to six inches below the structural members and a maximum distance of fourteen inches below the deck of the exterior balconies and decks that are constructed of open wood joist construction. Corrosion resistant sprinklers and components shall be used.
- 3.1.8.1 Other exterior projections such as canopies shall comply with 9.2.3.
- 3.1.8.2 Where the building is sprinklered, areas under exterior ceilings such as alcoves, in excess of 24”, shall be protected with corrosion resistant sprinklers and components (where exposed) due to the occupancy above and at the same hazard design.
- 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 beneath the decks or walkways 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. 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 Sprinklers may not be omitted 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.
- 3.1.11 Equipment access. Approved access shall be provided and maintained for all fire protection equipment to permit immediate safe operation and maintenance of such equipment. Storage, trash and other materials or objects shall not be placed or kept in such a manner that would prevent such equipment from being readily accessible. In general, a minimum 3' clearance to and around the equipment shall be provided.
- 3.1.12 When water impinged wall are required the criteria set forth in the SJFD handout "**Water Impinged Wall**", shall be followed.
- 3.1.13 Where preaction system(s) are installed, the criteria set forth in the SJFD handout "**Precision Systems**" shall be followed. A separate permit is required for preaction systems.
- 3.1.14 Where fire pump(s) are installed, see "**Standard for Installation of Stationary Fire Pumps for Fire Protection**" for further instructions. A separate permit is required for fire pumps.
- 3.1.15 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.
- 3.1.16 When fire underground work is 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 piping.
- 3.1.17 When Cleanrooms are required, the criteria set forth in the SJFD handout "**Cleanrooms Fire Suppression and Alarm Systems**" shall be followed.
- 3.1.18 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 sprinkler regardless of construction. Branch line piping shall be sized as follows:
 - a) The minimum flow shall be 22.5 gpm. The equivalent K-factor for each sprinkler shall be 5.08 (5.6 K-factor sprinklers with 20' of 1" Schedule 40 pipe and fittings). The corresponding equivalent K-factor for a K=8.0 sprinkler is 6.73. Note that this equivalent K-factor involves the shell system sprinkler location and the future finished ceiling sprinkler location.
 - b) Only standard spray sprinklers shall be used. Extended coverage sprinklers shall not be used.
 - c) The use of mechanical-tees is not permitted for new construction.

3.3 Speculative Buildings

3.3.1 Speculative buildings are defined as:

- a) A building or portion of a building that is built for lease, or
- b) 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-like 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 sprinkler. 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. Quick response sprinklers shall be used. Extended coverage sprinklers 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 extra hazard-like 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 sprinkler. 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. Quick response sprinklers shall be used unless building is a warehouse. Extended coverage sprinklers 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 Car Stackers

3.4.1 The ceiling sprinklers shall be calculated per Extra Hazard Group 1 (EH1, 0.30/2500). Maximum spacing is 100 sq. ft.

3.4.2 Sprinkler protection shall be required under all levels of the car stackers to satisfy Ordinary Hazard Group 2 (OH2). The sprinkler can be upright, pendent, or sidewall. Maximum spacing is 130 sq. ft. Extended coverage sprinklers shall not be used.

3.4.3 The ceiling sprinklers and under car stacker level sprinklers are to be calculated to flow at the same time. The ceiling design area shall be 2500 sq. ft. The high temperature sprinkler area reduction shall not be allowed for car stackers. The minimum number of sprinklers to flow under the car stacker levels shall be 8 sprinklers for 1 level, and 14 sprinklers for 2 or more levels (7 sprinklers each on most demanding 2 levels).

3.5 Sprinklers

3.5.1 Indicate the type, size, temperature rating, and manufacturer of the proposed sprinkler(s). Submit the manufacturer's data sheet for every sprinkler type to be used. Only new sprinklers shall be used. Re-use of sprinklers shall not be allowed (Also see 3.1.2, herein).

3.5.2 Upright sprinklers shall be installed with the frame arms parallel to piping it is supplied from.

3.5.3 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 9.2.1 as further modified by ordinance (See item 3.6.6 herein).

