SECTION 13935
SPRINKLER AND STANDPIPE SYSTEMS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

B. Requirements of Section 13910, "Basic Fire Protection Methods and Materials", apply to this Section.

1.02 SUMMARY

A. This Section specifies wet-pipe sprinkler and standpipe systems. Design and install in accordance with applicable building codes, NFPA and requirements of the local fire department, the State Fire Marshall's Office and the Owner's insurance underwriter.

B. Work included:
1. Installation of all materials to be furnished under this section and without limiting the generality thereof, consists of furnishing all labor, materials, equipment , plant, transportation, rigging, staging, appurtenances, and services necessary and/or incidental to properly complete all fire protection work as shown on the Fire Protection Drawings, as described in the Specifications, or as reasonably inferred from either.
2. Modifications to the existing wet-pipe type automatic sprinkler systems to conform with new architectural plan layout.
3. Testing of the existing fire pump system.
4. Obtain permits required for all fire protection work and pay all fees and charges associated with this work.
7. Local Fire Department and State Fire Marshall approval of plans, equipment and hydraulic calculations is required, prior to installation and submittal to architect.
8. Showing all new and existing wet-pipe sprinkler and equipment on coordination drawings.

C. Related Work Specified in Other Sections:
1. Fire barrier sealers: Section 07270, "Firestopping."
2. Alarm Devices: Section 13850, "Fire Alarm Systems."
3. Access panels: Section 08310, "Access Doors."

1.03 DEFINITIONS

A. Pipe sizes used in this Section are nominal pipe size (NPS) specified in inches. Tube sizes are standard tube size specified in inches.

B. Working plans as used in this Section refer to documents (including drawings and calculations) prepared pursuant to requirements in NFPA 13 and 14 for obtaining approval of authority having jurisdiction.

C. Other definitions for fire protection systems are included in referenced NFPA standards.

1.04 SYSTEM DESCRIPTION

A. Standpipe System: Systems that are wet type have water supply valve open and pressure maintained at all times and include branches extending from standpipes to sprinkler zone valves.
   1. Class I, Standpipe System: Arrangement of piping, valves, hose connections and accessories for use by persons trained in use of heavy fire streams. Valves are 2-1/2-inch (65 mm) size.

B. Wet-Pipe Sprinkler System: System with automatic sprinklers attached to piping system containing water and connected to water supply so that water discharges immediately from sprinklers when they are opened by fire.

C. Sprinkler System Protection Limits: All spaces within the building. Include closets, toilet room areas, and electric rooms.

1.05 SYSTEM PERFORMANCE REQUIREMENTS

A. Design and obtain approval from authority having jurisdiction for fire protection systems specified.

B. Minimum Pipe Sizes: Not smaller than sizes indicated for connection to water supply piping and branches to sprinklers.

C. Water Supply Information: The following information is for bidding purposes only. The installing Contractor shall perform a hydrant flow test and obtain a copy of the latest fire pump test report to use as a basis for hydraulically designed systems.
   1. Test Date: 05/22/01
   2. Static Reading: 90 psig
   3. Residual Reading: 84 psig
   4. Flow: 1140 gpm
   5. Test Elevation: 47 ft.

D. Fire Pump Performance: The existing facility is equipped with a fire pump system. The fire pump is rated for 1250 gpm at 75 psig boost.

E. Hydraulically design sprinkler systems according to:

   1. Sprinkler System Occupancy Hazard Classifications: As follows:
      a. Storage Areas: Ordinary hazard. Group 1.
      b. Mechanical Rooms: Ordinary hazard. Group 1.
      c. Laboratory Areas: Ordinary Hazard. Group 1.
      d. All remaining wet-pipe areas: Light Hazard.

   2. Minimum Density Requirements for Automatic Sprinkler System Hydraulic Design: As follows:
      a. Light Hazard Occupancy: 0.10 GPM over 1500 sq. ft. (6.3 mL/s over 140 sq. m) area.

b. Ordinary Hazard, Group 1 Occupancy: 0.15 GPM over 1500 sq. ft. (9.5 mL/s over 140 sq. m) area.

