**DESIGN A/E NOTE - GUIDE SPECIFICATION CONVENTIONS**

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**Red: Text updated in 1st quarter. April – June.**

**Strikethrough text and highlighting (not text) in previously issued quarters are deleted. Only 1st quarter highlighted updated text is indicated.**

**Turquoise: Text updated in 2nd quarter. July – September.**

**1st quarter updated text remains highlighted.**

**Pink: Text updated in 3rd quarter. October – December.**

**1st and 2nd quarter updated text remain highlighted.**

**Bright Green: Text updated in 4th quarter. January – March.**

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**IMPORTANT: Retain month and year under section title on first page indicating updated Guide Specification Section issue used.**

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SECTION **21 13 00**

FIRE-SUPPRESSION SPRINKLER SYSTEMS

(Edited from DeCA June 2022 Design Criteria)

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Wet-pipe sprinkler system.

Dry-pipe sprinkler system

System design, installation, and certification.

Backflow prevention.

Fire department connections.

Small hose stations.

Underground piping within 5 feet-0 inches of building.

* + - * 1. Related Sections:

Division 01 Section Mechanical, Refrigeration, Food Service Equipment and Electrical Coordination.

Division 01 Section Quality Control.

Division 01 Section Closeout Procedures.

Division 07 Section Firestopping

Division 21 Section Fire Pumps.

Division 26 Electrical.

Division 28 Section Fire Detection and Alarm

Division 31 Section Earthwork.

* + - * 1. System Description:

System to provide complete coverage for the entire building, including exterior canopies.

Provide system to Unified Facilities Criteria - UFC 3-600-01 and National Fire Protection Association - NFPA 13, Latest Edition, and occupancy and hazard classifications shown on the preliminary working plans (bid documents) completed by the Engineer Of Record.

Determine volume and pressure of incoming water supply from water flow test data. Conduct new water flow tests per NFPA 291. Do not rely on data shown on preliminary working plans. Provide new water flow test data to the Engineer of Record for evaluation and hydraulically design system based on the evaluated data from the Engineer of Record.

Interface system with building fire detection and alarm system.

Provide fire department connections where indicated.

* + - 1. QUALITY ASSURANCE

Perform Work in accordance with NFPA 13, Latest Edition, and UFC 3-600-01.

* + - 1. REFERENCES
         1. The following publications form a part of this Specification to the extent they are applicable:

Division 01 Section Quality Control.

NFPA 13 - Latest Edition - Installation of Sprinkler Systems.

NFPA 20 - Latest Edition - Standard for the Installation of Stationary Pumps for Fire Protection.

NFPA 70 - Latest Edition - National Electrical Code.

NFPA 72 - Latest Edition - National Fire Alarm and Signaling Code.

NFPA 170 – Latest Edition – Standard for Fire Safety and Emergency Symbols.

UFC 3-600-01 Fire Protection Engineering for facilities.

Underwriters Laboratories - UL 199 - Automatic Sprinklers.

American Society of Sanitary Engineering - ASSE 1015 - Double check backflow prevention assemblies and double check fire protection backflow assemblies.

Appendices to these standards shall be considered a part of the standard. Advisory portions of the standard shall be considered mandatory as if the word “shall” has been substituted for the word “should”.

* + - 1. SUBMITTALS
         1. Submittals for Review:

Division 01 Section Quality Control: Procedures for submittals.

Manufacturer’s Descriptive Data: Annotate descriptive data to show clearly the specific model, type, and size of each item. At a minimum, submit two sets of data to the COR for the following:

Pipe and fittings.

Valves, including gate, check, and globe.

Electric alarm valve.

Sprinkler heads.

Pressure or flow switch.

Pipe hangers and support.

Excess pressure pump.

Fire department connections.

Low air pressure supervisory panel.

Dry pipe valves.

Nitrogen Generator and Air compressor

Air Maintenance device.

Mechanical couplings/fittings.

Backflow preventer.

Tamper switch.

Hose connection.

Other new equipment required to be listed by a NRTL.

Shop Drawings (Working Plans):

Drawing symbols shall conform to NFPA 170.

Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.

Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.

Prepare in accordance with NFPA 13, Latest Edition. All items of NFPA 13, chapter 28 for working plans shall be complied with.

Working plans shall include sufficient information indicating conformance to the preliminary working plans (bid documents) completed by the Engineer of Record.