3.5.4 **Exterior enclosures/structures** (trash/recycle/gazebos/sheds/etc.): The rule of thumb has been that small auxiliary structures within 5 feet of a sprinklered building shall also be equipped with fire

sprinklers. Specifically, small auxiliary structures on a property are required to be equipped with fire sprinklers if the structure is on a property where the primary structure(s) is/are equipped with sprinklers and proper separation per the Building Code cannot be demonstrated to allow the auxiliary structure to be considered as a separate building as explained in 2019 CBC 503.1.2.

- 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 may not be omitted for the following conditions given by NFPA 13, in Section 9.2.1: Sections 9.2.1.1, 9.2.1.2, 9.2.1.10, 9.2.1.11, 9.2.1.12, 9.2.1.13, 9.2.1.17, and 9.2.1.18.
- 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 9.4.2.1.
- 3.5.8 The use of extended coverage sprinklers (EC) per Chapter 11 is not allowed by San Jose Ordinance SJFC 17.12.1045. However, our intention with this code cycle is to allow contractors to justify the use of ECs and see how it goes. It goes without saying that all NFPA and data sheet requirements will be followed.

We disallowed ECs in past because their use gives very little, if any, room for adjustments in the field and we had multiple projects have major complications because of them. So, our ordinance requires prior approval and we are allowing them on a case by case basis by approved request.

To request allowance to use ECs, provide the scope of proposed use and why it is unlikely that field modifications will be required. Written concurrence from the owner and general contractor indicating assumption of risk is required for approval.

Should a situation come up on inspection, no variance will be given. Several projects had to re-pipe the system to accommodate field conditions that were not the sprinkler contractor's fault. This added direct expense and months of time to get final Certificate of Occupancy.

- 3.5.9 Should baffles be required, they shall be in accordance with Sections 10.3.5.1.3 and 11.3.5.1.3 of NFPA 13.
- 3.5.10 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 fabricators certified welding records, per NFPA 13 Section 7.5.2.6 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 permitted as allowed by the listing or in accordance with NFPA 13 Section 16.3.8.

- 3.6.8 When using CPVC products the pipe, fittings, and adhesive shall all be compatible, and used per approved listing.
- 3.6.9 CPVC Fire Sprinkler Products, like all piping materials, will expand and contract with changes in temperature. The installation of expansion loops, offsets, or bends is required on long straight runs to compensate for this movement. This will allow the piping system to absorb forces generated by expansion/contraction without damage. This movement must be designed into the system per the manufacturer's stipulations.
- 3.6.10 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 3.14 of this handout).
- 3.6.11 All sprinkler systems shall have Fire Department Connection(s) as indicated in the San Jose Fire Department handouts "**Underground Fire Service Lines**" & "**Standpipes - Supplemental Design Requirements**".
 - 3.6.11.1 Fire Sprinkler and Standpipe Fire Department Connections (FDC) serving the same building shall be located directly adjacent to each other.
 - 3.6.11.2 Buildings in excess of 200 feet long and or having frontage on multiple streets shall have multiple FDCs.
- 3.6.12 The Locations shall be approved during Plan Check by San Jose Fire Department and shall be depicted on the riser key plan(s).

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 ensure 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 (e.g., stainless steel, polyester finish, factory wax coated, etc.) sprinklers shall be installed in corrosive environments such as those specified above. All corrosion-resistant sprinklers shall be glass bulb style for its heat-activated element.

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

- 3.7.10 Air Venting. A single air vent with a connection conforming to NFPA 13 section 16.7 shall be provided on each wet pipe system utilizing any metallic pipe. (See A.16.7.). Automatic air vents shall be used unless manual valves are approved by SJFD. Where manual valves are approved, the system(s) shall be piped to an approved location in accordance with good practice as indicated by NFPA 13 Sections 16.10 & 16.14. Sight test connections may be required, and the systems shall be required to be vented under inspection of SJFD.

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:
- 3.8.1.1 The building structure is capable of supporting the required seismic loads.
 - 3.8.1.2 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:
- 3.8.2.1 The seismic load - use the actual weight of the water-filled pipes to be braced (zone of influence);
 - 3.8.2.2 Type, length, and vertical angle of brace;
 - 3.8.2.3 Orientation of connecting surface: choose from figures shown in NFPA 13, figure 18.5.12.1;
 - 3.8.2.4 Method of attachment to the building structure: include size of the structural member; and
 - 3.8.2.5 The type and size of fastener.
 - 3.8.2.6 Provide the seismic design report as part of the complete seismic bracing calculations submittal.

