SECTION 210000 - FIRE PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Under this Division, the contractor shall furnish all labor, equipment and materials to perform all operations in connection with the design and installation of a complete and tested automatic wet standpipe system, automatic wet pipe fire sprinkler system as described in the Contract Documents. System shall start at flange fitting provided inside of building provided by underground contractor. Fire main up to flange fitting inside of building is provided under Division 02 work. System shall start at connection to utility main and extend throughout the building.

1.2 RELATED WORK IN OTHER SECTIONS

A. Related Requirements:

1. Section 220000 Plumbing Specialties
2. Section 230000 Mechanical General Provisions
3. Section 260000 Electrical Specialties

1.3 QUALITY ASSURANCE

A. Qualifications of Fabricators and Installers.

1. For actual fabrication and installation of sprinkler systems, use only personnel who are thoroughly trained and experienced with the products involved, and in the recommended methods of their installation.
2. Installing contractor shall have a California C-16 license and shall be experienced in design and installation of systems in projects of similar size and scope.

1.4 REFERENCES

A. In addition to complying with all pertinent standards, codes and regulations, comply with all requirements of :

1. The Office of the State Fire Marshal
2. NFPA 13, 14, 20, 24, 25, and 72 (as adopted or most recent editions).
3. Underwriters Laboratories (UL) and FM Global (FM) rating requirements for products.

1.5 SUBMITTALS

A. Shop Drawings : Fire Sprinkler Shop Drawings are part of the Base Building Design package.

B. Product Data : Provide data on sprinkler heads, valves, piping and specialties, including manufacturer's catalog information..

C. Contractor's Material and Test Certificate: Certify that the system has been tested and meets or exceeds code requirements. See NFPA 13 Figure 25.1

D. Maintenance Manual : Submit operations and maintenance manual per requirements of general contract fully describing maintenance schedules, replacement parts and other operation requirements.

E. Guarantee : Provide a one-year (12 months) guarantee under provisions of Division 01. The guarantee shall include parts, shipping, labor, travel costs, living expenses, required fees, and any other associated cost or expense to repair or replace products or systems. The guarantee period is to begin on the date of acceptance of the fire protection installation by the Owner.

1.6 COORDINATION

A. Coordinate work with that specified in other sections before the start of installation. Any installation found to be in conflict with such work as a result of neglected coordination shall be removed and reinstalled in new location designated by the Architect at no additional expense to the Owner.

B. Contractor shall contact the Architect and obtain necessary information to design fire sprinkler / standpipe system to fit into allotted spaces without interfering with work by other trades.

C. Coordinate with Plumbing section for size and location of drain receptors, where required or shown for draining and testing fire sprinkler risers and systems. All drain piping shall discharge into the receptors and not through walls or curbs, unless noted otherwise.

PART 2 - DESIGN AND MATERIALS

2.1 GENERAL DESIGN CRITERIA

A. Class 1 Standpipes: hydraulically design to provide a minimum residual pressure of 100 psi at the hydraulically most remote 2½" hose connection. Provide a minimum flow of 500 gpm through the two most remote 2 ½" hose connections. The minimum flow rate of each additional hose connection shall be 250 gpm. The maximum flow rate shall be 1000 gpm for sprinklered buildings.

B. Total Combined Inside & Outside Hose Allowances: Hydraulic calculations shall include an allowance for hose streams, added at the point of connection to the water supply.
1. Light hazard: 100 GPM Total combined
2. Ordinary hazard: 250 GPM total combined

C. Light Hazard Areas: Water density of 0.10 GPM per square foot calculated for an area of 1500 square feet in the most remote location.

D. Ordinary Group I Hazard Areas: Water density of 0.15 GPM per square foot calculated for an area of 1500 square feet in the most remote locations.

E. Head spacing shall not exceed the limits described in NFPA Pamphlet No. 13.
1. Light Hazard: 225 sq.ft. (for smooth ceiling).
2. Ordinary Hazard: 130 sq. ft.
3. Extra Hazard: 100 sq. ft.

F. Maximum floor areas protected by any one sprinkler system riser:
1. Light Hazard: 52,000 sq.ft.
2. Ordinary Hazard: 52,000 sq.ft.
3. Extra Hazard: 40,000 sq. ft.

G. Flow Data: Contractor is to verify flow data (static pressure, residual pressure and GPM flowing) available at site and provide design for available pressure and flow. Safety Factor: 10 percent reduction of static and residual pressure.

2.2 MATERIALS AND PRODUCTS - GENERAL

A. All materials installed shall be UL listed or FM approved for fire protection use by the referenced authorities, codes and standards. All materials shall be new and without field modifications.

2.3 SPRINKLERS

A. General : All sprinklers shall be of similar make and appearance and shall have the same bulb or link and finish except where otherwise required by exposure to heat sources, freezing temperatures, corrosive environment, etc.

B. Interior Finished Ceilings and Exterior Soffits :

1. Provide semi-recessed quick response pendent or horizontal sidewall, bulb or fusible link type with chrome finish and matching sprinkler escutcheon.
2. Corrosion-resistant finish shall be installed at exterior areas, with matching escutcheon. Color and finish of all corrosion-resistant sprinklers shall be UL/FM approved and coordinated with Architect.