Submit computer program generated hydraulic calculation to substantiate compliance with hydraulic design requirement per NFPA 13, latest edition. Specify name and edition of software program used.

Fire Sprinkler Contractor shall perform a two hydrant flow test in accordance with NFPA 291 at time of actual Working Plan design.

Submit complete sprinkler system Working Plans and hydraulic calculations sealed with the preparing subcontractor’s PE stamp of the FPE who prepared or supervised the preparation of the Working Plans, or as directed by UFC 3-600-01.

Operation and Maintenance Data.

* + - * 1. Submittals at Project Closeout:

Division 01 Section Closeout Procedures: Procedures for submittals.

Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

Manufacturer's Certificate: The Engineer of Record shall inspect the system and certify that the system has been tested and meets or exceeds specified requirements and code requirements.

Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot. Provide three copies, printed and bound in hard cover or three-ring loose leaf notebooks.

Warranty: Submit manufacturer warranty and ensure forms have been completed in Government's name and registered with manufacturer.

The components of the fire protection system(s) furnished under this division of the Specifications shall be guaranteed for a period of not less than one (1) year from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier, against defective materials, design, and workmanship. Upon receipt of notice from the Government of failure of any part of the equipment during the guarantee period, the affected part or parts shall be replaced promptly which includes removing the defective part or parts, replacing and installing the new part or parts and at the expense of the Contractor.

Provide one (1) soft-bound copy of NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

The contractor shall submit all certifications and testing data as a supplement to previously submitted O & M manuals at Contract Closeout. Testing data shall include all applicable "Acceptance Requirements" per NFPA 13.

* + - * 1. Sustainable **[LEED]** Submittals:

Retain subparagraph below if low-emitting materials are required for LEED-NC Credit EQ 4.1; coordinate with requirements selected in Part 2 for solvent cements.

Product Data **[for Credit EQ 4.1]**: For solvent cements and adhesive primers, including printed statement of VOC content and chemical components.

* + - 1. DELIVERY, STORAGE, AND PROTECTION
         1. Division 01 Section Quality Control: Transport, handle, store, and protect products.
         2. Store products in shipping containers and maintain in place until installation.
         3. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
      2. QUALIFICATIONS
         1. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum three years documented experience.
         2. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years documented experience.
         3. Design system under direct supervision of a state licensed Professional Fire Protection Engineer.
      3. REGULATORY REQUIREMENTS
         1. Conform to Underwriters Laboratories - UL.
         2. Perform Work in accordance with NFPA 13, Latest Edition and the Unified Facilities Criteria UFC 3-600-01. The requirements of the UFC 3-600-01 shall take precedence over the requirements of NFPA 13.
         3. Equipment and Components: Bear UL label or marking.
         4. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
      4. EXTRA MATERIALS
         1. Division 01 Section Closeout Procedures - Maintenance Data.
         2. Provide extra sprinklers under provisions of NFPA 13, Latest Edition. Minimum of one (1) per SIN and temperature rating used such that any newly installed sprinkler may be replaced with an identical one newly placed in the space head box.
         3. Provide manufacturer’s recommended wrenches for each sprinkler type.
         4. Provide metal storage cabinet in location designated near sprinkler riser.

1. PRODUCTS
   * + 1. SPRINKLERS
          1. Install sprinklers from reviewed Working Plans.
          2. All sprinklers shall be of similar design and from a single manufacturer.
          3. The operating temperature of sprinkler heads shall be as required by the specific location of installation.
          4. Extended coverage sprinklers shall not be used per UFC 3-600-01.
          5. Sprinklers shall conform to the following schedule, the requirements of NFPA 13 and as indicated in the preliminary working plans:

Suspended Ceiling - Finished Rooms:

Type: Recessed pendant type with matching escutcheon plate. Maximum projection below ceiling 1 inch.

Finish: Chrome plated.

Escutcheon Plate Finish: Chrome plated.

Fusible Link: Fusible solder link type or Glass bulb type temperature rated for specific area hazard.

Exposed Area - No Finished Ceiling Type:

Type: Standard upright type.

Finish: Brass.

Fusible Link: Fusible solder link type or Glass bulb type temperature rated for specific area hazard.

Suspended Ceilings - Janitors closets, Storage, Mechanical Rooms:

Type: Standard type with matching flat escutcheon plate. Projection below ceiling shall not exceed 2 inches.

