

PROJECT SUBMITTAL GUIDELINE: AUTOMATIC FIRE SPRINKLER SYSTEMS

A DSA Project Submittal Guideline is a compilation of recommendations based on Code, referenced standards, DSA [USP](#) documents, and DSA practices. These guidelines are designed to give the design profession helpful information and insight into the DSA project application, submittal, and review processes. Guidelines are provided by DSA in support of the USP goals of giving stakeholders the information they need in order to be able to work smoothly with DSA, and to help standardized practices among the four DSA Regional Offices.

Compliance with a Guideline does not assure that a project is complete or that it adheres to the requirements of the California Building Standards Code (Title 24 of the California Code of Regulations) or all DSA requirements. Additional information may be required, depending on project complexity or site conditions. For complete submittal requirements see forms DSA-1 and DSA-3.

For Projects Submitted to the DSA for Review Under the 2010 California Building Code

APPLICABLE CODES AND STANDARDS

(See CBC Chapter 35 for referenced standards currently in effect)

Title 19, State Fire Marshal - Public Safety
Title 24, California Building and Fire Code (Parts 1-9 inclusive)
NFPA 13, Installation of Fire Sprinkler Systems
NFPA 14, Standard for the Installation of Private Service Mains
NFPA 20, Installation of Stationary Pumps for Fire Protection
NFPA 25, Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (with California Amendments)

The following are the minimum requirements (plans, calculations and specifications) for submitting an AFSS plan.

Plans must be clearly legible and, where possible, drawn to 1/8" = 1'0" scale. Plans that are not legible may be rejected by the plan reviewer as unacceptable for plan review purposes. Only equipment, fittings, piping, etc. related to the automatic fire sprinklers should be shown on the fire sprinkler plans. Ensure the background is coordinated with the architectural floor plans, and include rated walls and uses of all areas or spaces. Provide dimensions where scaling is not practical or accurate.

As of January 1, 2013 a project submittal must include a site plan with from [DSA-810](#) information with Local Fire Authority (LFA) sign off on applicable items (see [DSA Bulletin 12-02](#)).

Revisions to AFSS plans previously approved by DSA must be **"clouded"** or otherwise **"highlighted"** to clearly identify changes from the original submittal (per Title 24, Part 1).

- 1. PROJECT INFORMATION:** Provide the following information and notes on the plans:
 - 1.1 Scope of work:** Usually found on title page. Provide a brief project description as it pertains to your plan submittal.
 - 1. Indicate if the campus is "new" or "existing". See the 2010 California Building Code (CBC), Part 2, Sections 202 (New Public School Campus) and 903.2.3.1.1.**
 - 2. Provide complete code analysis for each building in scope of work.**
 - 1.2 Name of owner**

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- 1.3** Location (including street address)
- 1.4** Point of compass (on each plan)
- 1.5** Name and address of contractor
- 1.6** Scale used on plans – provide graphic scale also

2. SUBMITTED DOCUMENTS

2.1 Underground Piping or Civil Plans: In addition to requirements of Section 1 above, all civil plans or plans for underground piping must include:

2.1.1 Soils Report: Submit a soils report with the plans.

- 1.** Indicate if soil is “corrosive.”
- 2.** Indicate soil bearing capacity of undisturbed soil.

2.1.2 Show and identify all existing and proposed buildings on the site:

- 1.** Indicate all buildings in scope of work.
- 2.** Indicate elevations (in feet) of all buildings.

2.1.3 Show all Hydrant locations, types and sizes:

- 1.** Show relationship to buildings – distances must be dimensioned and elevations in feet must be provided.
- 2.** Supply or city mains (pipe sizes, and if looped or dead end)
- 3.** Other sources of water supply with pressure or elevations noted
- 4.** Provide water supply information (performed no earlier than six months prior to date of submittal). See test information requirements below.
- 5.** Show locations and elevations of flow test hydrants.
- 6.** Test information
 - Date – if test data is more than six months old at time of plan submittal, more current information must be provided with the calculations.
 - Time
 - Static pressure
 - Residual pressure
 - Flow (gpm)
 - Test conducted by or information supplied by and signature of one of the following:
 - Water purveyor **or**
 - Local Fire Authority (LFA) **or**
 - Impartial third party with qualification (pre-approval from DSA or LFA required) **or**
 - Provide an estimate from a computer generated model (NFPA 24), “wet” signed by the water purveyor **or**
 - Licensed engineer approved by DSA **or**
 - C-16 designer/builder.