C. Concealed Areas, Unfinished Ceilings and Service Areas :

1. Provide standard spray upright or pendent with rough brass finish.

2. Where required, escutcheons shall be two piece, style # 401 with chrome finish at mechanical, electrical and storage room ceilings.

D. Temperature Ratings and Response Type :

1. Sprinklers below finished ceilings, and in all other occupied areas shall have a temperature rating of Ordinary (155 – 165 degrees F), except as noted below.
2. Sprinklers in unventilated spaces shall have a temperature rating of Intermediate (200 – 212 degrees F), unless otherwise required by code.

3. Sprinklers within the zone of influence of space heaters or other heat-producing equipment shall have a temperature rating of High (250-300 degree F), unless otherwise required by code.
4. All sprinklers shall be listed as quick response type unless otherwise specified.

2.4 HANGERS AND SUPPORTS

A. General

1. Provide hangers approved by UL/FM and NFPA 13 for fire protection systems. Shop fabricated supports shall be designed to meet requirements of NFPA 13, and must be certified by a registered professional engineer.

2. Provide earthquake bracing in accordance with UL/FM, NFPA 13 and ASCE 7. Locations of all bracing shall be clearly shown on shop drawings. All bracing shall be assembled, calculated and installed per NFPA 13, Section 9.3.5. All calculations shall be shown on shop drawings.

3. Size all anchors and fasteners per NFPA 13. All fasteners and/or anchors proposed for use in concrete construction shall be specifically listed and approved in seismic zones. Powder-driven studs shall not be used.

2.5 INTERIOR SPRINKLER PIPE AND FITTINGS

A. General

1. All pipe and fittings shall be new, acceptable to authorities having jurisdiction, per all applicable standards and codes, and free from damage and distortion.

B. Product Characteristics

1. Black steel, Schedule 40, ASTM A-135/795, for all piping, with threaded joints and fittings.

2. Black steel, Schedule 10, ASTM A-135/795, for all piping, with non-threaded joints and fittings.

3. Threaded fittings shall be of cast or malleable iron, Class 125 or 150, conforming to ANSI B16.3 and ANSI B16.4.

4. Flanged fittings shall be provided where required. Flanges shall be of cast iron, Class 125, conforming to ANSI B16.1.

5. Welded fittings shall be of wrought steel, conforming to ANSI B16.9.

6. One piece reducing fittings shall be used wherever a change is made in pipe size. Bushings shall not be used.

7. Grooved thin wall steel pipe connections shall be made using a UL/FM approved ductile iron coupling, with rubber gasket. Installation shall be per manufacturer’s instructions.

8. All piping shall be joined with welded, threaded or grooved fittings. Fittings for hole cut connections (mechanical tee's) are not acceptable.

2.6 ACCESSORY CABINET

A. Provide metal fire sprinkler cabinet for reserve supply of sprinkler heads, as required by NFPA. Include one suitable head wrench for each type of sprinkler installed. Stock shall include all types and temperature ratings installed. Locate as directed by Architect.

2.7 SIGNS

A. Provide metal signs, permanently marked to show function, for all valves, controls and related assemblies. Locate as required by codes and authorities having jurisdiction. Where signs are necessary to identify valves or assemblies in hidden or void spaces, locate as directed by Architect.

2.8 PROTECTION OF SPRINKLERS

A. Provide UL/FM listed steel guards for fire sprinkler heads located in areas susceptible to mechanical damage.

2.9 ESCUTCHEON PLATES

A. Provide chrome – plated escutcheons where piping penetrations are made through finished walls and ceilings. Plates shall be painted to resist corrosion when exterior installation is required.

2.10 LOCAL ALARM COMPONENTS

A. Exterior Alarm Bell

1. Furnish 10" inch diameter, UL/FM approved bell with identification sign, rated 120VAC, with standard mounting hardware.

2. Locate bell assembly where required by authorities having jurisdiction, and as acceptable to Architect.

B. Water Flow Switch

1. Provide UL/FM approved, 120VAC with two sets of Form C, single pole, double throw contacts, and adjustable retard feature.

2.11 CENTRAL STATION SUPERVISION

A. General

1. Furnish supervision at all valves controlling fire protection water supplies,.

2.12 FIRE DEPARTMENT CONNECTION

A. Provide single clapper, 4” x 2 ½” two-way, Siamese fire department connection. Finish and model shall be as required by serving fire department. Provide check valve per NFPA 13.

2.13 VALVE COMPONENTS

A. Control Valve

1. Grooved butterfly valve with tamper switch, ductile iron body, 200 PSI WOG min.

B. Interior Drain / Test Valves:

1. Provide brass, rubber disc, angle or globe pattern, with screwed ends, rated 200 psi WOG.

PART 3 - EXECUTION

3.1 JOB SITE CONDITIONS

A. Inspection

1. Prior to all work of this section carefully inspect the installed work of other sections, and verify that all such work is complete to the point where this portion of the work may properly commence in accordance with all submittals, designs and applicable codes.