Finish: Chrome.

Escutcheon Plate Finish: Chrome plated.

Fusible Link: Fusible solder link type or glass bulb type temperature rated for specific area hazard.

Sprinkler with deflectors less than 7 feet-6 inches above finished floor shall have listed sprinkler guards.

Dry Pendant Sprinklers - Coolers, Freezers, and canopy:

Type: Standard dry pendant type with matching escutcheon plate.

Finish: Chrome.

Escutcheon Plate Finish: Chrome plated.

Fusible Link: Fusible solder link type. Temperature rated for specific area hazard or glass bulb type rated for minus 20 degrees F temperature rating in areas with refrigeration equipment shall not be less than 286 degrees F.

Dry Sidewall Sprinklers:

Type: Dry Sidewall type with matching escutcheon plate.

Finish: Chrome.

Escutcheon Plate Finish: Chrome plated.

Fusible Link: Fusible solder link type or glass bulb type temperature rated for specific area hazard. Minimum 200 degrees F.

* + - 1. FLEXIBLE SPRINKLER HOSE FITTINGS
         1. Shall not be used per UFC 3-600-01.
      2. PIPE AND FITTINGS-EXTERIOR
         1. Piping underground shall be Class 52 cement lined ductile iron pipe or as required by the local utility company a minimum of 5 feet-0 inches from the building. Straight runs of pipe with no offsets may be rubber joint with bell and spigot. All fittings shall consist of mechanical joint type.
         2. All buried pipe and fittings shall be installed in a sand bedded trench, 6 inches under pipe and filled with sand to 12 inches minimum above pipe.
         3. Block or rod underground piping and fittings for static and surge pressures. Furnish and install concrete thrust blocks and joint ties at each change in direction of all underground piping in accordance with NFPA 13 and NFPA 24 requirements. Set screw ("Mega-Lug type") restraint shall be used in addition to concrete thrust blocks.
         4. Prior to connection to existing water line, the Water Authority having jurisdiction shall be contacted so that they can inspect the procedures used.
         5. All underground pipe, fittings, and valves shall conform to NFPA 13 and NFPA 24 requirements.
      3. PIPE AND FITTINGS-INTERIOR
         1. Interior piping for automatic sprinkler system shall conform to NFPA 13, UFC 3-600-01 and as follows.

Sprinkler piping above ground with threaded fittings shall be Schedule 40 black steel pipe with a corrosion resistance rating equal to or greater than 1.0. Threaded thin-wall pipe shall not be used.

Fittings for threaded and coupled pipe shall consist of cast iron or malleable threaded fittings joined with Teflon tape thread sealing compound or pipe joint compound. Pressure rating of fittings shall be as required for application.

Sprinkler piping above ground with grooved fittings for sizes 2-1/2-inch and larger shall be roll grooved Schedule 40 black steel pipe. Pressure rating of fittings shall be as required for application.

If a history of corrosion is not present, schedule 10 may be used.

Fittings for grooved end pipe shall in accordance with NFPA 13.

All dry sprinkler systems piping above ground 2 inches and smaller shall be standard threaded fittings and Schedule 40 pipe. Sizes 2-1/2-inch and larger shall be roll grooved Schedule 40 black steel pipe and painted fittings. Grooved pipe couplings shall be galvanized or painted.

All exterior copper pipe shall be type K soft or hard copper with brazed copper fittings.

All interior copper pipe shall be type L hard copper pipe with brazed wrought or cast copper fittings.

Fittings for plain end pipe shall not be used.

CPVC piping and fitting shall not be used.

Alternate piping systems approved by NFPA 13 may be allowed with prior approval of the Engineer of Record.

All piping shall be identified with pre-manufactured piping identification labels.

Piping not under pressure and open to atmosphere, including drain piping and some fire department connection piping, shall be galvanized. No other piping may be galvanized.

