

SECTION 210001

FIRE PROTECTION

(Filed Sub-Bid Required)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Time, Manner and Requirements for Submitting Sub-Bids:
 - 1. Sub-bids for work under this Section shall be for the complete work and shall be filed as stipulated in the "INSTRUCTIONS TO BIDDERS".
 - 2. Each sub-bid submitted for work under this Section shall be filed as required by Section 44F of Chapter 149 of the General Laws, as amended.
- C. Sub Sub-Bid Requirements: None
- D. Reference Drawings: The Work of this Filed Sub-Bid is shown on the following Contract Drawings: FP000, FP211, FP212, FP 213, FP221, FP222, FP223, FP600, G000, G001, G002, C100, C400, C401, A020, A200, A201, A210, A211, A212, A213, A214, A215, A216, A217, A300, A310, A311, A312, A313, A314, A500, A555, A556, A559, A575.

1.2 RELATED DOCUMENTS

- A. The "Standard Form of Agreement," AIA Document A101, 2007 Edition, Electronic Format, as published by The American Institute of Architects, together with all Amendments and Supplements as hereinbefore listed, shall apply and are hereby made a part of this section of the Specifications.
- B. The Section of these Specifications entitled "Special Conditions, "Minimum Wage Determination," and Division 01 "General Requirements" shall apply and are hereby made a part of this section of the Specifications.

1.3 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Exterior water service beginning 10 feet outside of the building wall.
 - 2. Combined sprinkler and standpipe system.
 - 3. Gate valves, check valves, and drain valves.
 - 4. Sprinkler heads, piping, fittings and valves.
 - 5. Preparation of complete "Fire Protection Working Drawings" and calculations.
 - 6. Tests of all piping, systems, devices and alarms.
 - 7. Sleeves, escutcheons, hangers and supports.
 - 8. Flow tests.
 - 9. Fire Department connections.
 - 10. Pressure gauges.

11. Miscellaneous steel supports.
 12. Flow and tamper switches.
 13. Fire department valves, cabinets.
 14. Sprinkler drains.
 15. Backflow preventer on fire water service.
 16. Identification of systems, equipment and valves.
 17. Shop drawings and submittals.
 18. Permits, fees and inspections.
 19. System and equipment start-ups; instructions.
 20. Operation and Maintenance Manuals.
 21. Vibration isolators, flexible connectors, expansion fittings.
 22. Drilling for installation of inserts.
 23. Thrust blocks and related supports and restraints.
 24. Core drilling for the work of this Section. Refer to Section 017329 CUTTING AND PATCHING.
 25. Hoisting Equipment: Trade subcontractors shall furnish, install and maintain in safe and adequate condition, all mechanical hoisting equipment, operating personnel and rigging that is necessary for the proper execution of the Work of this Section.
 26. Staging, Planking and Scaffolding: Trade subcontractors shall furnish, install and maintain in safe and adequate condition, all staging, planking and scaffolding that is necessary for the proper execution of the Work in this Section.
 27. Provide penetration firestopping in accordance with Section 078410 Penetration Firestopping for all openings through fire rated partitions, horizontal assemblies, and smoke barriers used by this Trade Sub-Bidder. Owner's Project Manager will hire third party independent testing agency to perform destructive testing in line with requirements of the 9th edition of the building code. Trade contractors should include repair of destructive test penetrations after testing is complete. All partitions and floor assemblies are to be considered rated for the purpose of sealing penetrations.
- B. Commissioning Intent: The project will be commissioned. The Trade Contractor shall coordinate with the commissioning agent, and other trades and provide all labor required to fully test and demonstrate that all systems operate as designed. Refer to 01 81 00 Commissioning for additional requirements
- C. The Work of this Section is shown on the following drawings: FP000, FP101, FP102, FP103, FP201, FP202, FP203, FP204, FP205, FP206, FP207, FP400, FP500 & FP600. The listing of the Contract Drawings above shall not limit responsibility to determine full extent of work of this Section as required by: all Contract Drawings noted on the Contract Drawings List of Drawings, the Project Manual and Addenda.
- D. Items to Be Furnished Only: Furnish the following items for installation by the designated Sections:
1. Section 033000 – CAST-IN-PLACE CONCRETE:
 - a. Lintels, sleeves, anchors, inserts, plates and similar items for fire protection systems.
 2. Section 092110 - GYPSUM BOARD ASSEMBLIES:
 - a. Access doors in gypsum board assemblies.
 3. Section 093000 - TILING:

