C-26 - FIRE PROTECTION SYSTEMS

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Preface

The designer is to review all design guidelines and use them to prepare their design and the contract documents for the Fire Protection Sprinkler Systems. This is document is not intended to conflict with any Code or NFPA Standard. If conflict is observed, the designer shall notify the Facility Planning Project Manager and if necessary, obtain a ruling from NC Office of State Construction.

The designer shall consider the following while preparing their design and the contract documents:

1. The designer shall determine the need for a fire pump prior to design development stage through the conduct of water flow tests. All testing must be coordinated with Orange Water and Sewer Authority (OWASA) and the University's Life Safety Systems Department. Designer shall contact OWASA to determine the fee for water flow tests and coordinate payment to OWASA with the UNC-CH Project Manager. A formal request along with the fee must be submitted to OWASA prior to testing (see the OWASA website).

2. In all new construction and wherever possible in renovations, fire pumps shall be directly connected to both the service transformer and the emergency generator via a service entrance rated combination fire pump controller.

3. Specify that a schedule of fire protection valves shall be installed adjacent to the main fire alarm control panel for the building.

Design Guidelines

I. FIRE PROTECTION SPRINKLER SYSTEMS

Both the North Carolina State Construction Office and the University's Life Safety Systems Department must review and approve shop drawings for fire protection sprinkler systems before such systems are installed.

UNC-CH's Fire Sprinkler guidelines are available on the UNC Facilities website. If additional information is needed contact the Life Safety Dept: Manager Sherwood McLamb (sherwood.mclamb@fac.unc.edu). Supervisor David Sharpe (david.sharpe@fac.unc.edu).

A. GENERAL

1. Codes and Standards:

- NFPA Compliance: Reference NFPA Standards
  (NC Code may list earlier but these permitted to be used)

- NFPA 13-2013* Sprinkler Systems
- NFPA 14-2013 Standpipe and Hose Systems
- NFPA 15-2012 Water Spray Fixed Systems
- NFPA 16-2015 Foam-Water Sprinkler Systems
- NFPA 20-2013 Centrifugal Fire Pumps
- NFPA 22-2013 Water Tanks for Private Fire Protection
- NFPA 24-2013 Private Fire Service Mains

- NFPA 25-2014 Insp., Testing, and Maintenance of Water-Based Fire
- NFPA 72-2013 National Fire Alarm Code

(*Please contact AHJ prior to any use of NFPA 13R or 13D for design, in lieu of NFPA 13.)

SCO Compliance: Comply with current applicable requirements of North Carolina State Construction Office.

2. Plans and Specifications Content:

- Water supply test data (static pressure, residual pressure, and flow) taken.
- Design density, remote area size, area per sprinkler, and hose demand.
- Permitted pipe, valves, sprinkler heads, fittings, and other materials
- Backflow prevention device requirements, location, and installation detail.
- Building specific Post Indicator Valve location and installation detail.
- Fire/booster pump requirements and installation detail, when pump used.
- Sprinkler riser diagram, beginning where the sprinkler system contract does, showing all cutoff valves, inspector test valves, test connections, supervisory switches, and drains.

3. Contractor's Shop Drawings and Hydraulic Calculations:

The specifying engineer (PE), if any, has primary responsibility for review and approval of sprinkler system shop drawings and calculations. Contractor must provide a minimum of 10 copies (more if required by engineer's specification). PE's review shall be to determine "substantial compliance" with this document and the project specification. After completing this review, the PE is to send one marked-up copy to the University's Life Safety Systems Department for review and approval and must include the hydraulic calculations. In addition, the PE is to send two (2) copies of the shop drawings, hydraulic calculations and materials/product data along with his/her review comments to SCO for review and approval.

4. Contractor Qualifications and Responsibilities:

The contractor must be licensed by the North Carolina State Board of Examiners of Plumbing, Heating, and Fire Sprinkler Contractors and must submit evidence of Level III certification in "Inspections and testing of water-based fire protection systems" by NICET. Minimum of 5 years documented experience installing fire sprinkler systems similar in size and scope to this project.