* + - 1. HANGERS AND SUPPORTS
         1. Space pipe hangers in accordance with the requirements of NFPA. Construct hangers, hanger rods, inserts and clamps as approved by NFPA 13.
      2. EARTHQUAKE BRACING
         1. Furnish and install all earthquake bracing as required by NFPA 13. Construct bracing as approved by NFPA 13.
      3. VALVES
         1. Gate valves shall be approved indicating type as required by NFPA and UFC. Check valves shall be as required by NFPA. Test and drain valves shall be approved brass globe, angle, or ball valves. Locate sprinkler system isolation valves as shown on the drawings complete with a tamper alarm.
      4. BACKFLOW PREVENTION DEVICES
         1. Install new backflow prevention devices of the type and configuration as required by the Water Authority having jurisdiction.
         2. Double Check Valve Assemblies shall be: ANSI/ASSE 1015, AWWA C510; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves two os&y valves, 175 psig working pressure, drain pipe to floor drain with air gap fitting.
         3. Reduced Pressure Backflow Assemblies shall be: ANSI/ASSE 1013, AWWA C511; stainless steel body with corrosion resistant internal parts and stainless steel springs; two link operating check valves with replaceable check disc rubber, two os&y valves, 175 psig working pressure, pressure relief with air gap fitting.
         4. Devices shall be UL or FM approved.
         5. All reduced pressure backflow prevention devices shall be provided with an air gap drain with splash guard and piped to the exterior or adequate floor drain with galvanized pipe and fittings. Drain pipe shall be sized as required by the manufacturer for full flow of the relief valve.
         6. Hydraulic friction loss to be per UFC 3-600-01 for the type of backflow used.
      5. SPECIALTIES
         1. Fire Seals:

Where piping passes through walls, floors or other building construction which by code requires a fire rating, approved fire rated assemblies shall be used. Proposed protection shall be submitted for approval. Plans shall clearly indicate details and locations of required protection.

* + - * 1. Escutcheon Plates:

Where exposed piping passes through finish work, chrome plated or other finish acceptable to the Government Authorized Technical Representative wall plates shall be installed. Split wall plates or escutcheons shall be installed to fit snugly around piping. All wall plates shall be metal.

Solid galvanized wall plates shall be used at both sides of all exterior walls.

* + - * 1. Valve Identification:

All valves within the building shall have permanently marked identification signs provided in accordance with MIL – Std-101 and UFC 3-600-01 9-6.8. Signs shall be manufactured and not hand written. Signs shall be hung with galvanized or chrome chain. Signs must indicate “Normally Open” or “Normally Closed.”

* + - * 1. Spare Sprinkler Box:

Furnish and install a supply of extra sprinklers and wrenches per NFPA 13 and Section 1.8.B, complete with mountable box. Mount box on wall next to sprinkler system riser. Box(es) must be sized to accommodate all new sprinklers, including dry pendent or sidewall sprinklers.

* + - * 1. Piping Identification:

All piping shall be identified, per UFC 3-600-01 9-6.8, at 40 foot maximum spacing and a minimum of one identification label per room viewable from at least two sides. Labels shall be Seton wrap around style or equal, or stencil painted 2-inches minimum letter height.

* + - 1. DRY PIPE VALVE
         1. Install dry pipe valve complete with necessary drain valves, pressure switches, check valves, etc., as required by NFPA 13 where shown on the drawings. Assembly shall have pressure switches with contacts for wiring to the fire alarm system.
         2. Valve shall be check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm and drain valve.
         3. Provide and install air compressor, automatic air maintenance device and low air alarms as required by NFPA 13 and UFC 3-600-01.
         4. Provide low air alarm switch.
         5. Provide accelerator if required.
      2. ELECTRICAL DEVICES
         1. All electrical devices shall be coordinated with Division 26 Electrical and Division 28 Fire Detection and Alarm requirements for compatibility of voltages and manufacturer.
         2. Water Flow Switch:

Vane type switch for mounting horizontal or vertical with retard adjustment. Switch shall have two sets of SPDT contacts; rated 10 amps at 125 volt AC and 2.5 amps at 24 volt. Enclosure shall be NEMA 4/IP54 rated. Flow sensitivity shall be 4-10 gpm Construction of base and cover shall be die-cast and provided with two (2) knockouts for 1/2-inch conduit. Switch shall be UL listed for fire protection service.

* + - * 1. Pressure Alarm Switch:

Pressure actuated switch suitable to provide an adjustable pressure supervisory signal. Switch shall have two sets of SPDT contacts; rated 10 amps at 125 volt AC and 2.5 amps at 24 volt DC. Enclosure shall be NEMA 4/IP55 rated. Construction of base and cover shall be die-cast and provided with two (2) knockouts for 1/2-inch conduit. Switch shall be UL listed for fire protection service.

