NORTHSTAR
FIRE DEPARTMENT

Fire Sprinklers (NFPA 13) – Guidelines & Specifications

Fire Prevention Guideline P-04

PURPOSE

To ensure that sprinkler plans submitted for review contain items necessary for approval prior to installation of systems. This guideline outlines the procedure to be followed when submitting sprinkler plans, certain design requirements and notes to be placed on fire sprinkler plan submittals.

SCOPE

This standard applies to all new or modified sprinkler systems in accordance with the latest California adopted/approved edition of NFPA 13.

For requirements regarding Fire Hydrants, please refer to guideline "Underground Piping for Fire Sprinklers (NFPA 13) & Hydrants".

FIRE SPRINKLER REQUIREMENTS

1. PLAN SUBMITTAL REQUIREMENTS

1.1 All fire sprinkler plans submittals to the fire department shall be sent as electronic copies in .pdf format and include:

- 1 sets of plans – electronic copy only (.pdf format only)
- 1 set of hydraulic calculations for each design area.
- Water flow data (within 12 months) from NCSD Utilities, NFD or other approved water supply source.
- 1 set of manufacturers material information sheets for the fire sprinkler heads, piping, bell and horn/strobe device, flow switch and hangars.

1.2 Any plan review fees will be determined after the plan review/check is complete. All fees must be paid before fire department sign-off.

1.3 Specific fire sprinkler plan submittal requirements:

- Location of project including street address and Assessor Parcel Number (APN).
- Name of sprinkler installer, address, phone number, type of license and license number.
- All plan sheets shall be to scale or dimension and numbered. The scale shall be no less than 1/8" = 1-foot.
- Complete detailed work sheets and computer hydraulic calculations as required by NFPA 13 shall be included with all submittals for hydraulically designed sprinkler systems. Calculations shall extend to the point at which the water supply data was determined.
- Sprinkler system design, including hose demand, shall be limited to 90% of the available water supply. Water supply data may be obtained from the NCSD Utilities or the Northstar Fire Department.

- If installed piping is six (6) inches or larger, structural load calculations will be required for the structural elements/systems supporting the load.
- Provide separate drawings for the piping plan and reflective ceiling plan.
- Provide a fire sprinkler legend including sprinkler symbol, manufacturer, Sprinkler Identification Number (SIN), model, style, K-factor, degree, finish, escutcheon and quantity.
- Provide the occupancy type of each room, ceiling heights and ceiling slopes with direction, slope pitch and ceiling height at the beginning of the slope as applicable.
- Provide soffit and ceiling pocket details including widths, depths and heights.
- Provide Seismic Bracing Calculations on the drawings per NFPA 13 using Cp and l/r ratio of 200. Separate Seismic Bracing Calculations shall be provided for lateral and longitudinal braces and each pipe size. Show details of the seismic bracing and branch line restraints on the drawings.
- Hydraulic Plate information shall be included on the drawings.
- Mark on the drawings the most hydraulically demanding remote area.
- Indicate zone of influence for lateral and longitudinal seismic bracing.
- Pipe Schedule Design is not allowed.
- A site plan drawn to scale with the following items shown on the plan:
  - All property lines, the outline of all buildings on the parcel, roads adjacent to the parcel, the driveway, a north arrow and the scale the plan is drawn to note.
  - The point of connection to public or private water system and size of any public water main.
  - Any alternate water supply components such as a well, pump or storage tank.
  - The point of entry of the water service to the dwelling.
  - The size and type of all pipe and fittings, with the length of each segment of the underground supply line.
  - The location, size and arrangement of all devices on the water supply line, such as a meter, valves and backflow prevention devices.
  - Show the location of the bell or horn/strobe.
  - Elevation reference points corresponding to matching locations in the hydraulic calculations.
- A floor plan / fire sprinkler plan drawn to scale with the following items shown on the plan:
  - Label all rooms and indicate the use of any room where sprinkler protection is not being provided.
  - The location of the fire sprinkler riser.
  - All sprinkler locations and spacing dimensioned on the floor plan, including the garage.
  - Size and type of all pipe and fittings, with length of each segment.
  - The location and type of all pipe hangers and other means of support.
  - The location of all heat producing devices with their heat zones noted on the plan.
  - The location of all ceiling electrical fixtures. Indicate the size and depth of all fixtures not flush with the ceiling.
  - Note any exposed beams, lighting fixtures or other ceiling obstructions to the sprinkler heads.

- The location, size, depth and spacing of exposed beams.
- Provide ceiling elevations, or cross sections, to indicate any sloped, beamed or special shaped ceilings.
- Specify the method of freeze protection for the piping system.
- Elevation reference points corresponding to matching locations in the hydraulic calculations.