Note: *S_s, the short period response parameter, for specific building locations can be obtained from the following websites: <https://seismicmaps.org/>, <https://hazards.atcouncil.org/#/seismic>, and <https://asce7hazardtool.online/> to use with section 18.5.9.3 of NFPA 13, 2019 edition.*

- 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 thread 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 (e.g., 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 arm-over detail (if applicable) for new systems and alterations to existing systems. Arm-overs using four elbow swing joint drops shall require a hanger if the length of the arm-over plus both horizontal lengths of the swing joint equal or exceed 24 inches (e.g., 12 inch arm-over + 6 inch top horizontal + 6 inch bottom horizontal = 24 inches, therefore hanger is required).
- 3.9.2 A hanger shall be required on arm-overs that extend off the unsupported length of the end of branch lines when the unsupported length plus the length of the arm-over exceed the length allowed by NFPA 13, Section 17.4.3.4... & 17.4.3.5...
- 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 17.2.2.9 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 17.1.2 or 17.1.3 as applicable 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 17.3, A.17.3 and Table 17.3.1(a). For trapeze members not listed in NFPA 13, Table 17.3.1(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 17.1.2 or 17.1.3 as applies of NFPA 13.
- 3.9.12 When fastening to the bottom chord of a wood structural member, the requirements of NFPA 13, Section 17.2.4 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 with minimum 3/8" shank diameter are acceptable only for CPVC and 1" steel pipe.

3.10 Control Valves

- 3.10.1 All sprinkler systems shall have indicating type control valves. NFPA 13, sections 16.9.11.2 through 16.9.11.4 have been deleted by local ordinance.
- 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 full-size exterior access door within 3 feet of the control valve(s). Locations of sprinkler system riser(s) and riser room shall be approved by the Fire Department.
- 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. 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 (e.g., gas cabinets, mezzanines, under floor systems, etc.).
- 3.10.8 Fire sprinkler system risers or other controls shall not be located in electrical rooms with or without sprinklers.
- 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 8.1.1.1, 16.13, and pressure gauges shall be installed at each main drain valve in accordance with NFPA 13, Figures A.16.10.4.6 (a & b).

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.
- 3.12.3 All systems shall be provided with a main drain in accordance with NFPA 13, Section 16.10.4.2.

3.13 Signs

- 3.13.1 In addition to the requirements of NFPA 13, Sections A.16.17, 28.5 and 28.6, for signage, the following permanent signs shall be provided at the riser:

- a) A key plan or plans located as directed by SJFD indicating the location of each area controlled by each control valve, inspectors test valves, all auxiliary control valves, air vent(s) and all auxiliary drain valves.
- b) Any special design criteria used to determine the system design, e.g., rack storage limitations; high piled storage limitations, etc. These criteria shall be shown on the key plan.
- c) Pipe Scheduled Systems shall be provided with a Design Information Plate indicating the requested data for NFPA 13 section 28.5.2 (1), (4) as available water supply, (5), and (7).

3.13.2 Fire sprinkler flow alarm signage as described in NFPA 13, Sections 16.11.2 & A16.11.2 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 The FDC shall be branded on top in accordance with NFPA 13. In addition, the FDC shall be provided with a permanent sign, made of durable material, indicating the address(es) of the system and type of system it supplies (e.g., "THIS FDC SUPPLIES THE FIRE SPRINKLER SYSTEM / STANDPIPE SYSTEM FOR NAME AND/OR ADDRESS OF BUILDING/COMPLEX.")

3.13.4.1 Note: *Manual wet standpipes shall be designated as "STANDPIPE SYSTEM".* See SJFD handout "**Standpipes - Supplemental Design Requirements**" for additional sign requirements.

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 safety for hydraulic calculations shall be the greater 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 supply data verified within six months of the submittal date. Water supply data may be obtained from the San Jose Water Company, San Jose Municipal Water, or Great Oaks Water Company.

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 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 **Backflow Preventer Retroactive Installation** – When backflow prevention devices are to be retroactively installed on existing fire sprinkler systems, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary system modifications to accommodate the additional friction loss, shall be completed as a part of the installation. New or changes to existing backflow preventers shall not be installed without Fire Department approval.

3.14.5 The minimum operating pressure shall be as listed for the sprinkler 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.