* + - * 1. Low Air Alarm:

Pressure actuated switch suitable to provide an adjustable pressure supervisory signal. Switch shall have two sets of SPDT contacts; rated 10 amps at 125 volt AC and 2.5 amps at 24 volt DC. Enclosure shall be NEMA 4/IP55 rated. Construction of base and cover shall be die-cast and provided with two (2) knockouts for 1/2-inch conduit. Switch shall be UL listed for fire protection service.

* + - * 1. Nitrogen Generator:

Nitrogen generator shall provide the supervisory air for all new and renovated Dry-Pipe sprinkler systems where an existing air compressor is not being reused.

Sized to achieve supervisory pressure within 10 minutes.

Provide a minimum of 98% Nitrogen purity.

Shall have storage tank(s) and a compressor to accomplish supervisory gas.

Be located near the Dry Pipe valve.

Connect to listed air maintenance device at the Dry Pipe valve.

Replaceable Nitrogen storage bottles are not an acceptable substitute for this equipment.

* + - * 1. Tamper Switch:

Tamper switch shall be suitable to monitor the open position of valves. Switch shall have two sets of SPDT contacts; rated 10 amps at 125 volt AC and 2.5 amps at 24 volt DC. Enclosure shall be NEMA 4 and NEMA 6(IP67) rated. Construction of base and cover having corrosion resistant finishes and tamper resistant screws. Switch shall be UL listed for fire protection service.

On each control valve, arranged to actuate alarm when valve is closed.

* + - * 1. Audio/Visual Alarm Indicating Appliances:

Devices to be per Specification Section 28.31.76 Fire Alarm / Mass Notification Systems

* + - 1. FIRE HOSE CONNECTIONS
         1. Furnish and install where shown on plans.
         2. Set all hose connections 3 feet above floor or as required by the Fire Marshal.
         3. Hose connections shall be rough brass globe valves with replaceable seats and discs complete with 1-1/2 inches adapter, Cap and Chain. Valves shall be 300 PSI UL rated. Coordinate with local fire department.
      2. FIRE DEPARTMENT CONNECTION
         1. Fire department connection shall be flush mounted wall type with chrome plated finish.
         2. Outlets: Two-way with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish.
         3. Drain: 3/4 inch automatic drip, connected to drain.
         4. Label: "Sprinkler ‑ Fire Department Connection."
         5. Signal: Electric strobe on outside wall above FDC tied in to each riser served by the particular FDC and activated by the alarm system when any water flow occurs.
         6. Siamese connections shall be set 2 feet-6 inches above grade.
         7. Coordinate height, thread type, connection type, and location with local fire department.
      3. BACKFLOW TEST CONNECTION
         1. Backflow connection shall be flush mounted wall type with chrome plated finish near FDC at an accessible height and downstream of the backflow prevention device.
         2. Outlets: 2 ½” Globe valves with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish. One valve per 250gpm of 100% UL rated flow through backflow preventer.
         3. Label: "Backflow Test" or as directed by the AHJ
         4. Control valves shall be electronically supervised “closed.”
      4. INSPECTOR’S TEST AND DRAIN
         1. Inspector’s test and drain shall be per UFC 3-600-01, 9-7.10.4, hard-piped to adequate drain at the exterior of building.
         2. Minimum of one per water flow switch.
         3. All wet systems shall have a pressure relief device at the ITC location per NFPA 13.
         4. ITC shall be minimum 1-inch piping and the orifice size shall match the smallest sprinkler orifice on the system.

1. EXECUTION
   * + 1. DESIGN CRITERIA
          1. Design Basis Information: Provide design, materials, equipment, installation, inspection, and testing of the automatic sprinkler system in accordance with the requirements of NFPA 13. Recommendations in appendices shall be treated as requirements.

Perform hydraulic calculations in accordance with NFPA 13 utilizing the Area/Density method only.

The room design method is not allowed.

Sprinkler Protection: To determine spacing and sizing, apply the following coverage classifications:

See occupancy design table and notes on preliminary working plans.

Request clarification from the Engineer of Record for any hazard classification not identified.

Hydraulic Calculations: Calculated demand including hose stream requirements shall fall no less than 10 percent below the available water supply curve, or other safety factor as deemed appropriate by the QFPE.

Quick response sprinkler reductions are not allowed.