3. Maximum Sprinkler Spacing: As follows:
   a. Light Hazard Areas: 225 sq. ft./sprinkler (21 sq. m/sprinkler).
   b. Ordinary Hazard Areas: 130 sq. ft./sprinkler (12 sq. m/sprinkler).
   c. Other Areas: According to NFPA 13.

F. A 10 PSI cushion shall be maintained between water supply pressure and sprinkler system total pressure demand.

G. Calculation and design shall be based on the Area/Density method and shall include a hose allowance of 100 GPM for light hazard and 250 GPM for ordinary hazard.

H. Maximum System Velocity: Hydraulic design shall limit velocity in all portions of the piping systems to no greater than twenty five, (25) feet per second.

1.06 SUBMITTALS

A. Submit drawings and hydraulic calculations stamped and signed by a professional fire protection engineer licensed in the State of Maine to local authorities for review and approval before submitting them to the Architect.

B. Product data for fire protection system components. Include the following:
1. Piping materials.
2. Specialty valves, accessories, and devices.
3. Sprinklers, escutcheons and guards. Include sprinkler flow characteristics, mounting, finish, and other data.

C. Licensed engineer's sprinkler system drawings specified in “Quality Assurance” Article to authority having jurisdiction. Include system hydraulic calculations where applicable.
1. Hydraulic calculations shall include allowances, 10 psi cushion, flow test data, hydraulic balance points and pipe sizing sufficient to serve and including all of the building zones.
2. Seismic bracing: Drawings shall indicate proposed locations of seismic braces, and details of braces, in accordance with NFPA requirements.

D. Test reports and certificates as described in NFPA 13, and 25. Include “Contractor's Material & Test Certificate for Aboveground Piping” and “Contractor's Material & Test Certificate for Underground Piping.”

E. Closeout Submittals:
1. Record Drawings for installed sprinkler system.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.

B. Listing/Approval Stamp, Label, or Other Marking: On equipment, specialties, and accessories made to specified standards.

C. Listing and Labeling: Equipment, specialties, and accessories that are listed and labeled. The Terms “Listed” and “Labeled”: As defined in “National Electrical Code,” Article 100.

D. Comply with requirements of authority having jurisdiction for submittals, approvals, materials, hose threads, installation, inspections, and testing.

E. Comply with requirements of Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.

F. Licensed Engineer: Submit design drawings, design calculations, and installation inspection reports. Include seal and signature of registered engineer licensed in jurisdiction where Project is located, certifying compliance with specifications.

G. Installer's Qualifications: Firms qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. A qualified firm is one that is experienced (minimum of 5 previous projects similar in size and scope to this Project) in such work, familiar with precautions required, and in compliance with the requirements of the authority having jurisdiction. Submit evidence of qualifications to the Architect upon request. Refer to Division 1 Section “Reference Standards and Definitions” for definition of “Installer.”

H. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the most recent editions of the following:
   1. NFPA 13, “Standard for the Installation of Sprinkler Systems."
   2. NFPA 14, “Standard for the Installation of Standpipe and Hose Systems.”
   3. NFPA 20, "Standard for Centrifugal Fire Pumps."
   4. NFPA 24, "Private Fire Service Mains and Their Appurtenances."
   5. NFPA 25, “Inspection, Testing and Maintenance of Water Based Fire Protection Systems."
   6. NFPA 26, “Recommended Practice for the Supervision of Valves Controlling Water Supplies for Fire Protection."
   7. NFPA 70, “National Electrical Code”.

I. Comply with USM IDAT per section 01810.

1.08 GUARANTEE

A. All work executed under this section shall be guaranteed for one year as stated under General Conditions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers: Subject to compliance with requirements, provide products by one of the following.
   1. Viking Corp.

2. Victualic Company of America.
3. Central Sprinkler Corp.

B. Grooved Couplings for Steel Piping: Subject to compliance with requirements, provide products by one of the following.
1. Victaulic Company of America.
2. Stockham Valves and Fittings, Inc.
3. Grinnell Supply Sales Co., Grinnell Corp.

