SECTION 15300
FIRE PROTECTION

PART 1 GENERAL

1.1 APPLICABLE REQUIREMENTS

A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 1 - General Requirements, Section 15050 - Basic Materials and Methods.

1.2 DEFINITIONS

A. Pipe sizes used in this Section are nominal pipe size (NPS) 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 for obtaining approval of authority having jurisdiction.

C. NICET - National Institute For Certification In Engineering Technologies

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

1.3 DESCRIPTION OF WORK

A. The work includes designing new and installing a complete and fully operable automatic sprinkler system in each building as described in this Section of the Specification and as shown on the contract construction drawings and shall be in accordance with rules, regulations and standards as required by the following authorities having jurisdiction.

1. State of California.

2. City of Perris, CA.

3. Building Department.

4. Fire Prevention Division, Fire Marshal's Office.

B. Work to be in accordance with criteria of the following design and installation standards:

1. National Fire Protection Association.
   a. No. 13 - Sprinkler Systems **2006** for California
   b. No. 70 - National Electrical Code.
   c. No. 101-Life Safety Code.

2. Uniform Fire Code (UFC), with latest amendments.

3. Uniform Building Code (UBC), 2007 Edition with State of California with state amendments.

4. Factory Mutual Approval Guide (Product listing, only).

5. Underwriters Laboratories, Inc.

6. Owner's insurance agency.

C. Work includes but is not limited to the following:

1. Automatic Wet Type Sprinkler System.

2. All cutting and patching.

3. Provide all pipe, fittings, sprinklers, valves, signs, flow switches, tamper switches, protective painting, test connections, drains and tests necessary to make the entire system complete and operative.

4. Coordinate with plumbing contractor for capacity of all sprinkler main, test, and auxiliary drain connections.

5. Valve tags and instruction plates shall be mounted and/or hung per local fire department requirements.

6. All required fire extinguishers.

7. All sleeves and inserts.

8. All trenching and backfilling, including culverts under rails and guard posts where required.

1.4 SUBMITTALS

A. Product Data: Submit six copies of manufacturer's technical data and installation instructions for fire protection materials and products.

1. Thirty days after the awarding of contract, contractor shall submit list of manufacturer's names and model numbers for review and comment to architect. This list shall identify any prior approved substituted items contractor wishes to use. Do not submit technical data until list has been approved. This is mandatory.

2. Prior to construction submit for approval items including but not be limited to the following:
   a. Coordinated layout drawings. Lettering shall be minimum 1/8" high.
   b. Sprinklers and escutcheons - designating area of use.
   c. Valves, valve boxes, flow switches, and tamper switches.
   d. Provide California State Fire Marshal approval numbers for flow switches and tamper switches.
   e. Pipe, fittings, sway bracing, inserts, anchors and hangers.
   f. Inspector's test and drain station.
   g. Fire department connections.

B. Working Plans: Prepare scaled working plans for fire protection pipe and fittings including, but not necessarily limited to, pipe and tube sizes, locations, and elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Indicate interface between and spatial relationship to piping and adjacent equipment. See Section 15050, "Coordination Documents", for further information. Lettering shall be minimum 1/8" high. All design work shall be done under supervision of licensed engineer.

1. Spacing of fire sprinklers shall be coordinated with lights, air conditioning outlets, sound speakers, architectural reflected ceiling plan; obstruction from light fixtures and other architectural features; and sprinkler piping shall be coordinated with HVAC ductwork & piping, plumbing, electrical conduit, cable trays and structure prior to the installation. Drawings shall be composite type including mechanical, plumbing and lighting equipment with sprinkler and sprinkler drain piping.

C. Submittal Drawings: Submit shop drawings to Agency having jurisdiction for approval bearing engineer of record stamp bearing preparer's NICET stamp. Submit six approved copies, bearing stamp and/or signature of authority having jurisdiction to the Engineer for review and comment.