- a. Access doors in tile.
 4. Section 090003 - ACOUSTICAL TILE:
 - a. Access doors in acoustical panel ceilings.
 - E. Related Work: The following items are not included in this Section and will be performed under the designated Sections.
 1. Section 079200 – JOINT SEALANTS for standard joint sealers.
 2. Section 018100 – COMMISSIONING.
 3. Section 053100 – METAL DECKING for restrictions concerning the hanging of materials, piping, mounts, brackets, hangers, hooks and other items from metal decking.
 4. Section 092110 – GYPSUM BOARD ASSEMBLIES for coordination with gypsum ceilings.
 5. Section 090003 – ACOUSTICAL TILE for coordination with acoustical ceilings.
 6. Section 220001 – PLUMBING for piping penetrations.
 7. Section 230001 – HEATING, VENTILATING AND AIR CONDITIONING for coordination with HVAC piping and ductwork.
 8. Section 260001 - ELECTRICAL WORK for fire alarm devices.
 9. Section 312000 – EARTH MOVING for excavation and backfilling.
 - F. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.
 - G. Drawings and Specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.
 - H. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.
- 1.4 SUBMITTALS
- A. Comply with requirements specified in Section 013300 – SUBMITTAL PROCEDURES.
 - B. Material and equipment requiring Shop Drawing Submittals shall include but not be limited to:
 1. Fire Protection Products:
 - a. Sprinkler alarm valves.
 - b. Fire department connections.
 - c. Sprinkler heads.
 - d. Valves.
 - e. Pipe and fittings.
 - f. Electric alarm bell.
 - g. Roof manifolds.
 - h. Fire hose cabinets.

- i. Fire department valves.
- j. Hangers and supports.
- k. Alarm devices.
- l. Wet alarm valve.

1.5 DEFINITIONS

- A. As used in this Section, "provide" means "furnish and install" and "POS" means "Provided Under Other Sections". "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."

1.6 CONTRACT DOCUMENTS

- A. Listing of Drawings does not limit responsibility of determining full extent of work required by Contract Documents. Refer to Architectural, HVAC, Plumbing, Fire Protection, Electrical, Structural, and other Drawings and other Sections that indicate types of construction in which work shall be installed and work of other trades with which work of this Section must be coordinated.
- B. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instruction to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.
- C. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.
- D. Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational.
- E. Information and components shown on riser diagrams but not shown on plans, and vice versa, shall apply or be provided as if expressly required on both.
- F. Data that may be furnished electronically by the Designer (on computer tape, diskette, or otherwise) is diagrammatic. Such electronically furnished information is subject to the same limitation of precision as heretofore described. If furnished, such data is for convenience and generalized reference, and shall not substitute for Designer's sealed or stamped construction documents.

1.7 DISCREPANCIES IN DOCUMENTS

- A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or unclarities thus resolved.

- B. Where Drawings or Specifications do not coincide with manufacturers' recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.
- C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.
- D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with Paragraph (A) above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- E. In cases covered by Paragraph (D) above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.

1.8 MODIFICATIONS IN LAYOUT

- A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet Architectural requirements.
- B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.
- C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.
- D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.
- E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.
- F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

1.9 SITE VISIT

- A. Before submitting bid, visit and carefully examine site to identify existing conditions and difficulties that will affect work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observer.

1.10 EXISTING CONDITIONS AND PREPARATORY WORK

- A. Before starting work in a particular area of the project, visit site and examine conditions under which work must be performed including preparatory work done under other Sections or Contracts or by the User Agency. Report conditions that might affect work adversely in writing through Contractor to Designer. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing conditions and preparatory work.