2. DESIGN REQUIREMENTS

2.1 All fire sprinkler plan submittals shall be designed to meet the requirements of NFPA 13, CRC, CFC, Northstar Community Services District (NCSD) Ordinances 36-19 and any additional requirements as outlined within this document.

2.2 Per NCSD 36-19, fire sprinkler systems are required throughout for:

- All new buildings regardless of occupancy type or square footage.
- When there is a change in use in all, or a portion, of an existing structure which would cause occupancy classification to change.
- Additions to be made to an existing structure so as to increase the Total Fire Area of the original structure to greater than twenty percent (20%).
- Remodels, alterations and/or repairs to an existing building involving demolition, removal or repair of more than 50% of the gross square footage of the building, the building, the building shall meet the requirements for a newly constructed building. For the purpose of this section, a 50% threshold shall be applied if the project involves any of the following:
  - The removal, demolition or repair of more than 50% of the exterior weight bearing walls; or
  - The removal, demolition or repair of more than 50% of the interior floor square footage.

- Exceptions:
  - Low life safety hazard structures, such as stand-alone public restrooms and ski lift operator structures that are less than 500 square feet shall be evaluated by the Fire Chief on a case-by-case basis.
  - Whenever there are practical difficulties involved, the Fire Chief shall have the authority to grant modifications in individual cases provided the modifications do not lessen the health, life and fire safety requirements as permitted in Section 104.8 of the California Fire Code.

2.3 The fire sprinkler systems shall be designed by either a California licensed Fire Protection Engineer, Mechanical Engineer, Registered Professional Engineer or a California licensed Fire Protection Contractor (C-16). A C-16 contractor may not install a design by another C-16 contractor.

2.4 For commercial and industrial "Shell Buildings", with the potential for high-pile storage and/or wherein no specific end use is identified at the time of plan check, the sprinkler system shall provide a minimum density of .495 GPM/square foot (Class 4 Storage Type) for a 2,000 square foot design area and 286°F sprinkler heads shall be used in these buildings. Roof coverage over mezzanine areas shall also be built to this standard. Any deviation from this requirement will require the NFD approval.

2.5 It is incumbent upon the sprinkler system designer to advise the building owner that the above density and design area are minimums for shell buildings; and that increases in sprinkler protection may be required based on future occupancy hazard classification, storage commodity classification, and storage configuration according to NFPA 13 and the California Fire Code (most recently adopted CA editions).

2.6 When a shell building is built without a hard lid or T-bar ceiling, the upright fire sprinklers shall be designed to the unfinished ceiling height and the density and design area for the required floor area.

2.7 Fire sprinkler design shall be limited to 90% of the available water supply.

2.8 Non-combustible construction shall be as defined by the California Building Code (most recent adopt CA edition). Wood frame construction shall be considered combustible construction regardless of materials used for surface covering.

2.9 Sprinklers with a temperature rating of not less than an intermediate temperature rating are required in all main electrical panel and meter rooms. No combustible materials shall be stored in these rooms.

2.10 Light fixtures, soffits and other potential obstructions shall not interfere with the spray patterns of sprinkler heads. The sprinkler contractor shall ensure that the type and location of potential obstructions are considered in the design and installation of the system. The sprinkler contractor is responsible for coordinating and resolving conflicts in coverage patterns.

2.11 Fire sprinklers shall not be installed directly below automatic smoke and heat vents.

2.12 Inspector Test Valve access panels and doors to fire sprinkler riser rooms shall have signs with appropriate descriptions.

2.13 All electrical rooms, upright sprinklers at the roof or in the attic space, nonconditioned rooms or exterior sprinkler heads shall be intermediate temperature heads.

2.14 If the attic space is less than thirty-six (36) inches in height and of combustible construction, all upright fire sprinkler heads shall be in accordance with NFPA 13.

CONTROLS

2.15 All control valves shall be UL listed indicating valves.

2.16 All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit and monitored at a UL listed central station service.

2.17 An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box) shall be provided on the exterior of the building in an approved location. A second horn/strobe shall be installed in the interior of the building in a normally occupied location. Power shall be provided from a listed fire alarm control unit.

2.18 A dedicated electrical circuit with a circuit breaker lock shall be required for the listed fire alarm control unit.

RISERS

2.19 When more than one (1) fire sprinkler riser is served by a single private fire service main lateral, a separate system riser with a UL listed indicating control valve, riser check valve, water flow indicator and main drain is required for each fire sprinkler riser.

2.20 In buildings exceeding 2 stories in height, each floor shall have a sectional riser with a UL listed indicating control valve, riser check valve, water flow indicator and main drain.

2.21 In order to provide access to the riser for future maintenance and repair, all fire sprinkler system riser locations shall provide a minimum eighteen (18) inch clearance to each side and to the front of the riser. If a riser is to be concealed by means of a wall or closet, access to the riser shall be provided by means of a door with minimum dimensions of two (2) feet and six (6) inches by six (6) feet and eight (8) inches.