1. Contractor shall submit sprinkler head locations to architect for approval.

2. Each calculation shall include legible schematic of system showing all hydraulic reference points.

D. Hydraulic Calculations: Prepare hydraulic calculations of fire protection systems. Submit to authority having jurisdiction for approval. Submit six approved copies, bearing stamp, and/or signature of Agency having jurisdiction to Owner's representative for review and comment.

1. Contractor shall submit published piping friction loss data from manufacturer with hydraulic calculations.

E. Certificate of Installation: Submit certificate upon completion of fire protection piping work, which indicates that work has been tested in accordance with NFPA 13, and also that system is operational, complete, and has no defects.

F. Maintenance Data: Submit maintenance data and parts lists for fire protection materials and products. Include this data, product data, shop drawings, approval drawings, approval calculation, certificate of installation, and record drawings in maintenance manual; in accordance with requirements of the General Conditions and of Div. 1, Section 01700.

G. Operating and Maintenance Instructions: Provide the Owner with three sets of operating and maintenance instructions covering completely the operation and maintenance of sprinkler equipment and controls. Manual shall be assembled in a 3-ring binder and arranged in following sections:

1. Site Utilities: Drawings showing location, size, depth of all connections, valve boxes, manholes, etc., as installed.

2. Section No. 1: A chart tabulating all types of pipefittings, valves, and piping specialties installed in each system.

3. Section No. 2: A chart tabulating all pressures, valve settings for fire department and sprinkler pressure reducing valves as required by S.F.F.D. Provide pressure reducing valve flow test documentation.

4. Section No. 3: Manufacturer's brochures of all sprinkler heads.

5. Section No. 4: Manufacturer's brochures of fire pumps, jockey pump and controllers.

6. Section No. 5: Tamper switches and flow switches.

7. Section No. 6: Fire Department connections.

8. Section No. 7: Fire Extinguishers.

9. Section No. 9: Reproducible copies of approved working drawings prepared to facilitate the actual installation of ductwork and piping. Drawings shall indicate location of all concealed valves, and other apparatus.

10. Section No. 10: 2 copies of NFPA 25 "Standard for Inspection, Testing and Maintenance of Water Based Fire Protection Systems."

11. Section No. 11: Approval Calculations.

12. Section No. 12: Certificate of Installation.

13. Section No. 13: Guarantees.

14. The Contractor is responsible for proper instruction of Owner's personnel for operation and maintenance of all material, equipment and apparatus provided.

1.5 DESIGN DESCRIPTION

A. This section of the specification combined with any of the contract drawings are intended as a guide to establish a basis of design for the systems required.

B. Contractor shall examine the Architectural, Interior Design, Structural, Plumbing, Mechanical and Electrical drawings, layout and install a completely hydraulically sized sprinkler system for all areas. Space shall be provided for any valving and equipment to be used.

1. System shall start 5'-0" from perimeter wall and extend throughout the building. Fire main beyond 5'-0" perimeter is provided under Division 2 work.

2. Contractor shall contact Owner's insurance agency to incorporate insurer's design requirements in this layout document.

C. The Stadium Club building shall be served with a wet type sprinkler system. A main riser shall be located in the Mechanical Room. See drawings for exact location.

D. All areas shall be sprinklered as the construction progresses, including accessible pipe chases, etc.

E. Pressure restricting devices shall be installed on any branch outlet exceeding 100 PSI.

F. All electrical devices used for this system shall be compatible with the fire alarm system, refer to Division 16.

G. Seismic Requirement: All automatic sprinkler systems to be seismically braced for CA and NFPA 13. Submit shop drawings on methods and materials.

1. Do not use NFPA Earthquake Zone Chart.

1.6 HYDRAULIC DESIGN

A. System shall be a straight line or gridded system per NFPA No. 13 with the following exceptions:

1. For all systems the design area shall be the hydraulically most demanding rectangular area.

2. Minimum pressure for any sprinkler head shall not be less than 7 psi.

B. Safety Factor: 10 Psi, or 10 percent of static and residual pressure, whichever is greater.

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. Ordinary Group II Hazard Areas: Water density of 0.20 GPM per square foot calculated for an area of 1500 square feet in the most remote locations.