1.11 CODES, STANDARDS, AUTHORITIES AND PERMITS

- A. Perform work strictly by rules, regulations, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities that have legal jurisdiction over the site. Materials and equipment shall be manufactured, installed and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:

1. Local and state building, plumbing, mechanical, electrical, fire and health department codes.
2. National Fire Protection Association (NFPA).
3. American Insurance Association (A.I.A.) (formerly National Board of Fire Underwriters).
4. Occupational Safety and Health Act (OSHA).
5. Factory Mutual Association (FM).
6. Underwriters' Laboratories (UL).
7. American National Standards Institute (ANSI).

- B. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME for intended service.

- C. When requirements cited in this Specification conflict with each other or with Contract Documents, most stringent shall govern work. Designer may relax this requirement when such relaxation does not violate ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing.

- D. Most recent editions of applicable specifications and publications of the following organizations form part of Contract Documents:

1. American National Standards Institute (ANSI).
2. American Society of Mechanical Engineers (ASME).
3. National Electric Manufacturers Association (NEMA).
4. American Society for Testing and Materials (ASTM).
5. American Water Works Association (AWWA).
6. Institute of Electrical and Electronics Engineers (IEEE).
7. Insulated Cable Engineers Association (ICEA).
8. National Fire Protection Association (NFPA).

- E. Special attention is directed to requirements of NFPA 45, Laboratories Using Chemicals.

1.12 GUARANTEE AND 24 HOUR SERVICE

- A. Guarantee Work of this Section in writing for two years following the date of beneficial occupancy by the User Agency. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to

Designer's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

- B. In addition to guarantee requirements of Division 01 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in User Agency's name.
- C. Replace material and equipment that require excessive service during guarantee period.
- D. Provide 24 hour service beginning on the date the project is first beneficially occupied by the User Agency, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the User Agency. Service can be provided by this contractor or a separate service organization. Choice of service organization shall be subject to Designer and User Agency approval. Submit name and a phone number that will be answered on a 24 hour basis each day of the week, for the duration of the service.
- E. Submit copies of equipment and material warranties to Designer before final payment.
- F. At end of guarantee period, transfer manufacturers' equipment and material warranties still in force to User Agency.
- G. This Paragraph shall not be interpreted to limit User Agency's rights under applicable codes and laws and under this Contract.
- H. Part 2 Paragraphs of this Specification may specify warranty requirements that exceed those of this Paragraph.
- I. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of work nor beneficial use by User Agency, and shall not institute guarantee period.
- J. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to Owner's Project Manager's satisfaction, advise Designer in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Designer will suggest course of action.

1.13 RECORD DRAWINGS

- A. Comply with requirements specified in Section 017700 – CLOSEOUT PROCEDURES.
- B. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.14 BULLETINS, MANUALS, AND OPERATING INSTRUCTIONS, AND PROTECTION

- A. Obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items. Assemble literature in coordinated manuals with additional information describing combined operation of field assembled units, including as-built wiring diagrams. Manual shall contain names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into three sections or books as follows:

1. Directions for and sequence of operation of each item of Fire Protection systems. Sequence shall list valves, switches, and other devices used to start, stop and control system. Detail procedure to be followed in case of malfunctions.
 2. Detailed maintenance and troubleshooting manuals containing data furnished by manufacturer for complete maintenance. Include copy of balancing report.
 3. Lubrication instructions detailing type of lubricant, amount, and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first class lubrication program. Include approved summary of lubrication instructions in chart form, where appropriate.
- B. Furnish three copies of manuals to Designer for approval and distribution to Owner's Project Manager. Deliver manuals no less than 30 days prior to acceptance of equipment to permit User Agency's personnel to become familiar with equipment and operation prior to acceptance.
- C. Provide framed and glazed charts as follows:
1. Flow diagrams from first part of manual as described above.
 2. Valve directory.
 3. Lubrication chart from third part of manual.
- D. Operating instructions: Upon completion of installation or when Owner's Project Manager accepts portions of building and equipment for operational use, instruct User Agency's operating personnel in any or all parts of various systems. Instructions shall be performed by factory-trained personnel. User Agency shall determine which systems require additional instructions. Duration of instructions shall take equipment through complete cycle of operation (at least five (5) working days). Make adjustments under operating conditions.
- E. Each contractor shall be responsible for his work and equipment until finally inspected, tested, and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material.
- F. Each separate contractor shall protect the work and material of other trades that might be damaged by his work or workmen and make good all damage thus caused.