3.14.6 A maximum flow velocity of 20 feet/second shall not be exceeded when designing to the criteria as set forth herein as sections 3.2 and 3.3. Provide calculations based on the Hazen-Williams formula.

3.14.7 The area of operation may not be reduced as allowed by NFPA 13, sections 19.3.3.1.4 & 19.3.3.2.3.1, where quick-response sprinklers are installed.

3.14.8 The area of operation shall be increased by 30% as required by NFPA 13, sections 19.3.3.2.4 and 19.3.3.2.5, for pitched roofs (> 2" in 12") where standard spray upright, pendent, sidewall, and CMSA sprinklers are used, and for dry pipe or gas charged preaction systems.

3.14.9 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 All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, water-flow switches on all sprinkler systems and commercial hood & duct fixed extinguishing systems shall be electrically supervised by a listed fire alarm control unit.

Exceptions:

- a. *Supervision of underground gate valves with roadway boxes shall not be required.*
- b. *Automatic sprinkler systems protecting one- and two-family dwellings.*
- c. *Limited area sprinkler systems in accordance with Section 903.3.8.*
- d. *Automatic sprinkler systems installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the automatic sprinkler system, and a separate shutoff valve for the automatic sprinkler system is not provided.*
- e. *Jockey pumps control valves that are sealed or locked in the open position.*
- f. *Control valves to paint spray booths or dip tanks that are sealed or locked in the open position.*
- g. *Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.*
- h. *Trim valves to pressure switches in dry, pre-action and deluge sprinkler systems that are sealed or locked in the open position.*
- i. *Commercial kitchen hood & duct fixed extinguishing systems located in buildings where a sprinkler monitoring system is not required or not present.*

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 48 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.*
- d) *Pursuant to Chapter 5.5, Division 1, Title 19 of the California Code of Regulations, effective 7/1/17 any individual performing the installation, alteration, or repair of water-based fire protection systems will be certified or registered with the State Fire Marshal. Violators may be subject to a "Stop Work Order".*

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 28.
- 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, 2013 California Edition*.
 - c) The Contractor's Material and Test Certificate(s) per NFPA 13, Chapter 28.
 - 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 3.7.3 of this handout).
 - b) Copies of the Welding Studs Pull Test Certificate, if applicable (See item 3.10.8 of this handout).
 - c) The Contractor's Material and Test Certificate(s) per NFPA 13, Chapter 28.

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, see SJFD development website, or call (408) 535-7750 and request the current version date.

Change of Use or Occupancy Risk Category

2019 CFC – 102.3 Change of use or occupancy - No change shall be made in the use or occupancy of any structure that would place the structure in a different division of the same group or occupancy or in a different group of occupancies, unless such structure is made to comply with the requirements of this code and the California Building Code. Subject to the approval of the fire code official, the use or occupancy of an existing structure shall be allowed to be changed and the structure is allowed to be occupied for purposes in other groups without conforming to all of the requirements of this code and the California Building Code for those groups, provided the new or proposed use is less hazardous, based on **life** and **fire** risk, than the existing use.

SJMC 17.12.220 – Addition to 2019 CFC as 102.3.1. An approved automatic sprinkler system shall be provided throughout buildings or structures when an automatic sprinkler system is required per the California Fire Code due to a change of use or occupancy.

For the purposes of the addition of fire sprinklers the following guidelines are given to be used in determination of if the change is less hazardous, based on life and fire risk, than the existing use. Any change constituting a higher risk in either category will result in Fire Sprinklers being required.

Risk Category (lowest {1} to highest {5}) - Each building and structure shall be assigned an existing and new risk category in accordance with the Table below. Where CBC Table 1604.5 or NFPA 13 specifies an occupancy category, the risk category shall not be taken as lower than the occupancy category specified therein. Where a building or structure is occupied by two or more occupancies not included in the same risk category, it shall be assigned the classification of the highest risk category corresponding to the various occupancies.