F. Extra Group I Hazard Areas: Water density of 0.30 GPM per square foot calculated for an area of 2500 square feet in the most remote locations.

G. 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.

H. 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.

I. 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.

1.7 RELATED WORK SPECIFIED ELSEWHERE

A. Section 15050: Basic Materials and Methods

B. Division 16: Electrical. Coordinate for electrical wiring of detectors, flow alarm switches, tamper switches and fire alarm bell connection by life safety section for remote monitoring. All electrical devices used for this system shall be compatible with the fire alarm system. Coordinate with electrical for electric fire pump motor size and emergency generator sizing.

C. Division 9: Painting

D. Division 2 - Site Work. Coordinate with General Contractor for excavation for the underground water supply system.

E. Coordination with Architectural for fire protection water supply tank.

F. Coordination with Mechanical for diesel exhaust.

G. Coordination with Mechanical for fuel oil day tank piping.

H. Coordination with Plumbing for drain.

1.8 QUALITY ASSURANCE

A. The Contractor for the fire protection installation shall be duly qualified Fire Protection Contractor, experienced and regularly engaged in the installation of fire protection systems with a license

classification of C-16. Where local authorities require additional licensing of the Fire Protection Contractor, and/or workmen, such a license shall be mandatory for a prospective Contractor.

1. Contractor is to verify flow data (static pressure, residual pressure and GPM flowing) available at site and provide design for available pressure and flow.

2. The Fire Protection contractor shall be the Engineer of Record for the automatic sprinkler system.

3. Permits - The Fire Protection Contractor shall obtain permits for the installation or construction as required for approval and installation of the fire protection system. The Fire Protection Contractor shall submit working plans to the authorities having jurisdiction to obtain approval.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 1. Handle components carefully to prevent damage, denting, and scoring. Do not install damaged components. Damaged components shall be replaced with new components.

B. Store/protect products under provisions of Division 1. Store components in clean, dry place. Protect from weather, dirt, water, construction debris, and physical damage.

1.10 GUARANTEE

A. Provide a one-year (12 months) guarantee under provisions of Division 1. 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.

PART 2 PRODUCTS

2.1 GENERAL

A. All products to be commercial grade, new and of the manufacturer's latest design model. Products manufacturers outside of North America will not be accepted without written approval from engineer prior to submission of bid.

B. All products to be UL listed and/or FM approved, except for items, which are not required to be listed by code.

C. All products shall be delivered and stored in original containers. Containers shall be clearly marked or stamped with manufacturer's name and rating.

D. The following items to be included but specified under Section 15050: Basic Materials and Methods.

1. Hangers and supports.

2. Escutcheons plates, flashings and sleeves.

3. Access panel and doors.

4. Identification markers and signs.

5. Expansion compensators and flexible connectors.

6. Anchors, and seismic restraints.

7. Excavation and backfill.

2.2 PIPE AND FITTINGS - ABOVE GROUND

A. General: The piping products listed below by manufacturer's name and model numbers are the only acceptable materials listed for this project. Substitutions of pipe must be submitted and approved in writing by the architect prior to bid. No copper pipe shall be allowed in the wet fire sprinkler system.

B. Piping or fittings that show substantial rust or breaks in coating will be removed and replaced.

C. Allied Tube & Conduit: Schedule 40 black steel, ASTM A-135 stamped on pipe, UV cured acrylic finish; Stockham, Grinnell or Warwick Class 150 threaded malleable, ASTM A197, ASTM A126, or Victaulic roll-grooved fittings and couplings, only.