1.15 COORDINATION DRAWINGS

- A. Refer to Section 013100 – PROJECT MANAGEMENT AND COORDINATION for coordination drawing requirements.
- B. Coordination Drawings include but are not necessarily limited to:
1. Structure.
 2. Partition/room layout.
 3. Ceiling tile and grid.
 4. Light fixtures.
 5. Access panels.
 6. Sheet metal, heating coils, boxes, grilles, diffusers.
 7. All heating piping and valves.
 8. Smoke and fire dampers.
 9. Soil, waste and vent piping.
 10. Major water and medical gases.

11. Roof drain piping.
12. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.
13. Above ceiling miscellaneous metal.
14. Sprinkler piping and heads.

1.16 SPRINKLER WORKING PLANS

- A. Definition: Working plans are the installation shop drawings required by NFPA Standard 13 and normally prepared by the installing sub-contractor.
- B. Prepare working plans according to the requirements of NFPA Standard 13. Working plans and hydraulic calculations shall be prepared by a NICET-certified Level III or IV automatic sprinkler system engineering technician or be stamped by a professional engineer registered in the jurisdiction of the Project.
 1. Working Plans shall be stamped and signed by a Professional Engineer when required by the approving authority.
- C. Submit working plans to the authorities having jurisdiction for approval, including:
 1. Building Department.
 2. Fire Department.
 3. User Agency's Insurance Underwriter.
 4. Designer.
- D. Deviation from the approved plans will require re-approval by the reviewing authorities.
- E. Prepare sprinkler head layout plans on reflected ceiling plans for submission to the Designer before submission of the working plans.
- F. Submit working plans and hydraulic calculations to the Designer in one complete package, after review by the other authorities having jurisdiction. Plans submitted without review stamps or hydraulic calculations will be returned without review.

1.17 WATER SUPPLY TEST DATA

- A. The following water supply data is included as information available to bidders only and shall not be used for final design calculations. Perform hydrant flow test under the work of this Section for water supply characteristics to be used for hydraulic calculations.
- B. Flow Test Results: Pressure Hydrant:
 1. Location: 200 Bigelow Road
 2. Elevation: 2 ft
 3. Static Pressure: 78 psi
 4. Residual Pressure: 60 psi
 5. Flow at 60 PSI: 1000 .5 gpm

1.18 WELDER REQUIREMENTS

- A. Before any welding is performed, Contractor shall submit three copies of the welding procedure specification for all metals included in the Work together with proof of qualifications as outlined in ANSI B31.1, ANSI B31.5 and ASME Boiler Code Section IX.

- B. Before any welder or operator shall perform any welding the Contractor shall submit three copies of the Welder's Performance Qualification Record in conformance with ANSI B31.1 and ANSI B31.5, and ASME Section IX, showing that the welder was tested under the accepted procedure specification submitted by the Contractor. In addition the Contractor shall submit each welder's assigned number, letter, or symbol which shall be used to identify the work of the welder which shall be affixed immediately upon completion of the weld. Welders making defective welds after passing a qualification test shall be required to take a re-qualification test.
- C. Welders failing the re-qualification tests shall not be permitted to work under this contract.
- D. Welding procedures, welders, and welding operators previously qualified by test may be accepted for this contract without re-qualification provided that all the conditions specified in ANSI B31.1 and ANSI B31.5 are met before a procedure is used.
- E. HOT WORK PER SECTION 015000.