C. Sprinkler Guards: Subject to compliance with requirements, provide products by one of the following.
1. Viking Corp.
2. Victaulic Company of America
3. Central Sprinkler Corp.

2.02 PIPING

A. Refer to Part 3 Article “Piping Applications” for identification of systems where pipe and fitting materials specified below are used.

B. Steel Pipe: ASTM A 53, Schedule 40 in sizes 2 inch and smaller and Schedule 10 in sizes 2-1/2 inches and larger, black and galvanized. Threaded ends, butt for welded, and cut-groove joints for schedule 40. Rolled-groove ends for schedule 10.

2.03 FITTINGS

A. Cast-Iron Threaded Fittings: ASME B16.4, Class 250, standard pattern, with threads according to ASME B1.20.1.

B. Malleable-Iron Threaded Fittings: ASME B16.3, Class 300, standard pattern, with threads according to ASME B1.20.1.

C. Steel Fittings: ASTM A 234/A 234M, seamless or welded; ASME B16.9, buttwelding; or ASME B16.11, socket-welding type for welded joints.

D. Steel Flanges and Flanged Fittings: ASME B16.5.

E. Grooved-End Fittings for Steel Pipe: UL-listed and FM-approved, ASTM A 536, Grade 65-45-12 ductile iron or ASTM A 47 Grade 32510 malleable iron, with grooves or shoulders designed to accept grooved couplings, Victaulic "Style 77," (Standard Flexible Coupling) or equal.

2.04 SPRINKLERS

A. Automatic Sprinklers: With heat-responsive element conforming to UL 199.

B. Sprinkler types and categories are as indicated and as required by application. Furnish automatic sprinklers with nominal 1/2-inch (12.7 mm) orifice for “Ordinary” temperature classification rating except where otherwise indicated and required by application.
1. Sprinklers shall be UL listed and FM approved.
2. Sprinklers which employ O-ring seals are not allowed.

a. Exception: Dry barrel heads.

C. Sprinkler types, features, and options include:
1. General: Sprinkler heads listed herein are as manufactured by Viking. Heads to be 1/2-inch nominal orifice. Temperature ratings to be 155°F or 165°F unless Intermediate temperature rating are required by Part 3, (212°F).
2. Upright: "Micromatic" or "Microfast" Model M, rough bronze finish.
3. Concealed Pendent: "Horizon Mirage" or "Horizon Mirage Quick Response" Model M, white cover plate.
4. Recessed Pendent: "Micromatic" or "Microfast" Model M, white finish and recessed white escutcheon.
5. Sidewall: "Micromatic" or "Microfast" Model M, rough bronze finish.
6. Pendent: "Micromatic" or "Microfast" Model M, rough bronze finish.
7. Recessed Dry Sidewall: "Micromatic" or "Microfast" Model M, white finish and recessed white escutcheon, 24-inch minimum barrel length.
8. Wax Coated Head: Upright and pendent, with factory applied coating of bee's wax.

D. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

E. Sprinkler Cabinets: Finished steel cabinet and hinged cover, with space for minimum of 6 spare sprinklers plus sprinkler wrench, suitable for wall mounting. Include number of sprinklers required by NFPA 13 and 1 wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each style sprinkler on Project.

PART 3 - EXECUTION

3.01 PIPING APPLICATIONS

A. Use pipe, fittings, and joining methods according to the following applications. Piping may be joined with flanges instead of indicated joints. Use grooved-end fittings with grooved couplings that are made by the same manufacturer and that comply with listing when used together for grooved-coupling joints.

B. Above ground, Sizes 2 Inches and Smaller: ASTM A 53, A 135; Schedule 40 steel pipe with threaded ends, cast-iron or malleable-iron threaded fittings, and threaded joints.

C. Above ground, Sizes 2.5 Inches (65 mm) to 6 Inches (150 mm): ASTM A 135 or A 795, Schedule 10 steel pipe with rolled-groove ends, grooved-end steel pipe fittings, and grooved-coupling joints.

3.02 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: Use gate or butterfly valves.
2. Line Drain: Use gate valves for drain only.
3. Inspector’s Test: Use specialty test, or drain and test valves.