D. Shop-weld thread-o-lets may be used in lieu of tee fittings, but field (site) welding will not be permitted.

E. Mechanical Couplings: Victaulic grooved couplings style 07, 75 or 77, or equal by Gruvlok.

F. Mechanical Tees: Victaulic style 920, Gruvlok. U-bolt mechanical tees are not acceptable.

G. Flexible sprinkler connector for ductwork sprinkler application: Flexhead or equal Factory Mutual approved system.

H. Use rigid couplings where flexibility is not required or provide necessary sway bracing.

I. Prohibited Piping and Fittings: Copper pipe, CPVC pipe, pipe less than schedule 40 for threaded or less than schedule 10 for roll grooving; Super 40 "Dyna-Flow", "Dyna-Thread", "Fireflow", XL, Thinwall, "Eddylite" by Bullmoose and Threadable Lightwall pipe are not allowed. POZ-LOK, U-bolt Victaulic style 921 mechanical tees, Victaulic style 99 Roust-A-Bout, Victaulic style 90 Plainlock, Hooker style fitting, quick disconnect, boltless, snap-joint, field drilling or welding of any main or branch lines, and any device specifically prohibited by the local authority having jurisdiction is not allowed. No unions shall be permitted for any size pipe. Plain end fittings are not allowed.

2.3 PIPE AND FITTINGS - UNDERGROUND

A. Class 52 ductile iron pipe and fittings, white, cement lined, mechanical or Tyton joint fittings. Piping to be factory encased with 8 mil polyethylene tube or sheet. Fittings to be double field wrapped with 2" wide, 20 mil vinyl tape, 50% overlap.

B. Manufacturer: United States Pipe and Foundry, Griffin or Pacific States, only.

C. Polyvinyl Chloride (PVC) Plastic Pipe:

1. Pipe and fittings: Pipe shall conform to AWWA C900 and shall be plain end or gasket bell-end, pressure Class 150 with cast-iron-pipe-equivalent OD. Fittings shall be gray-iron or ductile-iron conforming to AWWA C110, and shall have cement lining conforming to AWWA C104, standard thickness.

2. Joints and Jointing Material: Joints for pipe shall be push on joints as specified in ASTM D3139. Joints between pipe and metal fittings, valves, and other accessories shall be push on joints as specified in ASTM D3139 or shall be compression type joints / mechanical joints as respectively specified in ASTM D3139 and AWWA C111. Provide each joint connection with an elastomeric gasket suitable for bell or coupling or push-on joints with which it is to be used.

3. Transition from PVC to ductile iron pipe shall occur a minimum of 5 feet from building.

D. All underground piping for fire mains shall be installed, clamped, anchored, flushed and hydrostatically pressure tested according to the requirements of the authorities and/or agencies having jurisdiction, and NFPA Pamphlets Nos. 13 and 24 and F. M. Handbook of Industrial Loss Prevention.

E. Anchor underground riser stub to nearest underground connection by means of rodding. Retaining glands with setscrews above grade are not allowed.

2.4 UNDERGROUND PIPE COATING:

A. All underground ferrous piping shall be covered with:

1. Either two coats of 10 Mill Scotch Wrap No. 51, or with;

2. "XTRU-COAT" prefabricated extruded cover with joints sealed with two coats of 10 Mill Scotch Wrap #51.

3. Or approved equal

2.5 THRUST BLOCKS

A. Provide thrust blocks at changes in pipe direction, changes in pipe sizes, dead-end stops and at valves.

B. Calculate area of undisturbed earth of thrust block based on actual soil conditions and water test pressure of 200 Psi.

C. Concrete and reinforcing steel shall be as specified in Division 3 and 5. All concrete shall be Class A, unless specified otherwise.

D. Miscellaneous nuts and bolts shall be stainless steel.

2.6 RODS AND CLAMPS

A. Socket clamps shall be stainless steel; four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.

B. Rods shall be stainless steel, 3/4" diameter.

2.7 SPRINKLER HEADS - GENERAL

A. Sprinkler heads shall be regular automatic closed-type heads of ordinary degree temperature rating except that sprinkler heads installed in the vicinity of heating equipment or in special occupancy areas shall be of the temperature rating as described in NFPA No. 13.