1.19 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 015000 - Temporary Facilities and Controls and herein.
 - 1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 015000 - Temporary Facilities and Controls shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.
 - 2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 015000 - Temporary Facilities and Controls and as additionally required for dust control).
 - a. General Contractor is responsible to provide enclosures required for temporary heat from November 1 to March 31; refer to Section 015000 -Temporary Facilities and Controls.
 - 3. Furnish portable ladders and mobile platforms of all registered heights, which may be necessary to perform the work of this trade, are the responsibility of this Trade Contractor.

1.20 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated, and maintained in safe conditions by this Trade Contractor, as referenced under Section 015000 - Temporary Facilities and Controls.

1.21 ATTIC STOCK

- A. This contractor shall provide attic stock for all fire protection equipment and associated appurtenances. Stock shall include three (3) additional pieces of equipment and appurtenances for each type being installed within the building. Final approval and placement of all attic stock will be coordinated with the architect.

1.22 SPRINKLER CONTRACTOR REQUIREMENTS

- A. The sprinkler contractor shall be a licensed sprinkler contractor in MA.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fire protection system products which may be incorporated in the work include, but are not limited to, the following:

1. Gate Valves:
 - a. Fairbanks
 - b. Jenkins
 - c. Kennedy Valve
 - d. Stockham
 - e. Tyco Fire Protection Products
 - f. Tyco/Grinnell
2. Swing Check Valves:
 - a. Fairbanks
 - b. Jenkins
 - c. Kennedy Valve
 - d. Tyco Fire Protection Products
 - e. Stockham
3. Grooved Mechanical Couplings:
 - a. Stockham
 - b. Victaulic
 - c. Tyco/Grinnell
4. Water Flow Indicators:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Victaulic
 - c. Viking Corp.
 - d. Potter Electric
5. Water-Motor Gongs:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire Protection Products
 - c. Viking Corp.
6. Electric Alarm Bells:
 - a. Potter Electric
 - b. System Sensor
 - c. Notifier
7. Detector Check Valves:
 - a. Ames Company, Inc.
 - b. Kennedy Valve

- c. Victaulic
- 8. Alarm Check Valve:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire Protection Products
 - c. Viking Corp.
- 9. Hose Outlet Valves:
 - a. Guardian Fire Equipment, Inc.
 - b. Potter Roemer
 - c. Croker
 - d. Viking Corp.
- 10. Fire Department Connection Valve:
 - a. Guardian Fire Equipment, Inc.
 - b. Croker
 - c. Potter Roemer
 - d. Viking Corp.
- 11. Sprinkler Heads:
 - a. Tyco Fire Protection Products
 - b. Globe Fire Equipment Co.
 - c. Reliable Automatic Sprinkler Co., Inc.
 - d. Victaulic
 - e. Viking Corp.

2.2 PIPING, FITTINGS AND JOINTS

- A. Buried Fire Service Entrance: Ductile iron, Class 52, cement-lined with mechanical joints.
 - 1. Pipe: ANSI/AWWA C151-A21.51.
 - 2. Cement Lining: ANSI/AWWA C104-A21.4.
 - 3. Fittings: ANSI/AWWA C110-A21.10.
 - 4. Gasket: ANSI/AWWA C111-A21.11.
- B. Fire Line Piping in Service Room: Black steel Schedule 40 with flanged joints or rigid couplings.
 - 1. Pipe: ASTM A53.
 - 2. Flanges: ANSI B16.3.
- C. Fire Line Piping:
 - 1. Black steel Schedule 40, ASTM A53 with flanged, threaded, or grooved joints.
 - 2. Black steel Schedule 10, ASTM A135 lightwall with roll-grooved fittings.
- D. Sprinkler Piping:
 - 1. Steel: 2 inches and smaller: ASTM 135 Schedule 40 black steel with threaded joints; larger than 2 inches: ASTM 135 Schedule 10 lightwall with roll grooved joints or Schedule 40 black steel with grooved or threaded joints. Sizes 1-inch through 3-inches may be Allied galvanized XL threadable lightwall steel pipe with threaded joints and fittings.