SPRINKLERS, PIPING & HANGARS

2.22 The discharge area for the main drain and inspector's test valve shall be protected and prevent damage during periodic testing.

2.23 The maximum distance between hangars shall not exceed that specified in NFPA 13 or manufacturers listings -whichever is more restrictive.

2.24 Trapeze hangers shall be designed and installed according to NFPA 13.

2.25 Where a beam or joist thickness will not accommodate a fastener of a required length, a through bolt with the required diameter of the bolt and washer will be acceptable. All-thread rod is not acceptable for the required bolt.

2.26 Lag bolts and screws are not acceptable for fastening seismic bracing.

2.27 Seismic sway bracing shall use Schedule 40 pipe as a minimum.

2.28 Sprinklers used in horizontal combustible concealed spaces (with Slope not exceeding 2:12) with combustible wood truss, wood joist construction, or bar joist construction having a combustible upper surface and where the depth of the space is less than 36" from deck to deck, from deck to ceiling, or with double wood joist construction with a maximum of 36" between the top of the bottom joist and the bottom of the upper joist shall be listed for such use.

FIRE DEPARTMENT CONNECTIONS (FDC)

2.29 FDC shall be installed at apparatus access roads in locations approved by NFD prior to plan submittal. (Typically, installed on the address side of buildings.) The FDC shall extend between thirty (30) inches and thirty-six (36) inches above finished grade.

2.30 FDC shall be visible (facing the apparatus access road), accessible and located within fifty (50) feet of a public fire hydrant. Exceptions may be made by NFD.

2.31 The inlets of the FDC shall be a minimum of 2 feet and not greater than 15 feet from the back of curb or back of walkways adjacent to a public street or approved fire access lane. When a back-flow device is used, the FDC shall be located on the system side of the back-flow device facing and within 15 feet of the public street or fire access lane.

2.32 A FDC shall be located free of interference from nearby objects including buildings, fences, posts and landscaping. Consideration shall be given to the effects of maturing vegetation that may interfere with operations at a later date.

2.33 Vehicle protection shall be provided and approved for FDC's subject to vehicular damage by the installation of approved bollards or a minimum of a six-inch curb.

2.34 The FDC may only serve buildings on the same parcel. The final number of buildings shall be approved by the AHJ.

2.35 FDC shall be equipped with Knox locking protective plugs. Contact NFD for a Knox Authorization Order Form.

2.36 The curb adjacent to the FDC shall be painted red for a total of fifteen (15) feet (7 1/2 feet on each side of the FDC).

2.37 All buildings must have a 5” storz connection in addition to the standard FDC requirements of NFPA 13.

2.38 In a building complex where two (2) or more buildings are served, the identification of which building is served by separate FDC; NFD will require signs of substantial construction to be posted at each FDC identifying the respective buildings served. The minimum letter size shall be one (1) inch on a contrasting background.

2.39 FDC shall be painted red (Rust-Oleum Safety Red # 2163 or equivalent).

2.40 All piping below grade supplying FDCs shall be ductile iron. Piping above grade may be galvanized steel pipe.

FIRE PUMPS

2.41 Fire pumps shall be installed in accordance with NFPA 20, Standard for the Installation of Stationary Fire Pumps for Fire Protection.

2.42 A fire pump shall serve only one building unless approved for multiple buildings by the AHJ.

2.43 A fire pump shall have a by-pass line installed.

2.44 If a test loop is provided, listed control valves with normally closed tamper switches or other approved tamper switches shall be installed. In addition to the test loop, a method of flowing water every three years in accordance with the latest edition of NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems shall be provided.

2.45 Fire pumps shall be maintained in accordance with the applicable provisions of NFPA 25.

2.46 A licensed C-16 contractor shall perform all weekly testing of fire pumps. Exception: A qualified representative of the owner, approved by the Fire Department.

2.47 Annual flow testing shall be performed by a California State licensed C-16 contractor, California State licensed Fire Protection Engineer, authorized fire pump manufacturer representative or a qualified representative of an approved insurance company providing fire loss coverage on the protected premises.

2.48 Written maintenance records shall be maintained by the building owner in accordance with the provisions found within NFPA 25. The reports shall be provided to the AHJ upon request.

3. HYDRAULIC CALCULATION REQUIREMENTS

3.1 Calculations are required for in accordance with NFPA 13. NFD may require additional flowing heads if certain benchmarks are not met.

3.2 All fire sprinkler plans shall be engineered to the results of a flow test data provided by NCSD Utilities or NFD. 10% shall be deducted from the static and residual pressures for design purposes.