B. Provide quick response heads in all light hazard occupancies.

C. Provide corrosion-resistant sprinkler heads where they are exposed to weather, moisture or corrosive vapors.

D. The Contractor shall furnish spare heads. The heads shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating head installed. In addition to the spare heads, the contractor shall furnish not less than two special sprinkler head wrenches. Refer to NFPA 13 section; "Stock of Spare Heads".

2.8 SPRINKLER HEADS AND ESCUTCHEONS

A. Sprinkler heads installed shall be upright or pendent, as conditions require, and shall be of the following type and finish for the areas designated. Unless otherwise specified, sprinklers shall be small frame type, center bulb capsule for finished areas, fusible link for unfinished areas, and ½" orifice. Extended coverage heads not allowed in unfinished areas except garages.

Building Area	Sprinkler Head	Sprinkler Finish	Escutcheon Finish	Temp. Deg.
Office, Storage & Mechanical Rooms	Upright/Pendant	Brass	None	165°F
Soccer Shade Areas	Upright/Pendant with sprinkler guard	Brass	None	165°F
Electrical, Telephone & Switchgear Rooms	Upright	Brass	None	286° F
Finished Ceilings (Light color)	Concealed Pendant	Brass	White Coverplate	165° F
Finished Ceilings (Dark Color)	Concealed Pendant	Brass	Black Coverplate	165°F
Soffit	Flush Sidewall	White	White	165°F
Sidewall	Horizontal Sidewall	Brass	None	165°F

B. Manufacturer: Reliable, Star or Viking.

2.9 VALVING

A. 2" or Smaller:

1. Control Valve: OS&Y rising stem type gate valve bronze body, bonnet and disc, copper alloy stem, threaded ends, 175 PSI WOG min. Provide with tamper switch.

2. Check Valve: Swing check type with bronze body, cap and disc, threaded ends, 175 PSI WOG min.

3. Drip Valve: 3/4", cast brass automatic ball drip type, threaded ends, 175 PSI WOG min.

4. Testing Valve: 1-1/4", test and drain, sight glass, ½" test orifice, lever operated, 300 psi WOG. Drain to mop sink or drain riser.

5. Main Drain Valve: 2", angle gate valve, bronze body, copper alloy stem, threaded ends, 175 psi WOG. Drain to mop sink or drain riser.

B. 2-1/2" or Larger:

1. Control Valve: Lug type wafer valve with tamper switch, ductile iron body, nickel plated ductile iron disc, stainless steel stem and Buna-N seat, 175 PSI WOG min.

2. Control Valve: OS&Y rising stem type gate valve, cast iron body and bonnet, bronze stem, seat and disc, flanged ends, 175 PSI WOG min. Provide with tamper switch.

3. Check Valve: Swing check type with cast iron body, bolted cap and disc, flanged ends, 175 PSI WOG min.

4. Manufacturer: Grinnell, Stockham, Milwaukee, Mueller, Kennedy, Elkart or AGF.

2.10 WET SPRINKLER ALARM CHECK VALVE

A. Contractor shall provide, where required, a completely engineered horizontal wet alarm check valve, retarding chamber, and trim assembly. Viking #H-2, Star or Reliable.

2.11 UNDERGROUND WATER VALVE

A. Resilient seated gate, valve, non-rising stem, 2" square valve nut, ductile iron construction with epoxy coated surfaces, both interior and exterior, 250 PSI, mechanical joint ends. Provide yard box and cover.

B. Manufacture: American Darling, Clow, Dresser, or U.S. Pipe.

2.12 VALVE BOXES

A. Cast iron valve boxes for shutoff valves buried in ground shall be complete with bellbottoms, extension piece, top and cover. Boxes shall be suitable for the types of valves with which they are used. All valve boxes shall have a concrete collar flush with grade.

B. Lids shall have the applicable letters embossed upon the top surface. Tagging shall match existing lids.

C. Manufacturer: Tyler, ITT Grinnell, or equal.

2.13 PRESSURE REDUCING VALVES

A. Sprinkler System: Rough bronze body with red enameled hand wheel with integral check valve of the pressure reducing type. Outlet pressure shall not exceed 165 PSI at maximum system pressures. Pressure settings to be field adjustable.