The contractor shall be required to furnish evidence of satisfactory performance on previous sprinkler system installations of equivalent size, type, and complexity.

The contractor shall furnish all parts, materials, and labor required for a complete and operating system in accordance with all applicable requirements, even if each needed item is not specifically shown or described in the plans or specs.

The contractor is also responsible for the inevitable adjustments in sprinkler locations, sprinkler quantity, and piping required for full compliance with the NC Building Code, NFPA standards, and the project plans and specifications.

After the project is completed, Contractor’s Material and Test Certificates must be submitted

to the UNC Construction Management Representative and the UNC Life Safety Shop Representative, in accordance with NFPA 13. The sprinkler system riser must not be connected until the underground piping has been tested, flushed, and certified per NFPA 24 and inspected and approved by OWASA.

If any conflict is observed between this document and the project plans, referenced Codes, or Standards, obtain a ruling from the AHJ before proceeding with purchase of materials, fabrication, or installation of the system. Failure to do so may cause the sprinkler contractor to be held liable for any cost or delay incurred as a result.

The Installer must be present for the 100% test, Engineer's inspection and the University's Life Safety Systems Department inspections and must submit evidence of Level II certification in "Inspection and Testing of Water-based Protection Systems" by NICET.

B. BASIC SYSTEM PARAMETERS

1. *Hydraulic Calculations:*

The actual water supply must be verified by test using a minimum 2 hydrants as close to the point of connection as possible, witnessed by the Designer, and the University's Life Safety Systems Department. The waterflow test results shall be adjusted in accordance with DOI criteria by reducing the flow (gpm) and the residual pressure (psi) by 10%. Calculations start at the gauge hydrant used in the test and must include the backflow preventer and all valves and fittings. Use the "1.4 Rule," and include a 500gpm hose stream allowance if water supply permits. Limit water velocity to 25fps, except use 18fps for any segment with a vane type waterflow switch (to comply with UL listing).

2. *Minimum Design Density:*

Ordinary Hazard (Group 1) is the minimum system design normally accepted.

The minimum design density is to be 0.15gpm/SF for the hydraulically most remote 1500 SF. If there are open areas greater than 5,000 SF, or if combustible construction is used, the minimum design density shall be 0.12gpm/SF for the hydraulically most remote 3,000-SF. For dry systems, increase the area of application by 30%.

- EXCEPTION (1): When QR sprinklers are used and open spaces are relatively limited in size (e.g., dormitories, classroom-faculty office buildings), Chapter 11 of NFPA 13 is permitted to be used to reduce the system area of operation (and cost). Upon request, permission may also be granted to exceed the OH-1 area/sprinkler limit (130SF) if OH-1 density is still achieved.
- EXCEPTION (2): QR Extended Coverage sprinklers, currently listed only for Light Hazard applications, are permitted to be used in dormitories if density approximating OH-1 results.
- EXCEPTION (3): When NCDOI allows use of listed attic sprinklers, now listed only for Light Hazard. The minimum design in such spaces shall be the greater of 2,000SF or 5 sprinklers for wet systems, and 2,600SF or 7 sprinklers for dry systems.