4. INSPECTIONS & TESTING REQUIREMENTS

4.1 The system must pass all the fire protection systems inspections prior to a certificate of occupancy.

4.2 The Inspection, Testing and Maintenance of Water-Based Fire Protection Systems shall comply with California Code of Regulations (CCR) Title 19, Division 1, Chapter 5, and NFPA 25 (most recently CA adopted edition).

4.3 ALL AREAS MUST BE VISIBLE. Contractor shall schedule inspections before insulating, dry walling or installation of ceilings occurs. Inspection shall review compliance with approved plans, spacing, hangers, seismic bracing, etc. All areas must remain visible for any corrections from this inspection. A REINSPECTION OF CORRECTIONS WILL BE REQUIRED.

4.4 The following is required prior to fire sprinkler final:

- Approved drawings and hydraulic calculations available on site.
- Water service to sprinkler riser shall be installed and live.
- All HVAC registers shall be installed.
- All electrical shall be installed for lights, ceiling fans and smoke detectors.

4.5 A complete approved set of fire sprinkler system and private fire service main plans stamped approved by NFD shall be kept on the job site at all times.

4.6 Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this guideline or of other ordinances of the jurisdiction shall not be valid.

4.7 The following documents are required completed by the contractor and a copy shall be submitted through Compliance Engine at the time of acceptance testing and final inspection:

- Underground Fire Service Mains (NFPA 24)
  - Contractors Material and Test Certificate for Underground Piping
- Fire Sprinkler Systems (NFPA 13)
  - Contractors Material and Test Certificate for Aboveground Piping
- Standpipe and Hose Systems (NFPA 14)
  - Contractors Material and Test Certificate for Aboveground Piping
- Fire Pump Systems (NFPA 20)
  - Contractors Material and Test Certificate for Fire Pump Systems
- Fire Pump Systems (NFPA 20)
  - Contractors Material and Test Certificate for Fire Pump Systems
- Fire Alarm Systems (NFPA 72)
  - Record of Completion

NORTHSTAR FIRE DEPARTMENT NOTES
Fire Sprinkler Systems 13

PLACE THE FOLLOWING NOTES VERBATIM ON THE PLAN:

1. Scope of Work:_____
2. Sprinkler plans shall be approved prior to the installation of any pipe. A set of approved plans, including hydraulic calculations for new systems, shall be retained at the job site at all times.
3. This automatic fire protection system shall be designed, fabricated, and installed in accordance with the most current CA adopted version of NFPA 13 and local amendments enforced by the NFD.
4. The point of connection is _____ (e.g., 6" AFF).
5. All valves shall have a permanently affixed sign identifying their function and building served.
6. All system risers shall be equipped with a Hydraulic Design Information Sign as described in NFPA 13.
7. All underground mains and lead in connections shall be flushed in accordance with NFPA 13 and/or 24 prior to connection to the overhead system; the flush shall be witnessed by a NFD fire inspector.
8. Call NFD to schedule inspections at (530) 562-1212 ext.1 to schedule all inspections at least 48 hours in advance.
9. The installer shall perform all required acceptance tests in the presence of the fire inspector.
10. All new systems and additions or modifications to existing piping affecting more than 20 sprinklers shall be hydrostatically tested for two hours at 200 psi or at 50 psi above the system operating pressure, whichever is greater. Hydro testing above operating pressure is not required for relocated drops.
11. All FDCs, wall PIVs, and exterior/exposed sprinkler riser valves shall be painted OSHA safety red. Other fire sprinkler or supply pipe exposed to the sky or susceptible to wet conditions shall be painted (any color) or otherwise coated to inhibit corrosion. Stainless steel assemblies and piping may be left unpainted provided that any hose connections, valves, or other components operated by the fire department are painted red.
12. All sprinkler piping shall remain uncovered until inspected by NFD.
13. A dedicated electrical circuit with a circuit breaker lock shall be required for the listed fire alarm control unit.
14. All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit and monitored at a UL listed central station service.
15. An approved audible sprinkler flow alarm (horn/strobe with weather-proof back box) shall be provided on the exterior of the building in an approved location. Power shall be provided from a listed fire alarm control unit.
16. The fire sprinkler branch lines shall be restrained against excessive vertical and lateral movement or by other approved means per NFPA 13.
17. At final inspection, ceiling tiles shall be installed at each sprinkler. Hard-lid and all other types of ceilings shall have all patches, repairs, and final finishes completed.

FLOW TEST INFORMATION (all blanks must be complete)
Location _____; Date _____/_____/_____ ; Elevation (ft) _____
Static Pressure (psi) _____; Residual Pressure (psi) _____; Flow (gpm) _____

FIRE SPRINKLER DESIGN CRITERIA (all blanks must be complete)
Hydraulic Design _____ (gpm/sq.ft.) over (sq.ft.);
Requiring _____ (gpm) at _____ (psi) at the Base of Riser; Safety Margin (psi) _____