SECTION 3 MD: MECHANICAL DIVISION

Latest Update 7-14-11, See underlined text

PART IV: FIRE PROTECTION SYSTEM DESIGN

1. SCOPE:

1.1. This part outlines the minimum requirements for the design procedures for the fire protection system, for new buildings, and repair and alteration projects for existing buildings on the UM campus

2. GENERAL REQUIREMENTS:

2.1. In general, all UM buildings shall be protected with a sprinkler system which covers 100% of the floor area, and which meets the requirements of the State of Maryland Fire Protection Code and appropriate NFPA Codes. Most fire protection requirements imposed by the State of Maryland are adopted by incorporation by reference to national codes and standards developed by associations such as the National Fire Protection Association (NFPA), American Society for Testing and Materials (ASTM) American National Standards Institute (ANSI), and the International Building Code (IBC) with modifications. These standards are considered requirements for the State of Maryland to the extent they are referenced, except where exceptions are noted. Special situations may require a different type of automatic fire protection system for localized areas, as listed herein. Coordinate with OFM for selection of alternative systems.

2.2. **Building Codes:** Construction, repairs and alterations shall be in compliance with state adopted nationally recognized model fire and building codes and other recognized codes such as Electrical, HVAC, and Plumbing Codes. The referenced edition of these codes/standards shall be used.

2.3. **Systems and Codes:** Types of fire protection systems and applicable codes:

a. Automatic Wet Pipe Sprinkler System - NFPA 13.

b. Automatic Dry Pipe Sprinkler System - NFPA 13.

c. Standpipe and Hose Systems - NFPA 14.

d. Water Tanks for Private Fire Protection - NFPA 22.

e. Private Fire Service Mains and Their Appurtenances - NFPA 24.

f. Halon Replacement Fire Extinguishing Systems - NFPA 12A

g. Water Spray Fixed Systems - NFPA 15.

h. Dry Chemical Fire Extinguishing Systems - NFPA 17.

i. Wet Chemical Fire Extinguishing Systems - NFPA 17A.

j. Residential Type Wet Sprinkler Systems - NFPA 13R.

2.4. When required by the building design and/or applicable codes, UM buildings shall be provided with a smoke evacuation system and/or stair pressurization systems, as required by NFPA 101 Life Safety Code.

2.5. Coordinate all system components with the UM OFM, and the University Fire Marshal.

2.6. For protection of potable water systems see Section 3 MD: Plumbing System Design of these Design Standards.

2.7. All sprinkler system designs shall be based on the UM fire protection specification. The proposed "Occupancy Classification" shall be presented for discussion with UM OFM as such buildings or building portions are designed. The engineer shall determine the appropriate occupancies, together with the architect, for the purpose of identifying proper hose stream and sprinkler system flow rates, densities and coverages. The UM Fire Marshall shall have final approval on identification of building occupancies. The engineer shall perform necessary hydraulic calculations to determine water supply pipe sizes, pressures, and pressure drops to the most hydraulically remote area. The engineer shall provide a performance-based design, including all required design and sizing criteria on the document to allow the fire protection contractor to hydraulically design the automatic sprinkler system. The intent of the A/E Design is to provide enough information on the contract document so that the contractor can accurately bid the project based on the plans and specifications. The following information shall be provided on the mechanical, plumbing or separate fire protection drawings:

a. For a combination standpipe and sprinkler system, the document shall contain:

(1) Flow test data. The A/E shall make arrangements for a flow test to be performed during the design.

(2) Sizing of fire service to building.

(3) Location of backflow preventer.

(4) Sizing of fire pump, if required.

(5) Fire pump room layout.

(6) Type of fire/jockey pump controller.

(7) Sizing of standpipe.

(8) Location of floor control valves.

(9) Pressure rating of piping and valves.

(10) Location of tamper and flow switches.

(11) Return bends required at typical drop to pendent sprinkler heads.

(12) Location of fire department connection, alarm check valve, fire pump test header, all system drains and fire department hose valves.

(13) Location of building supply mains and standpipe risers.

b. For sprinkler system only, the document shall contain:

(1) Flow test data.

(2) Sizing of fire service to building.

(3) Location of backflow preventer.

(4) Sizing of fire pump, if required.

(5) Fire pump room layout.

(6) Location, style and size of fire entrance riser.

(7) Type of fire/jockey pump controller.

(8) Pressure rating of piping and valves.

(9) Location of tamper and flow switches.

(10) Return bends required at typical drop to pendent sprinkler heads.

(11) Location of fire department connection, alarm check valve, fire pump test header, all system drains and fire department hose valves.

(12) Location of building supply mains and standpipe risers.

2.8. The engineer shall specify the following contractor requirements:

a. Contractor Responsibilities:

(1) Flow test data, independent of A/E flow test.

(2) Provide a complete and operable system in accordance with NFPA codes and local regulations.

(3) Provide working drawings in accordance with NFPA codes.

(4) Complete sprinkler piping and head layout downstream of the fire entrance riser and/or floor control devices at each floor.

(5) Coordinate routing of piping with other disciplines and building structure.

2.9. The engineer shall incorporate the UM fire protection specification into the project construction documents. This UM specification shall be edited and formatted by the engineer to suit the project requirements.

3. WATER SUPPLY REQUIREMENTS:

3.1. Types of Water Supplies: The water supply system shall provide ample water to meet the needs according to NFPA. There are two (2) types of fire protection water uses as follows:

a. Large hose streams from inside building standpipe/fire department hose connections.

b. Automatic sprinkler systems.