1. Manufacturer: Zurn #Z-3004

B. Fire Service: 150 class pressure rating, cast iron body with brass main valve trim, control system cast bronze with stainless steel trim

1. Manufacturer: Cla-Val #90-21UL.

2.14 PRESSURE RELIEF VALVE

A. Provide 3/4" pressure relief valve on discharge side of Sprinkler system pressure reducing valve. Set to a maximum of 175 PSI.

1. Manufacturer: Zurn #P1000A.

2.15 BACKFLOW PREVENTER

A. Provide listed backflow prevention device as required by local codes and ordinances. Backflow prevention devices installed in the vertical position shall be approved for that orientation.

2.16 INTEGRAL INSPECTORS ALARM TEST AND SYSTEM DRAIN

A. Combination system drain and visible orifice insert/sight glass for testing system alarm; with screwed or grooved inlet and outlet connections, Malleable iron hand wheel, EPDM valve seats, maximum working pressure 300 Psi, 1/2" orifice insert, Bronze housing, UL listed and FM Approved. Victaulic TestMaster II style 720, or approved equal.

B. Water pressure gauge, range 0-300 Psi, in 5 Psi increments, brass case - 3-1/2" diameter, 1/4" NPT male pipe connection, UL listed. Locate pressure gage on riser per code. Star Sprinkler, Ashcroft or approved equal.

C. Pressure gauge test valve, brass 1/4" screwed ends, 300 Psi WOG. United or approved equal.

D. All relief, main, auxiliary and equipment drains shall be routed separately to floor drain or air gap fitting (by plumbing).

2.17 TAMPER SWITCHES

A. Switch shall be mounted so as not to interfere with normal operation of the valve and be adjusted to operate when handle of valve has traveled more than one-fifth the distance of its normal operating position. Electrical Contractor shall provide conduit from switch to fire alarm panel.

B. Housing shall be of aluminum, acid-treated, primed and finished in baked red enamel. Removal of housing shall cause switch to operate. Inside shall be single pole, double throw micro switch with connection for electrical conduit.

C. Install on all control valves.

D. Manufacturer: Potter-Electric, Notifier, Ellenco, or Simplex.

2.18 EXTERIOR ALARM

A. Electric bell, 10" diameter, U.L. listed, weather-proof back box housing, 120 VAC, 99 dB at 10 FT; Potter model PBA12010 or equal.

B. Electric Horn: Potter-Electric, Ellenco, Notifier, or Simplex weatherproof, 120 VAC.

2.19 FIRE DEPARTMENT CONNECTIONS

A. Flush wall mounted unit or freestanding unit with individual clapper valves, plugs and chains, locations as indicated on drawings. Escutcheon plate to be lettered as follows; "AUTO SPRINKLER", "DRY STANDPIPE" or "AUTO SPRINKLER AND STANDPIPE". Unit shall be polished chrome or brass finish, mounted 36" above finished grade. Number of inlets required shall be in accordance with regulations of the Fire Marshal or local fire department.

2.20 POST INDICATOR VALVE

A. See civil drawings

2.21 FIRE HYDRANT

A. See civil drawings

PART 3 EXECUTION

3.1 GENERAL

A. This system to be installed by an experienced firm regularly engaged in the installation of automatic sprinkler system as specified by the requirements of the Specifications.

3.2 PERFORMANCE OF WORK

A. Examine areas and conditions under which materials are to be installed. Layout the system to suit the different types of construction and equipment as indicated on the drawings and in accordance with NFPA Pamphlet No. 13, 14, 20 and 24.

B. Work to start immediately after authorization has been given to proceed so that the overall progress of the construction is not delayed.

C. Coordinate with other trades as necessary to properly interface components of the sprinkler system.

D. Follow manufacturer's directions and recommendations in all cases.

E. The omission from the drawings or Specifications of any details of construction, installation, materials, or essential specialties shall not relieve the Contractor from furnishing the same in place for a complete system.