NOTE: The Appendix of NFPA 13 includes suggested lists of "occupancies" categorized by fire hazard as being Light, Ordinary (Group 1), etc. It carefully qualifies the lists as applying only to "typical" facilities, stating that higher than normal fuel loading, or susceptibility to change, should be considered in classifying the present or potential hazard of each facility. The following facts justify using Ordinary Hazard (Group 1) as the minimum design density: (1) It provides a modest safety factor for changes in building use or occupancy, an important consideration for facilities expected to be in service 50-100 years or more (most public buildings). (2) It helps keep the hydraulic design basis for the system from becoming invalid due to deterioration in the public water supply, a common occurrence due to increasing demand or the build-up of scale in mains. (3) It makes rapid suppression of fire more probable, an important factor in limiting losses and, where plastic pipe is used, in preventing the system from being breached. (4) For residential and institutional facilities using QR sprinkler heads, it increases the probability of saving sleeping occupants in the room of origin. (5) A modest safety factor is also very prudent when the owner is self-insured or has insurance with high loss retention. All these factors apply to the State of NC, which is self-insured. It has high rise facilities in rural areas protected by volunteer fire departments that aren't able to provide the fire fighting resources of cities. Public buildings are often in use 100 years or more, with changes in their fire load common. Finally, anyone who has toured crowded State office buildings or typical college dorms in recent years will understand the fuel load is frequently more than "Light." These provide a strong, prudent basis for adopting Ordinary Hazard (Group 1) as the minimum system design normally accepted. Individual project circumstances may warrant an exception to this criterion.

3. ***Extent of Sprinkler Coverage:***
   Ordinary electrical equipment rooms, telephone closets, housekeeping closets and similar spaces shall be fully sprinklered. Sprinkler protection is permitted to be omitted in main electrical switchgear and generator rooms, provided they have direct outside access for the fire department and are enclosed by 2- hour fire rated construction.

4. ***System Zoning Requirements:***
   Each story must be a separate sprinkler zone with a dedicated cutoff valve, tamper switch, water flow switch, and an Inspector's Test valve piped to a drain capable of handling full flow without backup or splatter. All cutoff and test valves are to be located on the floor they serve, unless the Owner permits a different arrangement.

   NOTE: For buildings of more than 12 floors, consider two risers, separated from one another and located within stairways or otherwise protected from fire. Each riser would serve either: (1) Alternate floors, or (2) Roughly half of each floor. Where the floors are divided by smoke or fire partitions, we recommend option (2) if the sprinkler zone boundaries could reasonably correspond to smoke/fire partitions.

5. ***Multiple Riser Designs:***

   Multiple riser designs that require the operation of more than one floor cutoff valve to isolate any portion of the system are not permitted.

NOTE: This assures non-ambiguous waterflow alarm and enables a single valve to shut off water to any zone.

6. ***Electrical Supervision:***

Electrical supervision per NFPA 72 is required for monitoring the position of all sprinkler cutoff valves beyond the water source valve, including the outside post indicator valves (PIV), water motor gong control valves and isolation valves for the backflow prevention device. Tamper switches for OS&Y valves shall be mounted to rigid frames secured by bolts through clamp bars. ("J"-hook mounting to the valve's frame is not permitted.)

- EXCEPTION (1): Valves are permitted to be secured by locks when located in prison yards, underground pits, or other environments unsuitable for supervisory switches. The Owner may permit additional exceptions based on the individual circumstances.
- EXCEPTION (2): Normally closed valves to test headers, rooftop hose connections, etc., are permitted to be provided with locks, in lieu of electrical supervision.

Separate pump houses and hot boxes shall be monitored for freezing. Dry pipe and preaction system air supply must also be monitored, for both low and high pressure, and a manual bleeder valve is to be provided for testing and adjusting air pressure supervisory switches.

NOTE: Low air pressure can cause the dry system to trip wet, requiring it to be drained, the dry pipe valve reset, and repressurized. High air pressure will retard system response to fire, since the air pressure will first have to bleed down to the trip point before water enters the system.

7. ***Fire/Booster Pump, Water Supply, Throttling, and Metering:***

The water supply to the sprinkler system must provide at least 150% of pump rated capacity at a positive pressure and also meet the system demand at 20psi minimum. The water supply test shall have been performed within the most recent 12 months.

NOTE: A water supply of 200% of pump capacity is recommended whenever this can be reasonably achieved.

Per the NC Administrative Code, Title 15A, Subchapter 18C, an automatic pilot-operated throttling valve must be installed on the output side of the booster pump, to maintain required minimum pressure. Suction side control is not permitted, due to possible cavitations. Where permitted by SCO a low pressure shutoff sensing the suction pressure may be substituted if the water supply provides 200% of pump rated capacity at a minimum pressure of 40psi, and an acceptable means is provided to periodically test the calibration of this device in its installed location.

Provide a permanently installed meter for net pump performance testing without water streams. The meter outlet must discharge to a drain or to the suction tank, if provided, or (where permitted by NCDOI) to the suction side of the pump

An electrical disconnect rated at 6 time FLA shall be located between the power utility and the Fire Pump ATS/Controller.

The Fire Pump ATS and Fire Pump Controller shall be in separate rated and listed enclosures.

All sensing line Gauges shall be liquid filled.

C. MATERIALS AND COMPONENTS

1. *Listing / Approval:*

All sprinkler system materials and components must be listed or approved, and installed in strict conformance to the conditions of their listing / approval.

2. *Sprinkler Piping:*

a) Metal:

Only steel pipe shall be used, with a Corrosion Resistance Ratio (CRR) of one (1) or greater. Schedule
5 pipe is not permitted, in any size. Schedule 10 steel pipe and the approximately equal "flow" products, sizes 1.5" and larger, are permitted to be used only with listed roll groove end fittings. All dry pipe, deluge, and preaction system pipe must be galvanized, including any fittings exposed to weather. Listed flexible stainless steel piping systems (e.g. FlexHead, Flex-Arm) are also permitted.

b) Plastic:

Listed CPVC sprinkler pipe is only permitted, with prior written approval by the University's Life Safety Systems Department, to be used in occupancies other than Institutional-Restrained, when all of the following criteria are met:

- Pipe and fittings shall be post-chlorinated polyvinyl chloride, UL Listed and FM Approved for sprinkler system use, and fully compliant with ANSI/UL 1821-1994 and ANSI/UL 1887-1996.
- Base resin, compound, finished pipe, and fittings shall meet all the ASTM criteria specified for
  Noveon BlazeMaster2000 CPVC, and must be produced in the USA or Canada by an ISO 9002
  Certified facility.

NOTE: The benchmark BlazeMaster product is produced under license by several different manufacturers in the USA and Canada. Any listed product meeting the same ASTM, ANSI/UL, and ISO criteria is also acceptable.

- System shall be the wet pipe type with quick response sprinkler heads. It must be installed indoors (only), where the temperature will not exceed 150F.
- Except in corridors and stairs, pipe shall be run concealed or protected from fire exposure by one of the following methods: (a) 19/32" plywood, (b) 1/2" gypsum board, (c) prefabricated 20-gauge
  steel soffit system over mineral wool insulation, (d) plaster ceiling, (e) approved construction

providing a 15-minute fire rating.

NOTE: Protection from fire exposure is generally required because CPVC pipe is listed for Light Hazard applications only and we judge most State facilities to be predominantly Ordinary Hazard – Group 1. In corridors and stairs the fire hazard should always be "Light," hence no protection is needed. However, we recommend a 20-gauge steel soffit (alone) in corridors, for physical protection and aesthetic appearance.

- CPVC pipe shall not be threaded, grooved, or drilled.
- If stored outdoors the pipe must be protected from exposure to sunlight (UV) by an opaque covering.
- Where pipe penetrates rated wall, floors, or ceilings the fire stopping used must be labeled as being compatible with CPVC.

- NOTE: Some fire stop sealants and wrap strips contain solvents or plasticizers that may damage CPVC. It is very important to use only fire stop materials certified to be compatible with this pipe.
- If pipe is to be painted, only water-based paints shall be used (no oil-based).

NOTE: Petroleum-base solvents and lubricants are not compatible with CPVC and may cause damage.

- For threaded connectors, use only Teflon tape. For the steel portions of the system, any pipe dope used must be labeled as being compatible with CPVC.

Each installer of CPVC sprinkler pipe must provide documentation supporting they have attended an authorized training class in how to properly use this material, within the previous two years. They are not permitted to do any CPVC installation work prior to such training, or if not trained within 2 years.

c) Fittings and Joints:

All fittings must be listed or approved for the specific pipe and type of system they are used on. For gasketed fittings, install only with the lubricant the manufacturer obtained listing with, since other lubricants may not provide suitable performance.

d) Metal:

The following joining methods are acceptable for steel pipe, to the extent permitted by listings, except that threading or cut groove fittings are accepted for use only on fully complying Schedule 40 and heavier pipe:

- Threading
- Shop Welding
- Cut Groove with Gasket Fitting
- Roll Groove with Gasket Fitting
- Full Back Design Clamp-on Fittings
- "U" Bolt Design Clamp-on Fittings (Only for pipe of 2.5" run size and smaller)

Plain end, hooker, press-on, key type or slip type metal fittings are not permitted.

All grooved metal products on a job (both fittings and couplings) must be products of the same manufacturer.

NOTE: Mixing different brands may cause problems due to variations in design dimensions and tolerances, which could cause leaks or even failure.

e) Plastic:

CPVC pipe and fittings shall be joined by solvent cementing, in accordance with the following criteria:

- Use only solvent cements which are specifically tested and listed for use with CPVC, and which have been approved by the pipe and fitting manufacturer(s). Apply them strictly in accordance with the manufacturer's instructions.
- Solvent cement must not be used beyond its shelf life, or if gelled or discolored.

- To prevent solvent cement from running and plugging sprinkler orifices, the sprinkler heads are not permitted to be installed until all solvent-welded CPVC pipe, fittings, and head adapters have been allowed to cure a minimum of 30 minutes.
- Torque values must be observed when joining threaded or flanged CPVC adapters.

Grooved coupling adapters must be joined only with flexible couplings (not rigid type), using standard
Grade "E" EDPM compound to lubricate the
gasket.

f) Valves:

An outside post indicator type control valve (PIV) must be provided for all systems. All indoor cutoff valves in the two (2) inch through eight (8) inch range shall be the butterfly type, with integral tamper switch and position indicator.

NOTE: We've had many field problems with frame-mounted tamper switches mounted on OS&Y valves using "J-bolts", often field-fabricated from threaded rod stock. Adjustment to obtain proper operation is often very difficult, and does not hold. Factory installed butterfly valve tamper switches have proven to be very reliable.

- EXCEPTION (1): Valves on each side of any fire pump are to be the OS&Y type. This does not apply to the fire pump bypass valves (kept normally open), which are permitted be either the butterfly or OS&Y type. CAUTION: Butterfly valves bolted to a check valve frame may create an interference problem in some cases. Check specs to assure non-interference, or provide a short section of pipe between them.
- EXCEPTION (2): All valves are permitted to be OS&Y type if their tamper switches are mounted with substantial, rigid frames (not "J-bolts"), so that adjustments hold.

g) Sprinkler Heads:

- For combustible attics, roof decks, or floors above crawl spaces, use sprinklers that provide good wetting of exposed combustible members. The acceptable options include listed attic sprinklers, or pendant heads installed upright.
- Use Dry pendant or sidewall sprinklers for protecting refrigerated storage.
- Quick Response (QR) sprinkler heads shall be used in all sleeping rooms and laboratories, except where institutional heads are needed for security reasons.
- The use of QR heads is encouraged in any other applications for which listed.
- The use of Listed/Approved Residential Sprinklers should be considered for all sleeping occupancies.

NOTE: Although OH-1 is the minimum design normally allowed, Light hazard listed QR heads may be permitted where spacing will provide (near) OH-1 density. Examples: (1) dormitory rooms, (2) sidewall heads used to avoid ornate ceiling impact and/or running exposed pipe in aesthetically sensitive areas.

Residential sprinklers are not to be used in dry systems, unless the spec permits, as water delay might permit too many of these more responsive heads to open.

h) Backflow Prevention Devices:

Provide a cutoff valve on both sides of the backflow prevention device in the water supply connection, for isolation (servicing). RPZ backflow prevention device shall be provided with cutoff valves as part of a complete factory assembly, shipped and provided to the project as a whole. Where a booster pump is installed the backflow assembly, required by water quality regulations to be on the suction side, must be located as far from pump intake as possible (at least 10 pipe diameters).

D. SPECIAL SPRINKLER SYSTEMS

1. Preaction Systems:

Preaction valves shall be single interlocked, except for freezer facilities the double interlocked type must be used. Preaction Systems shall be installed per NFPA 13 and manufacturer's specifications.

2. Foam-Water Systems:

Closed head foam-water systems shall be the pre-primed, wet pipe type, except use pre-action type if subject to freezing. (Dry pipe designs not permitted.) Design for solid performance at low flow rate. Endurance shall be at least 20 minutes full flow to the specified design area. Foam concentrates from different manufacturers are not to be mixed. Replace the concentrate used during system inspections. Ceiling sprinklers are to be 286F (141C) rating. Provide a two-inch flushing connection at the far end of each cross main, with a conveniently accessible valve and piped to a suitable discharge location that permits the observation and sampling of foam.

NOTE: The flushing connections help assure a rich foam mixture upon initial flow. They also facilitate needed periodic renewal of the water-concentrate solution in the system piping.

3. ***Refrigerated Area Systems:***
Dry systems for freezers must have a regenerative compressed air dryer that will maintain the system dew point at least 20□F below the lowest freezer operating temperature. For freezers with wet systems and dry pendant or dry sidewall heads, the connection between the sprinkler head and the wet pipe must extend at least 12 inches beyond the cooler and be provided with insulating wrap to prevent sweating.

NOTE: To preserve the freezer warranty, only the freezer manufacturer's representative should cut and seal the holes for sprinklers. This should be covered in the engineer's specification.

4. ***Freeze Protection of Systems:***
Heat tracing is NOT acceptable for dry pipe or preaction valve freeze protection. A heated room or closet must be provided to protect these vital components.

NOTE: Antifreeze-primed systems are no longer permitted, due to environmental concerns.

E. INSTALLATION, TEST, AND CERTIFICATION

1. ***Locating Valves, Drains, and Inspector's Test Connections:***
All sprinkler valves and controls must be located for safe and convenient access during emergencies and testing. Control valves shall not be located above ceilings.

NOTE: Inspector's Test Connections should be operable from floor level whenever possible. They're permitted to be locked if vandalism is a concern. Where control valves must be located more than 10 feet

AFF, provision for access should be provided (e.g., permanent ladder/catwalk or, if the Owner permits, a chain-operated valve).

Identify each valve and control with a prominent engraved phenolic or stamped metal placard. Any such devices that are behind access doors or panels must also have their location made known by an appropriate placard on the means of access. A valve placard I.D. legend shall be posted at the main sprinkler riser denoting the locations of the identified valves.

2. ***Contractor's Inspection of System:***
The contractor shall thoroughly inspect the completed system to assure compliance with this document, project plans and specs, and applicable Codes and Standards. IMPORTANT: This must include an operational test of each waterflow alarm switch and all system supervisory devices (valve tamper, hi-low air pressure, pump status, etc), in coordination with the fire alarm system contractor.

When a fire pump / booster pump is provided, its flow test will be witnessed by the specifying engineer, UNC Life Safety Shop Representative, SCO and/or the Owner. The contractor must

notify them 2 weeks before the pump test, to permit sufficient time to schedule an inspector to be there.

Pressure tests shall be done with all sprinkler heads installed. Where an existing sprinkler system is being expanded or renovated, the contractor is responsible for the integrity of all new piping plus existing piping within three feet of new or renovation work, and the owner is responsible for the integrity of the balance of the system, during the pressure test.