E. Fittings:

1. Ductile Iron: ASTM A-536.
2. Malleable Iron: ANSI B16.3.
3. Steel: ANSI B16.11.
4. Cast Iron: ANSI B16.4. (Not for use in dry system.)

F. Grooved Fittings and Couplings:

1. Tyco/Grinnell Fig. 705, Gustin-Bacon No. 105 or Victaulic Style 75.
2. Compatibility: Couplings and fittings shall be of a single manufacturer or shall be certified as compatible by both manufacturers.

2.3 JOINING MATERIALS

A. Welding Materials: Comply, with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

1. Brazing Filter Metals: AWS A5.8, Classification Bag1 (Silver).
2. Solder Filter Metals: ASTM B 32, 95-5 Tin Antimony.

B. Gasket Materials: Thickness, material, and type suitable for fluid or gas to be handled, and design temperatures and pressures.

2.4 SLEEVES, INSERTS AND ESCUTCHEONS

A. All pipes passing through floors, walls, or partitions shall be provided with sleeves having an internal diameter of approximately one inch larger than the outside diameter of the pipe or insulation on covered lines.

B. Sleeves through floors and through exterior, structural and fire-rated construction shall be hot-dipped galvanized Schedule 40 steel pipe.

C. Sleeves through partitions and non-fire-rated construction shall be 25 gauge galvanized steel with lock longitudinal seams, or approved plastic pipe.

D. Provide waterproofing membrane locking devices at slab on grade floors. Provide 150 lb. Slip-on welding flanges or approved equal waterstop device at exterior wall penetrations.

E. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4 inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 2 inch diameter to be passed through the insert body. Strip inserts shall have attached rods with hooked ends to allow fastening to reinforcing rods.

F. Unless otherwise specified herein, escutcheons shall be cast brass chrome plated type and provided with a set screw to properly hold escutcheon in place.

G. Where piping passes below grade beams, provide a ductile iron sleeve three sizes larger than the pipe being served. Sleeve shall be a minimum of six feet in length.

H. The void between sleeves and piping passing through all interior above grade fire rated partitions and floor slabs shall be filled with a two hour fire rated mastic.

- I. Watertight sleeves shall be required in all exterior below grade walls. Annular sleeve space between the carrier pipe and the sleeve shall be sealed by means of a confined or interlocking type rubber gasket capable of withstanding 350 psi.

2.5 GENERAL DUTY VALVES

- A. Gate valves, 2 inches and smaller shall be outside screw and yoke, bronze, rising stem, wedge disc type, threaded, conforming to MSS SP-80. Gate valve 2-1/2 inches and larger shall be iron body, bronze trim, outside screw and yoke, flanged, UL/FM listed conforming to MSS SP-70. All valves shall be UL listed for at least 175 psi working water pressure (wwp).
- B. Globe and angle valves may be used as auxiliary valves (drain valves, test valves, trim valves and valves on compressed air piping) for diameters not over 2 in. They shall be bronze, rising stem, with bronze disc, threaded, conforming to MSS SP-80 Class 150.
- C. Butterfly valves 3 in. and larger shall be lug style, ductile iron body, ductile iron nickel plated disc, stainless steel stem, gear operated, with a position indicator, U4 listed for 175 psi wwp, conforming to MSS SP-67.
 1. For diameters 2-1/2 in. and smaller, if the valve requires a supervisory tamper switch, only valves listed with the supervisory attachment may be used. These valves shall have bronze body with threaded ends, stainless steel disc and stem, visual position indicator and a built-in tamper proof supervisory switch rated 10 amps, 115 VAC. Valve listed pressure rating shall be 175 psi wwp. Butterfly valves 3 in. and larger shall not be used:
 - a. On the suction side of fire pumps.
 - b. Wherever the valve's position shall be supervised by a supervisory switch (tamper switch).
- D. Check valves shall be swing type except as noted. Valves 2 inches and smaller shall be bronze, regrinding type with renewable disc, screwed caps, threaded, class 150 conforming to MSS SP-80. Check valves 2-1/2 inches and greater shall be iron body, bronze trim, bolted cover, flanged, conforming to MSS SP-71, UL listed for 175 psi wwp.