3.03 JOINT CONSTRUCTION

A. Grooved-End Pipe and Grooved-End Fitting Joints: Use grooved-end fittings and grooved couplings that are made by the same manufacturer and that are listed for use together. Groove pipe and assemble joints with grooved coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
   1. Groove Type: Rolled.

B. Dissimilar Materials Piping Joints: Make joints using adapters compatible with both piping materials.

3.04 PIPING INSTALLATION

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
   1. Deviations from approved “working plans” for sprinkler piping require written approval from authority with jurisdiction. File written approval with the Architect prior to deviating from approved “working plans.”

B. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

C. Install unions adjacent to each valve in pipes 2 inches (50 mm) and smaller. Unions are not required on flanged devices or in piping installations using grooved couplings.

D. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2-inch (65 mm) and larger connections.

E. Install “Inspector's Test Connections” in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.

F. Hangers and Supports: Install hangers and supports per section 13910 requirements.

G. Seismic Bracing: Install seismic bracing per section 13910 requirements.

3.05 SPRINKLER INSTALLATION

A. Install sprinklers in general patterns indicated on Architects Reflected Ceiling Drawings. Coordinate with Architect/Owner for exact type of sprinkler required in various areas and rooms if discrepancy above.
   1. Where only partial ceilings are installed, provide full upright coverage above the ceilings, and obstruction coverage at the ceiling level. Provide coverage above and below ceilings in areas which contain timber or other combustible construction.

B. Locate sprinklers in strict accordance with NFPA 13. Locate sprinklers centered in ceiling tiles. In no instance shall a head be located closer than 6-inches from the edge of any ceiling tile or panel.

C. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers supplied from heated space.

D. Sprinkler Applications: Use standard response heads in Ordinary Hazard areas. Use quick response heads in Light Hazard areas.
   1. Hard, (gypsum) ceilings: concealed heads.
   2. Suspended ceilings: recessed heads.
   3. No ceilings, general: upright heads.
   4. Near heat producing equipment and in elevator machine rooms: 212°F heads.
   5. Elevator pits: sidewall heads.
   6. Chemical storage areas: wax coated heads or corrosion resistant construction.

3.07 CONNECTIONS

A. Connect to specialty valves, specialties, fire department connections, and accessories.

B. Connect to, and extend from existing sprinkler/standpipe systems.

C. Electrical Connections: Power wiring is specified in Division 16.

3.08 FIELD QUALITY CONTROL

A. In presence of the Architect's Representative and local fire department, perform field acceptance tests of each fire protection system.
   1. Flush, test, and inspect sprinkler piping systems according to NFPA 13 Chapter "System Acceptance."

B. Replace piping system components that do not pass test procedures specified, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
   1. Report test results promptly and in writing to Architect, Owner, and Owner's insurance company.

C. Test the existing fire pump assembly once electrical work is complete. Submit test report in accordance with NFPA 20.

3.09 CLEANING

A. Clean dirt and debris from sprinklers. Replace sprinklers having paint other than factory finish with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.

3.10 START-UP

A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturer, proceed as follows:
   1. Verify that all existing specialty valves, trim, fittings, controls, and accessories have been installed correctly and operate correctly.
   2. Verify that specified tests of piping are complete.
   3. Check that damaged sprinklers and sprinklers with paint or coating not specified have been replaced with new, correct type of sprinklers.
   4. Check that sprinklers are correct type, have correct finish and temperature ratings, and have guards where required for applications.
   5. Fill wet-pipe sprinkler systems with water.
   6. Energize circuits to electrical equipment and devices, including fire pump.

7. Adjust operating controls and pressure settings.

B. Coordinate with fire alarm system tests. Operate systems as required.

3.11 DEMONSTRATION

A. Instruct such persons as Owner designates in proper operation and maintenance of the systems and their components. Submit to the Architect a letter naming the person or persons so instructed and the dates of such instruction. Insert a copy of this letter in the maintenance data bank.

B. Schedule demonstration with at least 7 days' advance notice.

END OF SECTION 13935