Water Supply: See preliminary working plans.

* + - * 1. The fire protection system supplier shall design the piping to supply the system. Piping shall be laid out so as not to interfere with the installation of other piping, ductwork or light fixtures.
        2. The entire sprinkler system is not shown on preliminary working plans. The intent is to provide complete sprinkler systems as required. This Contractor shall be responsible for surveying the site, existing construction, and new construction, and prepare working plans for the total system.
        3. All piping shall be run concealed wherever possible. Where piping is run exposed, special notation on Contractor's working plans to that effect shall be evident and conspicuous on the drawings. Any piping determined to be a problem shall be relocated at no cost to the Government.
        4. System piping to be hydraulically calculated including system riser and fire pumper connection in accordance with NFPA 13.
        5. Meet the Seismic Restraint requirements in NFPA 13, Latest Edition, Vibration Isolation and Seismic Restraints. Seismic coefficient to be provided or derived from NFPA 13, using site specific seismic data**. [described in Division 01, Section Summary of Work] [as indicated on Drawing Sheet \_\_\_\_.]**
        6. The preparation of all working plans and hydraulic calculations shall be prepared by an FPE or Registered Professional Engineer meeting the requirements of the UFC3-600-01.
      1. INSTALLATION
         1. Furnish sprinkler system with the following components:

Systems shall be equipped with an electronically supervised isolation valve and an approved flow alarm connected to the building fire alarm system.

A Fire Department Connection shall be installed on the system side of the water supply check valve complete with its own check valve and ball drip.

A main drain shall be installed on each riser or sectional zone control valve and shall drain to the exterior or to an adequate drain connection.

Auxiliary drains shall be provided when a change in piping direction prevents drainage of sections of branch lines or mains through the main drain valve.

Inspector’s Test Connection.

Pressure relief valve at each wet system ITC per NFPA 13.

Exterior alarm shall be installed as near as practical to Fire Department connection with identification sign. Exterior horn/strobe shall be wired to alarm system.

* + - * 1. Installation shall be accomplished by the licensed Contractor. Provide a qualified technician, experienced in the installation and operation of the type of system being installed, to supervise the installation and testing of the system.
        2. Installation of Piping:

Pipe threads to be deburred, cleaned, and made free of rust prior to installation.

Internally and externally cold galvanize all threaded and roll grooved ends cut in the field. Properly clean the pipe per manufacture’s instruction before applying the finish.

Accurately cut pipe to measurements established by the installer and work into place without springing or forcing. In any situations where bending of the pipe is required, use a standard pipe-bending template.

Install concealed piping in spaces that have finished ceilings. Pipe installed near equipment shall not block or encroach on equipment access or impede maintenance. Where ceiling mounted equipment exists, install sprinklers so as not to obstruct the movement or operation of the equipment or block access. Sidewall heads may need to be utilized.

Locate piping in stairways as near to the ceiling as possible to prevent tampering by unauthorized personnel, and to provide a minimum headroom clearance of seven feet-six inches. To prevent an obstruction to egress, provide piping clearances in accordance with NFPA 101.