3.2. Fire Department Connection: Only one fire department connection shall be provided for any building that has a sprinkler system or standpipe system. In new construction, standpipe and sprinkler systems shall be interconnected so that each fire department connection will serve all fire protection needs simultaneously. Where the building faces on more than one street, additional fire department connections may be required. Coordinate with the UM Fire Marshal during design.

3.3. Deficient Water Pressure: If the available water supply lacks the required water pressure to meet the applicable codes, a fire booster pump shall be provided.

3.4. Hydrants and Mains: When necessary to provide fire hydrants, valves, or underground fire mains, the material, installation and location shall meet the requirements of NFPA No. 24, and Baltimore City Department of Public Works.

3.5. Fire and Booster Pumps: Fire pumps, booster pumps and their related electrical controllers shall meet the requirements of NFPA 20 and NFPA 70. Where fire/booster pumps are required to meet pressure requirements of the sprinkler and standpipe systems, the pump shall be sized for the sprinkler system only, unless otherwise directed by UM OFM. The engineer shall include in the fire pump design a fire pump test header to facilitate fire pump flow tests. The discharge for the test header shall be piped to discharge outside near grade.

3.6. Public Water Main Connections: Connections to public water mains shall be sized to provide the required water demand for the fire protection system. During the design process the engineer shall verify through appropriate analysis, calculations, and consultation with the appropriate Baltimore City Departments, the adequacy of the existing water supply mains to provide the necessary flow rates. See Section 3 MD: Plumbing System Design of these Design Standards for water meter requirements.

3.7. Sprinkler System Devices: Required sprinklers shall be connected to a vertical fire riser system in accordance with NFPA 13. The sprinkler system connection shall be equipped with a waterflow alarm connected to the building fire alarm system. An inspectors test shall be constructed as one self-contained unit, and valve tamper devices shall be provided. Valve tamper devices shall be connected to the trouble side of the building fire alarm system.

3.8. Fire Department Hose Connections: Provide 2 1/2 inch fire department hose connections at each floor level off the fire main riser. All 2 1/2 inch fire department fire hose connections shall be located inside fire rated stairways. If additional fire department connections are required on any floor due to the square footage or length of the floor, the connection shall be installed as required by NFPA 14. Threads shall be compatible to the Baltimore City Fire Department hose. Provide a 2 1/2 inch to 1 1/2 inch reducer with an easily removed cap on each 2 1/2 inch Fire Department hose connection. These threads shall also be compatible to the Baltimore City Fire Department hose.

4. AUTOMATIC SPRINKLER PROTECTION:

4.1. Coverage:

a. Automatic sprinkler systems shall be provided for the entire project area.

b. Automatic sprinkler systems shall be installed in accordance with NFPA 13, with modifications as required to meet the special needs of UM.

c. Wherever partial coverage sprinkler systems are required by the program scope, the sprinklered area shall be separated from the unprotected areas by fire rated construction materials.

4.2. Systems:

a. All sprinkler system installations shall be of the wet type, except:

(1) Where sprinkler protection is required in unconditioned areas, such as loading docks or attic spaces, the A/E team shall specify a dry pipe sprinkler system and all necessary components for these types of areas.

4.3. Sprinkler Heads:

a. Quick Response Heads: Quick response commercial type sprinkler heads shall be used in all new sprinkler systems.

b. High Temperature Heads: High temperature commercial type sprinkler heads shall be used in areas where sterilizers, glass washers and/or cage washers are installed.

4.4. Special Considerations:

a. In areas of the building where local control of the sprinkler system is required, provide a shut off valve with a tamper switch in the sprinkler piping serving the area. This valve and tamper switch must be accessible. Examples of areas requiring local control are:

(1) Electrical Rooms.

(2) Computer Main Frame Rooms.

(3) Library Book Stacks.

(4) Rare Book Rooms.

(5) Elevator Machine Rooms.

(6) Elevator Shafts.

b. The local control valve may be located above the ceiling or installed in a recessed wall cabinet, as directed by UM OFM and/or the University Fire Marshall. The local valve shall always be located outside of the room or area served.

5. SMOKE CONTROL SYSTEMS:

5.1. Smoke control systems shall be completely engineered systems in accordance with accepted engineering practice and in compliance with Section 7-3 of the referenced NFPA 101 Life Safety Code. Where allowable and economically feasible, these systems shall utilize the existing or new HVAC components as appropriate. Where the engineered smoke control system includes smoke evacuation or exhaust, provisions shall be made for positive introduction of outside make-up air. These systems shall not rely on window or door openings for make-up air. Approval of the design shall be subject to review and acceptance by UM OFM and the UM Fire Marshal. Provisions shall be included for initial and periodic testing and demonstration of performance of the systems, including appropriate documentation of all pertinent performance criteria.

5.2. Smoke control systems shall be activated by a flow switch in the sprinkler system.

5.3. Provide an on-off-auto switch for the smoke control system in the annunciation panel.

6. STAIR PRESSURIZATION SYSTEMS:

6.1. Stair pressurization systems shall be completely engineered systems in accordance with accepted engineering practice and in compliance with Section 5-2.3.9 of the referenced NFPA 101 Life Safety Code. These systems shall be designed to be completely independent of all other HVAC Systems. These systems shall not be provided with any heating, cooling or filtering equipment or coils. Approval of the design shall be subject to review and acceptance by UM OFM the UM Fire Marshal. Provisions shall be included for initial and periodic testing and demonstration of

performance of the system, including appropriate documentation of all pertinent performance criteria.

END OF SECTION 3 MD - PART IV
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