2.1.4 Data on other sources of water supply water (pressure and gpm):

- 1.** Water tank test information (capacity and pressure)

2.1.5 Show all underground piping for domestic water, fire lines, and gas lines:

- 1.** Size of all piping
- 2.** Type/material of piping

3. Type of soil
 - Corrosive (all ferrous piping must be factory wrapped)
 - Non-corrosive
4. Length of all piping
5. Depth of burial above top of pipe (indicate frost line if applicable)
6. Turns and all fittings
7. Elevations – Indicate changes in all depths ensure all elevation changes are accounted for in the hydraulic calculations.
8. Location of all underground valves and vaults
9. Type of all piping restraints used
 - Thrust block locations
 - Locations of rods or other restraint methods
10. Double detector check valve assemblies, pressure reducing valves, or others, are required to comply with NFPA 13, Section 23.1.8.1.
11. FDC/PIV locations, type and sizes as applicable
12. AFSS riser location(s)
 - Risers must not be located more than 6 feet within the perimeter of the building unless trenching is provided.
 - Identify all locations of trenching and provide details and type(s) of covers.
13. Size and locations of all standpipes, hose houses, monitor outlets and related equipment
14. Hydraulic reference points (nodes)
 - Must be legible
 - Must be distinct from other symbols
 - Must correspond to and be the same type (number and/or letter) as those shown in hydraulic calculations

2.2 Sprinkler/Building Plans: Where the equipment is to be installed as an addition to an existing system, enough of the existing system should be indicated on the plans to justify the hydraulic calculations and to make all conditions clear.

2.2.1 Legend: Provide a legend on each plan indicating:

1. Symbols for all sprinklers used to include:
 - Make, type and model (upright, pendant, or side wall)
 - Temperature rating
 - K Factor
 - Size
 - Sprinkler Identification Number (SIN)
 - Number of sprinklers by type on each riser per floor
 - Total number of sprinklers on each dry pipe system, preaction system, combined dry pipe-preaction system, deluge system or any other special system
2. Symbols for:
 - Type of pipe and schedule of wall thickness

- Special pipe with limited application, such as flexible pipe
- Kind and type of alarm bell, horn, or other audible alarm appliance and location
- Kind and type of all hangers (provide details)
- Kind and types of all sway bracing (provide details)
- Kind and types of all fittings (provide details)
- Hydraulic Nodes clearly visible
- Piping changes of elevations (up or down) and lengths
- Flex piping locations (provide symbol in legend, and pressure loss)
- Seismic joints and details (provide symbol in legend, and details) and pressure loss for individual devices.

2.2.2 Details: Provide the following details on all plans:

1. FDC/PIV configurations
2. Back flow prevention devices
3. Risers and riser manifolds
4. All underground fittings
5. Thrust blocks and/or other methods of pipe restraint
6. Types and kinds of hangers, sway bracing, overhead pipe fitting.
7. Bracing for flexible pipe within suspended ceiling systems
8. Seismic joints
9. Where pipe penetrates rated assemblies, provide details of how the penetration will be sealed in an approved manner.
10. Other details as needed

2.2.3 Floor Plans: Provide floor plans that reflect the architectural floor plans.

1. Provide relative elevations of sprinklers, junction points, and supply or reference points.
2. Indicate rises and drops of piping, include lengths of drops and/or rises.
3. Indicate the use of each space, including soffits, mansards, closets, etc.
4. Show all partitions, walls, draft stops, concealed spaces, attics, bathrooms and other features
 - Unless otherwise noted all walls, partitions, etc, will be viewed as full height.
 - Indicate any small space that will not have a sprinkler installed and provide justification.
5. Indicate all rated walls and assemblies.
6. Indicate total area protected by each AFSS system on each floor.
7. Indicate design type (gridded, closed-loop, etc.), area, and number of sprinklers in design area.
8. Show locations of all sprinklers by type -
 - Must correspond to those shown in legend
 - Must correspond to temperature rating shown in legend
9. Show most hydraulically remote area(s)
10. Show area used in hydraulic calculation(s).