* + - * 1. Welding: Conform to the requirements and recommendations of NFPA 13.
        2. Drains: Install adequate drains piped to floor drains or out of doors. Pipe drains to discharge at safe points outside of the building or to sight cones attached to drains of adequate size to readily carry the full flow from each drain under maximum pressure. Do not provide a direct drain connection to sewer system or discharge into sinks. Install drips and drains where necessary and required by NFPA 13.
        3. Waterflow Alarm Switches: Install waterflow switch and adjacent valves in easily accessible locations.
        4. Inspector's Test Connection: Install and supply in conformance with NFPA 13, locate in a secured area, and discharge to the exterior of the Building.
        5. Affix cutout disks, which are created by cutting holes in the walls of pipe for flow switches and non-threaded pipe connections to the respective waterflow switch or pipe connection near to the pipe from where they were cut.
        6. Sleeves: Provide for pipes passing through masonry or concrete schedule 40 pipe. Provide space between the pipe and the sleeve in accordance with NFPA 13. Seal this space with a UL Listed through penetration fire stop material per UL assembly listings.
        7. Provide pressure gage at each water flow alarm switch location, at the top of each standpipe, and at each main drain connection.
        8. Securely attach identification signs to control valves, drain valves, and test valves. Locate hydraulic placard information signs at each sectional control valve where there is a zone water flow switch.
        9. Repairs: Repair damage to the building or equipment resulting from the installation of the sprinkler system by the installer at no additional expense to the Government.
        10. Where details of installation are not given, the installation shall be made using manufacturer's recommended practices or at the direction of the Architect/Engineer.
        11. Contractor shall complete the fire protection systems ready for operation, in all respects, as soon as possible. When system is complete and ready for continuous operation, activate the system for its intended use. After system has been activated for continuous use, water charges will be paid by the Government.
        12. Install equipment in accordance with manufacturer’s instructions.
        13. Conceal piping above suspended ceilings.
        14. Install buried shut‑off valves in valve box. Provide post indicator.
        15. Run piping as high as possible in areas without ceilings.
        16. Provide approved double check valve backflow preventer assembly or reduced pressure backflow assembly at sprinkler system water source connection. Provide means of forward flow testing at system demand per NFPA 13.
        17. No sprinkler mains are permitted in Electrical Rooms.
        18. No sprinkler branch lines are permitted directly above electrical panels or gear.
        19. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent equipment to allow full swing of fire department wrench handle. For each fire department connection, provide the symbolic sign given in NFPA 170 and locate 8 to 10 feet above each connection location. Size sign 18 by 18 inches with the symbol being at least 14 by 14 inches.
        20. Locate outside electric alarm bell on building wall as indicated.
        21. Place pipe runs to minimize obstruction to other work.
        22. Place piping in concealed spaces above finished ceilings.
        23. Center sprinklers in one direction in ceiling tile and provide piping offsets as required.
        24. Coordinate sprinkler locations with light fixtures, structure, HVAC ducts, grilles, diffusers, etc. Provide additional heads under ducts, equipment, etc, as per NFPA 13, Latest Edition.
        25. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting.
        26. Install and connect to fire pump system in accordance with NFPA 13, Latest Edition, and Division 21 Section Fire Pumps.
        27. Install air compressor on vibration isolators. Refer to Division 22 Section Vibration and Seismic Controls for Plumbing Piping and Equipment.
        28. Install guards on sprinklers where indicated or required.
        29. Provide all electrical devices and wiring required but not provided under Division 26.
        30. Flush entire piping system, new and existing, of foreign matter
        31. Provide labels on all controls, valves, etc. as required by NFPA 13, Latest Edition.
        32. This Contractor shall remove from the building, all rubbish and unused materials due to or connected with this installation.
        33. The surface of all piping shall be cleaned and left ready for painting.
      1. TESTING
         1. The entire sprinkler system shall be hydrostatically tested at not less than 200 psig or 50 psig above normal working pressure, not to exceed 225 psig for a period of not less than two (2) hours with no pressure drop in the system and per NFPA 13.
         2. Dry pipe and pre-action system shall be air-tested in accordance with the requirements of NFPA 13. A recording pressure gage and a recording thermometer shall be used in conjunction with the air test to verify no additional air has been introduced into the system and temperature variations have not introduced testing errors.
         3. The underground fire service main shall be hydrostatically tested at not less than 200 psig or 50 psig above normal working pressure, not to exceed 225 psig for a period of not less than two (2) hours with no pressure drop in the system and per NFPA 13.
         4. All testing shall be witnessed by a representative of the Engineer or Government.
         5. Conduct Preliminary Test in the presence of the Fire Department and the FPE. The test shall include hydrostatic test per NFPA 13, and operational tests of alarms and all other devices. Make any corrections required. Submit a signed and dated Contractor’s Material and Test Certificate for Aboveground Piping, specified in NFPA 13, to the Contracting Officer. The FPE shall prepare a report documenting the test and results.
         6. Submit a request for formal test and inspection at least 15 days prior to the desired inspection date and after the Preliminary test is complete and corrections are completed and approved. An experienced technician regularly employed by the system installer shall be present, as well as the Fire Department, and the FPE. The test shall include all applicable testing and documentation required by NFPA 13, including, but not limited to: hydrostatic test, and operational tests of alarms and other devices. The Contracting Officer or Government Authorized Technical Representative shall witness formal tests and approve systems before they are accepted.
         7. Where jurisdictional authority's standards are more stringent than the above test, they shall prevail.
      2. INTERFACE WITH OTHER PRODUCTS
         1. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION