



DESIGN REQUIREMENTS

FIRE PROTECTION

GENERAL INFORMATION

- 1.1 Refer to Section 230000 for General Mechanical Requirements.
- 1.2 Refer to Section 230529 for Hangers and Supports.
- 1.3 Refer to Section 230553 for Pipe and Equipment Identification Requirements.
- 1.4 Refer to Section 230800 for Commissioning Requirements.
- 1.5 Refer to list of Preferred Manufacturers.
- 1.6 Existing buildings on the Morningside Campus are typically served by a combination of area fire pumps and fire protection tanks. Obtain basis of design information for the specific building at the start of the project from the Columbia University Project Manager.
- 1.7 The A/E is to request from the Columbia University Project Manager any existing flow test or fire pump test data. In the absence of such data, the A/E shall request a hydrant flow test from the New York City Department of Environmental Protection for the street(s) fronting the project location.
- 1.8 Vertical fire pumps shall not be used at the University.
- 1.9 Grooved coupling piping shall be permitted for sprinkler and standpipe systems only.

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- 2.1 All areas of the building shall be provided with automatic sprinklers. In general, wet sprinkler systems shall be designed. Pre-action sprinkler systems shall be considered in areas where an accidental discharge or water leak cannot be tolerated. Areas include computer rooms, library rare books storage areas, etc.
- 2.2 Where sprinklers are installed in areas subject to freezing (loading docks, etc.) dry systems shall be considered.
- 2.3 Schedule 40 shall be the minimum allowable pipe wall thickness. Sprinkler pipe shall not be Schedule 10, even if allowed by Code.



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- 2.4 The sprinkler system shall be hydraulically designed in accordance with local Code requirements unless required otherwise by the Insurance Underwriter. The maximum pipe velocity permitted in the piping system is 20 feet per second.
- 2.5 Design Documentation for Sprinkler Work
- a. The specifications shall require the contractor to submit complete, coordinated working plans, prior to the commencement of any work, and to submit and obtain all approvals from agencies having jurisdiction including the New York City Department of Buildings, Fire Department, Underwriters' Laboratories and Factory Mutual.
 - b. Working plans shall include the following information:
 - 1. Name and address of Owner.
 - 2. Name and address of the Architect, Engineers and Contractor.
 - 3. Location of project.
 - 4. Symbol list and abbreviations for entire fire protection system.
 - 5. North Arrow.
 - 6. Drawing scale (1/8" = 1'-0" minimum)
 - 7. Plans of all floors showing partitions, exits, beams, chutes, lights, unit heaters, diffusers, registers, ducts over four feet wide and ceiling heights.
 - 8. Riser diagram of entire system indicating all alarms, valves, tamper switches, floor control assemblies, air compressors, Siamese connections, mains, risers, source of water supply, quantity of sprinklers in each fire area on each floor, water pressure at each floor and height of each floor.
 - 9. Location, name, type, temperature rating and model of sprinkler heads.
 - 10. Structural beams and penetrations.
 - 11. Source of water supply, service size, static and residual pressure of street main(s), flow at residual pressure, and whether dead end or loop, and location of fire hydrants
 - 12. Number of sprinklers on each riser, floor and each room and total in the building, including location and size of risers, mains, branches and most remote area.
 - 13. Cutting lengths of pipe.
 - 14. Water flow alarms.



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15. Type of hangers, inserts and sleeves.
16. Seismic support details.
17. Inspector's test connections, drain pipes and test pipes.
18. Crosses, riser nipples and sizes.
19. Provisions for flushing.
20. Location of Fire Command Station.
21. Siamese locations.
22. Valve locations.
23. Hydraulic calculations of entire system including branches, mains and cross-mains performed by a licensed professional engineer.
24. Fire pump, jockey pump and related appurtenances.
25. Indicate all fire standpipe valve stations, cabinets, piping, valves, Siamese, test connections, roof manifold and all related appurtenances.

2.6 Renovation and Demolition

- a. Provide temporary standpipe and sprinkler protection during construction in accordance with NYCBC requirements.
- b. Remove abandoned branch piping back to risers/mains. Remove abandoned conduit and equipment. The abandonment of existing equipment and material in-place is not acceptable. Other systems which are presently operating that are to be abandoned, as well as those previously abandoned should be removed.
- c. Conserve space as much as possible, ensure designs are compact.
- d. Clearly identify any equipment or materials that are to be reused on the contract documents.

2.7 Grooved Coupling Piping

- a. Malleable and/or ductile iron couplings shall conform to ASTM A-47 and ASTM A-536, respectively, complete with gasket, bolts and nuts approved for fire protection service.
- b. Provide galvanized couplings for galvanized piping systems.

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2.8 Material for Pipe

SERVICE	MATERIAL	SCHEDULE	DESIGNATION
Fire Standpipe Below Ground	AWWA Ductile Iron Cement Lined	AWWA Class 52	AWWA C-151 & C-104
Sprinkler Below Ground	AWWA Ductile Iron Cement Lined	AWWA Class 52	AWWA C-151 & C-104
Fire Standpipe Above Ground	Black Steel	40	ASTM A-120
Sprinkler Above Ground	Black Steel	40	ASTM A-120
Drain Above Ground	Galvanized Steel	40	ASTM A-120
Sprinkler Tank Fill Line	Galvanized Steel	40	ASTM A-120
Air Lines	Copper or Galvanized Steel	Type "L" for copper 40 for Steel	ASTM B-88 ASTM A-120

2.9 Materials for Fittings

SERVICE	MATERIAL	WEIGHT	TYPE
Fire Standpipe Below Ground	AWWA Ductile Iron Cement Lined	AWWA Class 52	Mechanical
Sprinkler Below Ground	AWWA Ductile Iron Cement Lined	AWWA Class 52	Mechanical
Fire Standpipe Above Ground	Cast Iron, Malleable, Ductile, Cast Steel	Class 250, 300, 500, 800, 1000	Screwed, Flanged & Grooved Coupling
Sprinkler Above Ground	Cast Iron, Malleable Iron	Class 250	Screwed, Flanged & Grooved Coupling

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SERVICE	MATERIAL	WEIGHT	TYPE
Drain Above Ground	Galvanized Cast Iron	Class 125	Screwed & Grooved
Air Lines	Wrought Copper Galvanized Malleable	Class 125	Soldered Screwed

2.10 Hose Station

- a. Hose stations shall be provided as required by NYCBC.

2.11 Fire Extinguishers

- a. Fire extinguishers shall be installed in each fire hose cabinet. Provide wall hung fire extinguisher in Mechanical Equipment Rooms, Electrical Switchgear and Service Rooms, Elevator Equipment Rooms and other areas as required by the Fire Department or Code.

2.12 Siamese Connection

- a. Siamese connections shall be provided as described in the New York City Building Code. The specifications must state that the threads shall conform to the New York City Fire Department requirements.
- b. Siamese escutcheon shall be lettered "Standpipe", "Auto Spkr", "Combination Standpipe and Auto Spkr", "Dry Spkr", etc. and shall be provided with red, green, yellow, and green caps respectively.
- c. Finish of siamese assembly including escutcheon, caps and chain shall be polish chrome plated.

2.13 Fire Pump Test Station

- a. Fire pump test station shall discharge outdoors.
- b. Adjacent to the fire pump location, provide three saddle racks, three single jacket cotton rubber lined fire hoses with 2-1/2" brass couplings attached. Fire hose size shall be 2-1/2" and length of each section shall be 50 feet. Also furnish three 2-1/2" x 15" red enameled nozzles and three 2-1/2" malleable iron spanners with chains and twelve washers.

2.14 Automatic Ball Drip

- a. Each siamese and fire pump test connection shall have an automatic ball drip with discharge to a slop sink or floor drain.



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2.15 Tamper Switches

- a. All control valves shall be provided with a tamper switch to detect and indicate when a valve has been closed.

2.16 Water Flow Alarms

- a. Provide adjustable water flow alarms to detect water flow in each fire zone. Whenever a water flow alarm is installed in the piping system, an approved control valve shall be provided upstream of the alarm indicator.

2.17 Sprinkler Heads

- a. All sprinkler heads shall be Quick Response, UL listed, Factory Mutual and New York City BS&A approved. In general, sprinklers shall have a 1/2 inch orifice and ordinary temperature rating (160-165°F) except where required to prevent false sprinkler discharge.
- b. Provide listed protection cage around sprinkler heads in Mechanical Rooms.
- c. Sprinkler heads in unfinished areas without hung ceilings shall be all bronze upright or/pendent type.
- d. The type of sprinkler head in hung ceilings (recessed, semi-recessed or pendent) shall be coordinated with the Architect.
- e. Sprinkler heads for a dry system installed in areas without hung ceilings shall be cast brass closed fusible link up-right sprinkler head type. In hung ceiling areas use dry pendant type sprinkler heads.
- f. Sprinkler heads for a concealed sidewall installation (recessed or concealed) shall be coordinated with the Architect.
- g. In loading dock areas, freight elevator lobbies and similar areas where heads are subject to damage, provide a sprinkler guard with a red enamel finish for pendent and upright sprinkler heads.
- h. Provide six (6) spare heads of each type used on project. Include removal tool.

2.18 Valves

- a. Valves for Fire Standpipe and Sprinkler Systems shall be iron body bronze mounted OS&Y solid wedge gate valves with rising stem. All valves shall be stamped with manufacturer name and working pressure of the valve. A valved by-pass around valves six inches and larger shall be provided.

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- b. Valves shall be provided with properly lettered valve signs indicating the section or portion of the system that is controlled.
- c. Check valves on pump discharge shall be flanged flat type UL and FM and BS&A approved.
- d. Globe and angle valves shall be UL, FM approved.
- e. Valves below ground or floor levels shall be UL, FM and AWWA listed.
- f. Indicator post for below ground or floor levels shall be UL, FM and AWWA listed.
- g. Curb valves box shall be three-piece screw type extension box with "Water" indexed cover.
- h. Sprinkler branch piping subjected to pressures exceeding 175 psi connecting to a fire standpipe, combined fire protection or sprinkler riser shall be provided with an automatic pressure control valve. The valve shall be UL, FM and BS&A approved. A shutoff valve shall be provided upstream of the pressure control valve.

2.19 Access Ladders

- a. Where valves are located 7 feet or higher above the finished floor, a permanent steel ladder shall be provided. In mechanical rooms and similar areas, a wheel and chain shall be provided.

2.20 Access Doors

- a. Access doors are required in finished walls, ceilings, partitions, etc., for access to all valves, flow indicators, flushing connections, etc, concealed behind finished construction

CONSTRUCTION REQUIREMENTS

3.1 Flushing and Testing

- a. All sections of the piping system shall be thoroughly flushed at flow rates.
- b. All sections of the piping system shall be hydrostatically tested at not less than 200 psi for two hours at the building service or siamese. Test pressures shall be maintained by a small capacity pump to minimize water damage in the event of a break.
- c. The sprinkler system must be tested in accordance with the requirements of the New York City Building Code (NYCBC).
- d. The fire standpipe system must be tested in accordance with the requirements of New York City Building Code (NYCBC).



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- e. With the entire system under normal operating pressure, each control valve shall be opened and closed to demonstrate proper operation.
- f. All tests shall be performed in the presence of the University's representative, and all authorities having jurisdiction.

REFERENCE

- 4.1 The applicable CSI Specifications Sections are 21 00 00, 21 05 00, 21 12 00, 21 13 13, and 21 30 00.