B. Discrepancies

1. In the event of a discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies and/or omissions have been fully reviewed and clarified.

3.2 FABRICATION

A. General

1. All pipe, fittings and materials shall be prepared by qualified personnel, trained and experienced with the products involved, and the recommended methods of preparation.

2. All pipe cuts, threads, and grooves shall be made according to applicable codes, standards and accepted good practices.

3. Pipe shall be free of damage, flaws and burrs. Threads and grooves shall not be excessively shallow or deep.

4. Fittings shall be made onto the pipe no tighter than necessary. Cracked or broken fittings shall be replaced, without exception.

5. Excessive pipe dope and oils shall be removed before shipment to job site.

B. Welding

1. Welding methods shall comply with NFPA 13 and AWS B2.1. Contractor shall be responsible for all welded joints and any qualifying procedures for welders and related personnel.

2. Holes in pipe for outlets shall be cut to full inside diameter of fitting, prior to welding in place. Holes shall be free of slag and welding residue, and of smooth continuous bore. Fittings shall not penetrate internal diameter of run piping. Holes shall be cut by hole-saw or other rotary bit. Torch-cutting of holes is strictly prohibited.

3. All welded pipe shall be subject to inspection by serving Fire Department before it is installed. Provide documentation of acceptance, as required, at the time of project closeout.

3.3 INSTALLATION

A. General

1. All installation shall be per referenced standards. Follow manufactures directions and recommendations in all cases as required for all approvals and warranty enforcement.

2. All cutting of structure shall be subject to approval by the Architect. Beams, decks and other structural components shall not be cut or altered in any way unless previously approved.

3. Provide flexible couplings where required to provide expansion capability, and for earthquake protection per NFPA 13. Provide sway bracing as required by coupling locations.

4. Entire sprinkler / standpipe system shall be installed in such a manner so that it can be drained in accordance with NFPA 13. Drains shall be located at suitable points as approved by Architect. No primary or auxiliary drain shall be located in any public area or electrical room. All drains shall discharge into dedicated receptors.

5. No work shall be covered or enclosed until inspection, tested, and approved by Architect and / or authority having jurisdiction. Should any work be concealed before inspection, the Contractor shall at Contractor's expense, uncover such work and after it has been inspected, tested and approved, provide for all repairs as may be necessary to restore work to original and proper condition.

6. Sprinklers at finished ceilings and in exposed locations shall form a symmetrical pattern and shall be located at the exact center of 2' ft. square ceiling tiles and " Second Look " tile modules. Where 2' x 4' ceilings occur, pendent sprinklers shall be centered in the 2' ft. direction with escutcheons to be at least 12" inches clear of ceiling T-bar grid.

7. Sprinkler layout shall accommodate lighting and HVAC register locations. Coordination with the work of these sections is the responsibility of Contractor.

8. Without exception, no piping shall be installed under or through any skylight or skylight well. Any additional upright or pendent fire sprinklers, which may be required by skylight locations, shall be the responsibility of this contractor.

9. All penetrations of wall and floor assemblies shall be suitably sleeved, patched and / or sealed in order to preserve fire rating, where applicable.

10. Location of control valves, fire department connection, and inspectors test shall be as required by authorities having jurisdiction, and as approved by Architect.

11. Local alarm bell shall be located so that it can be easily heard and seen by passersby and fire department personnel. Locate on exterior wall, 10' ft. above finished grade, as approved by Architect.

3.4 FIELD QUALITY CONTROL

A. Testing

1. At various stages and upon completion, the system shall be tested in the presence of the State Fire Marshal.

2. Perform all tests as required by NFPA 13, and all authorities having jurisdiction. Maintain an accurate record of all tests and inspections on the job site, including date of test and inspecting agency.

3. Prior to connection of interior piping system to underground main, underground piping shall be hydrostatically pressure tested, flushed and accepted by authorities having jurisdiction. Provide documentation of acceptance by jurisdictional authorities. All required health and bacterial tests shall be the responsibility of Contractor if applicable.

3.5 COMPLETION

A. Closeout

1. Upon completion and approval of systems, and prior to occupancy, provide instructions to the Owner, or Owners representatives, in all details of system operation and maintenance. Prepare and submit Maintenance and Operation Manual per contract requirements.

2. Provide three copies of final inspection and certification as prescribed by Owners Insurance underwriter, and other authorities having jurisdiction.

3. Provide three copies of system " As-Built " drawings to the Owner or Owners representatives. Drawings shall show actual installation details including all piping and equipment locations, rooms or facilities modifications, etc.. One copy of drawing shall be on reproducible type media.

4. Provide two copies of guarantee / warranty per contract documents.

B. Clean Up

1. Equipment, appurtenances, fixtures and exposed piping shall be clean, and all excess pipe dope and cutting oil shall be removed. Fire sprinkler heads shall be cleaned without the use of any solvents.

2. Upon completion of work, remove all surplus material, debris and equipment associated with or used in the execution of this work. Sweep work and storage areas, as required, to remove metal shavings and oily residue.

END OF SECTION 210000