- Include and identify areas used for proof calculations.
 - Include and identify areas serviced by other systems (dry pendant, anti-freeze, in rack, etc.).
- 11.** Location and size of riser nipples
 - 12.** Location and size of all piping
 - Where typical branch lines prevail, it shall be necessary to size only one typical line.
 - Lines that are used as the prevailing typical line shall be identified.
 - 13.** Location and size of all control valves, check valves, drain pipes, and test connections, and **inspector's** test valve
 - Recommend **inspector's** test valve to be installed at most hydraulically remote area. Must provide smallest size sprinkler orifice in system for testing.
 - Drain to exterior
 - 14.** Location and type of all hangers, sleeves, braces, and methods of securing sprinklers, mains, and branch lines.

Note: sprinkler uprights over 4 feet in length must be restrained to prevent damage to piping.

 - Splay wires may be used for restraint of uprights.
 - Seismic bracing is required for all piping 2.5 inches or larger.
 - Where flexible couplings are installed on mains, a lateral brace shall be provided within 24 inches of the coupling.
 - 15.** Location and type of all bends, fittings, flexible pipe, seismic joints, and seismic bracing.
 - Provide seismic calculations for sway braces.
 - Provide attachment details for bracing and hangers.
 - Provide clamping detail for I beam clamps and restraining straps.
 - 16.** Hydraulic reference points (nodes)
 - Must be legible
 - Must be distinct from other symbols
 - Must correspond to and be the same type (number and/or letter) as those shown in hydraulic calculations
 - 17.** Indicate temperature rating of high-temperature sprinklers.
 - 18.** Indicate nominal pipe sizes for all pipe.
 - 19.** Indicate lengths of all piping.
 - 20.** Indicate all areas subject to freezing and provide freeze protection method and materials.

2.2.4 Reflected Ceiling Plans:

1. Show locations of all sprinklers.
2. Show locations of all lighting fixtures.
3. Show locations of all HVAC registers.
4. Show locations of all soffits, mansards, voids, stairways, atriums and other areas where sprinklers will not be installed for each floor and system.
5. Show locations of all obstructions (beams, architectural features, etc.).

2.2.5 Cross Section Plans: Provide full height cross section of all pertinent areas:

1. Show ceiling construction.
2. Structural member information
3. Attic spaces
4. Soffits, mansards, and any voids
5. Areas where ceiling and or attic is sloped or configured other than "flat"
6. Piping in all areas

2.3 Calculations:

2.3.1 Water Flow: For water flow calculations see Section 2.1.3, Item 6.

2.3.2 Thrust Block Details and Calculations: For each type of fitting based on soil bearing capacity of undisturbed soil.

2.3.3 Hydraulic Calculations - Provide for each building and/or system/design area. Provide "proof" calculations for grid systems and for areas that do not appear to be the most remote.

Required Information includes:

1. School district/site address
2. Building number/name
3. Date of calculations
4. Name of contractor
5. Name of designer
6. Authority Having Jurisdiction (AHJ)
7. Design data
 - Occupancy classification
 - Density
 - Area of application
 - Coverage per sprinkler
 - Uprights
 - Pendants
 - Number of sprinklers calculated
 - Total sprinkler water flow required
 - Total water required and available
 - Inside hose stream allowance
 - Outside hose stream allowance
 - Flow and pressure at base of riser
7. ME/FPE license or contractor certification number
8. Minimum design area
 - Increases (for roof pitch, etc.)
 - Decreases (for quick response heads, etc.)
9. Program used for computerized hydraulic calculations
10. Water supply data

- Source node identity (tag)
- Static pressure (PSI)
- Residual pressure (PSI)
- Flow (GPM)
- Available pressure (PSI)
- Total demand (GPM)
- Required pressure (PSI)

11. Aggregate flow analysis

- Total flow at source (GPM)
- Total hose stream allowance at source
- Other hose stream allowances
- Total discharge from active sprinklers (GPM and PSI)