Risk	Life Risk Category	Fire Risk Category
1	<p>Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to:</p> <ul style="list-style-type: none"> • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities 	<p>Occupancies in this class are considered LIGHT hazard occupancies, where quantity and combustibility of contents are low. Any fire would tend to develop at a relatively low rate and have relatively low rates of heat release.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Educational • Fire stations • Hospitals • Institutional (Nursing homes, convalescent homes, Prisons, etc.) • Libraries (except with large stockroom areas) • Museums • Offices, including data processing • Residential (Apartments, Dwellings, Hotels and motels, etc.) • Restaurant seating areas • Theaters and auditoriums, excluding stages and prosceniums
2	<p>Buildings and other structures except those listed in Occupancy Categories I, III and IV</p>	<p>Occupancies in this class are considered LOW hazard (Ordinary Group 1) occupancies, where quantity and combustibility of contents are moderate. Typically these uses are such that the quantity of combustibles is relatively low, the combustibility of contents is moderate, storage does not exceed 8 feet in height, and moderate-rate-of-heat-release fires would be expected.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Armories • Automobile parking garages and showrooms • Bakeries • Barber and beauty shops • Beverage manufacturing, Breweries, Wineries, etc. • Canneries • Churches • Dairy products manufacturing and processing • Doctors' offices • Electronic plants • Foundries • Gasoline service stations • Glass and glass products manufacturing • Laundries • Municipal buildings • Restaurant service areas
3	<p>Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:</p> <ul style="list-style-type: none"> • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group 1-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities. • Group 1-3 occupancies. • Any other occupancy with an occupant load greater than 5,000^a. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Occupancy Category IV. • Buildings and other structures not included in Occupancy Category IV containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released. 	<p>Occupancies in this class are considered MODERATE hazard (Ordinary Group 2) occupancies, where quantity and combustibility of contents are moderate, storage does not exceed 12 feet in height, and any fire would tend to develop quickly and have moderately high rates of heat release.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Amusement occupancies • Cereal mills • Chemical plants — ordinary • Clothing and manufacturing plants • Cold storage warehouses • Confectionery products • Dairy barns • Distilleries • Dry cleaners • Farm equipment sheds • Feed mills • Horse stables • Laundries • Leather goods manufacturing • Libraries — large stack room areas • Machine shops • Metal working • Mercantile • Paper and pulp mills • Paper process plants • Piers and wharves • Post offices • Printing and publishing plants • Repair garages • Resin application area • Restaurants • Stages • Textile manufacturing • Tire manufacturing • Tobacco products manufacturing • Unoccupied buildings • Wood machining • Wood product assembly

Risk	Life Risk Category	Fire Risk Category
4	<p>Buildings and other structures designated as essential facilities, including but not limited to:</p> <ul style="list-style-type: none"> • Group 1-2 occupancies having surgery or emergency treatment facilities. [OSHPD 3] For OSHPD 3 facilities, see Section 308. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1 (2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression. 	<p>Occupancies in this class are considered HIGH hazard (Extra Hazard Group 1) occupancies, where quantity and combustibility of contents are very high, but, quantity of flammable and/or combustible liquids are small. Any fire would tend to develop rapidly and have high rates of heat release.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Aircraft hangars (except as governed by NFPA 409, Standard on Aircraft Hangars) • Auditoriums and theaters • Barns and stables • Building materials • Combustible hydraulic fluid use areas • Department stores • Die casting • Feed stores • Freight terminals • Metal extruding • Paper and pulp mills • Paper processing plants • Piers and wharves • Plywood and particle board manufacturing • Printing [using inks having flash points below 100°F • Repair garages • Rubber products manufacturing and storage, reclaiming, compounding, drying, milling, vulcanizing • Saw mills • Textile picking, opening, blending, garneting, or carding, combining of cotton, synthetics, wool shoddy, or burlap • Upholstering with plastic foams • Warehouses for paper, paint, furniture
5	Left Blank Intentionally	<p>Occupancies in this class are considered SEVERE hazard (Extra Hazard Group 2) occupancies, where quantity and combustibility of contents are high and/or extensive shielding of the combustibles is present. Any fire would tend to develop very rapidly and have high rates of heat release.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Aircraft hangers • Asphalt saturating • Cereal and flour mills • Flammable liquids spraying • Flow coating • Grain elevators • Explosives manufacturing and storage • Linseed oil mills • Lumberyards • Manufactured home or modular building assemblies (where finished enclosure is present and has combustible interiors) • Oil refineries • Open oil quenching • Plastics manufacturing, processing and storage • Saw mills • Solvent distilleries, cleaning • Varnish and paint dipping