3. ***Contractor's Material and Test Certificates:***
Prior to final inspection by SCO, NCDOI, and the University's Life Safety Systems Department, the system installer is to submit NFPA-required Contractor's Material and Test Certificate(s) for aboveground, and underground, piping. These documents should be witnessed and signed by the contractor, the Designer/Engineer of Record and/or the UNC Construction Management Representative. Send copies to the following:

- The Specifying Engineer (PE), if any
- SCO
- UNC Construction Management Representative
- UNC Life Safety Shop Representative

EXCEPTION: If the sprinkler contractor did not provide the underground piping, the responsible contractor must submit that certification. The sprinkler contractor is not to connect the riser until underground piping has been flushed, tested, and certified by the responsible contractor.

NOTE: For State of NC building projects, the owner is normally represented by the State Construction Office or by the facility's Construction Project Coordinator, as applicable. For private sector projects, the insurance carrier may be the "Representative of the Building Owner."

4. ***Reference Information:***
For convenient reference, relevant NFPA test requirements are summarized below. See the applicable NFPA standard for additional details and the forms that must be used by the contractor(s) to document the results of these tests.

- Underground Pipe Flushing and Test: Underground pipe shall be thoroughly flushed before being connected to the sprinkler system. Perform hydrostatic pressure test in accordance with NFPA 13 or
24 (generally at 200psi for 2 hours), as applicable. Provide certification per 5.3 that the leakage limits
described in detail by the relevant standard were not exceeded.
- Interior Piping Test: Hydrostatically test all interior piping and appurtenances in accordance with NFPA 13. This generally requires that the system hold 200psi for 2 hours without any water leakage. Record results and submit copies per 5.3.
- Additional Air Test for Dry Pipe Systems: Pump the system to 40psi and allow to stand for 24 hours.
The air pressure must not leak down more than 1.5psi. Record results on the Contractor's

Material and
Test Certificate per 5.3, above.

- Additional Operating Test for Dry Pipe Systems: All dry pipe systems must deliver sustained water flow to the inspector's test connection within sixty (60) seconds. Record the actual time on Contractor's Material and Test Certificate.

F. INSTRUCTIONS TO DESIGNERS

This document is not intended to conflict with any Code or NFPA Standard. If conflict is observed, the designer shall notify the Facility Planning Project Manager and if necessary obtain a ruling from NC Office of State Construction.

- Insert this entire document at the back of the specification (as an Appendix). Require compliance by reference in the sprinkler system section (by title and revision date), or
- Reference this document in the text (by title and revision date), require compliance, and mandate that the contractor obtain a free copy from NCDOI (available on their website) for use on the project, or
- Incorporate all of the relevant portions of this document in the sprinkler specification. To facilitate that process, the electronic version of this document contains a separate, attached MS Word Section, comprised of all of the criteria herein, but with the following items deleted: DOI Letterhead, Introduction, all page
headings, and fine print NOTES, the Instructions to Designers, Table of Contents, and Revision Record.
This makes it very convenient for the engineer to cut and paste these criteria as part of the sprinkler system specification.

The designer and contractor are jointly responsible for coordination of system details with the other designers/trades, as needed. This includes suitable location (and access) for all cutoff valves, determination of which contractor provides alarm/supervisory switches, and coordination with the fire alarm designer on sprinkler system monitoring by the FACU:

- Waterflow alarm, by sprinkler system zone
- Supervision of each sprinkler cutoff valve
- Supervision of high-low air pressure (if used)
- Supervision of fire/booster pump (if present)
- Other sprinkler system supervisory signals (as applicable)

The NC Building Code requires that sprinkler system alarm and supervisory signals be monitored, and transmitted off-premises, by the building fire alarm system. The above signals are permitted to be grouped as follows when received at the remote supervising station: (1) Waterflow Alarm, (2) Sprinkler Supervisory Signal (System Status Abnormal)

Locate points which discharge to the outside of the building (This includes flow testing, system drain down points, and RPZ discharge.) so that any water hazards, erosion hazards, and/or ice hazards are not created by these discharge or drain-down flows.