3.3 TEMPORARY FIRE PROTECTION

A. Provide all temporary valving, piping, Siamese connections and other components as directed by the fire agency office during all phases of construction.

3.4 INSTALLATION - GENERAL

A. Fire protection system shall be installed in accordance with the approved Drawings. The finished ceiling is not to be erected until all fire protection piping has been installed, tested, and inspected. Sprinkler heads located in the electrical equipment, elevator, or similar rooms shall be furnished with deflectors to prevent water spray on equipment.

B. Before connection to the overhead piping, all underground piping shall be flushed with water flowing at velocity and quantity required by the installation standards specified above in this Section of the Specifications.

C. The arrangement of all pipes shall conform to all architectural requirements and field conditions, shall be as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and shall be neatly spaced. Offsets will be permitted only where required to permit the pipes to follow the walls. Standard fittings shall be used for offsets. All risers shall be erected plumb and true, shall be parallel with the walls and other pipes, and shall be neatly spaced. All work shall be coordinated with HVAC, Plumbing, Electrical and Structural work in order to avoid interference and unnecessary cutting of floors or walls. All underground or concealed work shall be inspected before the construction is closed up.

D. All sprinkler heads to be installed in ceilings throughout the scope of work building as listed in Section 2.6. All areas without ceilings shall have rough brass upright or pendent heads as shown on drawings.

E. Sprinkler heads in all finished areas are to be installed on a true axis line in both directions, with maximum deviation from the axis line of 1<<2>> inch plus or minus and shall be plus or minus 1" within center of tile. At the completion of the installation, if any heads are found to exceed the above-mentioned tolerance, they shall be removed and reinstalled.

F. No pipes or other apparatus shall be installed so as to interfere in any way with full swing of doors.

G. The arrangement, positions, and connections of pipes, drains, valves, etc., shall be as required by NFPA Pamphlet #13 for all areas to be sprinklered. However, the right is reserved by the Architect to change the location of any item to accommodate conditions, which may arise during progress of the work, without additional compensation for such changes provided that no additional heads are required prior to the installation of the work.

H. Where required, piping shall be installed concealed in building construction, or though steel beams, to obtain adequate head room.

I. All pipe throughout the job shall be reamed smooth before being installed. Pipe shall not be split, bent, flattened, or otherwise injured either before or during installation.

J. Provide protective pans under pipes passing over high voltage electrical bus duct or switchgear equipment. The pan shall be constructed of 12 gauge black iron with a 6 inch lip, the corners being welded to make the pans watertight. Each pan shall be given three coats of Rust-Oleum paint and shall be supported by pipe hangers. The pan shall drain clear of the bus duct or switchgear.

K. All pipe interiors shall be thoroughly cleaned of foreign matter before installation, and shall be kept clean during installation by plugging or other approved means. Piping shall be covered with visqueen during storage. Piping that shows signs of rusting will be removed from job site and replaced.

L. Field Connections: Any modifications to system required by field conditions, physical equipment changes or compliance with code regulations shall be made promptly without cost to Owner.

M. Interference: No piping or sprinkler devices shall interfere with the operations of any door, window or mechanical and electrical systems. No part of this system shall visibly be installed in the physical parameter of any window. <<Sprinkler mains and branch piping shall not interfere with existing or future ceiling, light fixtures and HVAC diffusers.>>

N. Threaded Pipe: Threads shall be clean cut, standard and tapered. Threads shall be made up using flaked graphite and lubricating oil, piping compound or Teflon tape applied to the male threads only.

O. Grooved Pipe: Installation shall be as prescribed in the Victaulic Piping Manual only. Holes in the piping are to be made in the fabrication shop, not at the job site. Contractor shall provide at the project site a sample of each type of coupling (threaded, standard grooved coupling and mechanical type), showing complete assembly with pipe connections. Keep all pipe and other openings closed to prevent entry of foreign matter. Cover all equipment and apparatus to protect against dirt, water, chemical or mechanical damage, before and during construction period. Restore to original condition all apparatus and equipment damaged prior to final acceptance, including restoration of damaged shop coats of paint.