12. Node analysis data

- Identify nodes (must correspond to those shown on plans – no “ghost pipe”)
- Elevations (ft)
- Node type (K Factor)
- Pressure (PSI)
 - Total (PSI)
 - Normal (PSI)
 - Discharge (GPM)
 - Fixed PSI losses shown in proper sequence and nodes match those on plans (backflow, double detector check valve assemblies, etc.)
 - Notes applicable to specific hydraulic calculations

13. Graph of sprinkler system hydraulic analysis

- Plot available pressure and GPM
- Plot required pressure and GPM
- Plot 10% safety factor pressure and GPM

2.4 Specifications:

2.4.1 Product Data Sheets (Cut Sheets):

- 1.** Submit product data sheets for all materials and devices used.
- 2.** Piping must be approved for use per NFPA 13.
- 3.** Fire alarm components must be per NFPA 72.
 - Provide SFM listings for all fire alarm appliances and devices.
 - Water flow supervisory switches
 - Fire alarm bells and/or horns
 - Water gongs
 - Miscellaneous relays and others
 - Fixed pressure loss devices
 - Backflow preventers
 - Double detector check valve assemblies
 - Include GPM/PSI charts or fixed losses.
 - Include all other justification data for pressure losses.

- Welding certifications (with welder's stamp on pipe at welds)
- Verify UL central station monitoring.

2.4.2 Specifications and Product Data Sheets must match materials and devices in bid set or provide a change order with new materials and devices. Plans, specifications, cut sheets and hydraulic calculations must be on site for the project inspector prior to commencement of installation.

2.4 Fire Alarm:

All water flow and tamper alarms required for the fire sprinkler system shall be tied into the main campus fire alarm system, including transmission of signal to UL supervisory station.

3. SUBMITTAL REQUIREMENTS FOR USE OF BUILDINGS DESIGNED BY THE DSA PRE-CHECK (PC) PROCESS:

- 3.1** Clearly indicate on the site specific plans the sprinkler system design water requirements at the base of the riser, calculated as flow (GPM) and pressure (PSI), with hydraulic calculations back to test source.
- 3.2** C-16 contractors shall only design sprinkler systems which they install, (design includes fire sprinkler riser). Design intended for general bids shall be prepared by a licensed Fire Protection Engineer or Mechanical Engineer.
- 3.3** Fire service underground shall be reviewed as part of the site specific project. Water supply shall be designed to meet the PC designed building's sprinkler demand requirements.
- 3.4** Identify the hydraulic design area on the sprinkler piping plans for each PC options being selected. Where used, provide the design area reduction calculation on the plans.

3.5 Submittal for Over-the-Counter (OTC) Review:

- 3.5.1** OTC, as described in [DSA Procedure 07-01](#), is available for site specific projects utilizing PC designed buildings, provided the project involves:
- Only 1 building
 - Only one construction type, as described in Section 602 of the California Building Code
 - Only 1 story
 - Only 1 site
 - Only buildings with fire sprinkler systems that have been designed for light hazard occupancies only. The building shall be limited to Administration, Assembly or Classroom use.
- 3.5.2 Note:** Design must include a 10% cushion added for water requirement. Alternatively, provide verification from water purveyor that fire flow has been tested at system peak use.
- 3.5.2 Note:** If it is determined that the submittal is incomplete, the Fire and Life Safety plan reviewer may terminate the OTC review.

- 3.6 Conditions Under Which OTC Will Not Be Permitted:** Several situations, examples of which are described below, will require that the project be reviewed conventionally.
- 3.6.1** Any substitution of sprinkler contractor from that indicated as the AFSS designer on the site specific project drawings will suspend review as an OTC. Conventional review and approval of a revised sprinkler system shall be required.
- 3.6.2** No substitution of fire sprinkler system components from those shown on the DSA approved PC design shall be allowed in OTC review. Components include piping, sprinkler type, hangers, fittings, etc.
- 3.6.3** Any modification of interior wall layout or the addition of soffits or similar obstructions to fire sprinkler coverage will require the project be reviewed conventionally and will not be eligible for OTC review.
- 3.6.4** Any variation of use which may affect the sprinkler hydraulic design shall not be allowed in OTC review. Uses requiring conventional review include, but are not limited to, stages, science labs, vocational shops, library book stack areas, and campus kitchens.