P. Location of sprinkler piping is critical.

1. Where ceiling space is at a minimum under beams location of ductwork takes precedence, coordinate accordingly.

2. Include in base bid (3) two-hour coordination meetings with Owner, Architect, and Engineer for coordination of sprinkler pipe routing.

3. Coordinate beam and shear wall penetrations with Structural Engineer. Obtain written approval for all beam penetrations from Structural Engineer.

Q. Tracer wire shall be wrapped and taped to non-metallic underground piping at maximum 20 foot intervals.

3.5 EXCAVATION AND BACKFILL

A. Trench and excavation work shall be done in a neat workmanlike manner, of the depth required by the authorities and/or agencies having jurisdiction. Pipe crown shall not be less than 30 inches below the finished ground surface. After the pipe has been properly tested and inspected, trench shall be backfilled with sand, or an approved sandy material, to a depth of 6 inches above the pipe. Backfill material shall be consolidated by tamping or by saturating with water and vibrating. Subsequent backfill shall consist of the original excavated material, free of organic matter, placed in 6 inch layers and compacted layer by layer by means of power driven vibrators.

B. Replace to original condition all turf, plants, concrete, asphalt, or other improvements disturbed by trenching. In graded, unpaved areas, backfill trenches with crown 8 inches above the surrounding surface.

3.6 SLEEVES AND FLASHINGS

A. Wherever pipes are exposed and pass through walls, floors, partitions or ceilings, they shall be fitted with chromium plated steel escutcheons held in place with setscrews. Care shall be taken to protect the escutcheons during the course of construction.

B. Penetrations through fire rated walls and floors shall be sealed with listed mastic of similar fire rating.

3.7 HANGERS, INSERTS, SUPPORTS, AND SWAY BRACING

A. Hangers and supports shall be installed per NFPA #13 sections on Hangers and Protection of Piping Against Damage Where Subject to Earthquake. Provide restraint from movement at end sprinkler on branch line per NFPA 13.

B. Bending of threaded hanger rod is not allowed. All powder driven anchor pins in concrete are not allowed.

3.8 SAFETY TESTING & VERIFICATION

A. Flush, test, and inspect sprinkler piping systems according to NFPA 13 Chapter "System Acceptance."

B. Provide NFPA 13 Contractor's Material & Test Certificate Form 85A for above ground piping and Form 85B for underground piping.

C. Provide manpower to test the function and performance of all Life Safety System components and devices per floor and per zone basis in accordance with the local requirements.

3.9 IDENTIFICATION

A. In addition to the requirements of Section 15050, provide pipe markers every 20 feet, once in every room, and at each building level traversed, minimum.

B. Provide hydraulic design data nameplates on the riser of each sprinkler system in accordance with NFPA 13

C. Equipment such as valves, drains, etc., shall be provided with signs that identify type of equipment and service. The tag shall be securely fastened to the handle or spindle of the valve by a brass chain. Furnish four schedules of valves so tagged. There shall also be furnished four diagrammatic charts showing schematically the complete sprinkler system with major control valves and numbers thereof. One set of Schedules and charts shall be mounted in glazed frames located where directed.

3.10 AS-BUILT RECORD DRAWINGS AND CERTIFICATION

A. As-built Record Drawings are to be kept up-to-date and the Master Copy kept at the job site. Prior to final acceptance of work being approved, these drawings are to be turned over to the Owner's Representative for approval.

B. Written certification from the insuring agents, and authorities having jurisdiction that the tests were satisfactory.

C. After installation is complete and tests satisfactorily approved, deliver test certificates and approval by the local Fire Authorities and the FMA to the architect. Final acceptance of sprinkler/standpipe system by Owner's Representative shall be contingent upon receipt of certificate and approval from authorities having jurisdiction and for the delivery of final As-Built Drawings.

END OF SECTION 15300