2.6 SPECIALTY VALVES

- A. Alarm Check Valves: 300 psig working pressure, shall be equal to Tyco Model AV-1. Alarm Check Valves shall be of ductile iron construction intended for use in either the vertical or horizontal position. Valves shall be rated for use at a maximum service pressure of 300 psi. When variable water supply pressures exist, Alarm Check Valves shall be installed with a retard chamber. Alarm Check Valves shall be connected to a water motor-operated mechanical alarm or a pressure switch equal to the Potter PS10A, for initiating electrical alarms, or both. Alarm Check Valves shall be UL listed and FM approved. Alarm Valve trim shall be listed/approved with the Alarm Valve to which it is attached.

2.7 AUTOMATIC SPRINKLERS

- A. Sprinkler Heads: fusible link type, and style as indicated or required by the application.

- B. Unless otherwise indicated, provide heads with nominal 1/2 inch discharge orifice, for “Ordinary” temperature range (155 deg F minimum). Intermediate temperature rating sprinklers to be installed in kiln room, kitchen and skylights.
- C. Sprinkler Heads Finishes: Provide heads with the following finishes:
 - 1. Upright, Pendent, and Sidewall Styles: chrome plated in all spaces.
 - 2. Concealed Style: rough brass, with painted white cover plate.
- D. Sprinkler Head Cabinet and Wrench: finished steel cabinet, suitable for wall mounting, with hinged cover and space for 6 spare sprinkler heads on the project.

2.8 FIRE DEPARTMENT VALVES AND CABINETS

- A. Hose Outlet Valves: 300 psig, 2-1/2 inch, polished chrome plated, brass angle valve, with removable, 2-1/2 inch x 1-1/2 inch reducing, lug pin, hose connector coupling and pressure restriction device. Valve and coupling shall have external threads having the NH standard thread, for the 2-1/2 inch valve, as specified in NFPA 1995. Provide spanner wrench for removal of reducing coupling.
- B. Hose Valve Cabinet: Provide solid white door recessed trimless hose valve cabinet. Fire rated cabinets to be located in fire rated walls.

2.9 FIRE DEPARTMENT CONNECTIONS

- A. Storz Connection: Chrome plated cast brass, angle body, two way, storz connection. Connection sizes shall be 4-inch outlet and 4 inch female inlet, having NH standard threads, for the connection size indicated, as specified in NFPA 1963. Inlet shall have a clapper valve, and plug and chain. Provide 18 inch high chrome plated brass sleeve and chrome plated brass sidewalk plate, with words “STANDPIPE - FIRE DEPT CONNECTION” or “AUTO SKR. - FIRE DEPT CONNECTION,” or “AUTO SKR. & STANDPIPE - FIRE DEPT CONNECTION” in raised letters.

2.10 ALARM DEVICES

- A. General: Types and sizes shall mate and match piping and equipment connections.
- B. Water Flow Indicators: Vane type waterflow detector, rated to 250 psig; designed for horizontal or vertical installation; have 2-SPDT circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere 125 volts AC and 0.25 ampere 24 volts DC; complete with factory-set, field-adjustable retard element to prevent false signals, and tamper-proof cover which sends a signal when cover is removed.
- C. Electric Alarm Bell: 6-inch diameter bell, with factory-finish in red enamel and weatherproof operation. Bell shall be wired to building’s main flow switch and shall be located as shown on the fire protection drawings. Bell shall be installed in accordance with all local and state codes.
- D. Supervisory Switches: SPST, normally closed contacts, designed to signal valve in other than full open position.

2.11 PIPE AND HANGER SUPPORTS

- A. Provide pipe supports, sway braces, hangers, and clamps conforming to NFPA 13 and listed by UL and approved by FM.
- B. Provide protection of piping against earthquake damage in accordance with NFPA 13.

2.12 ACCESS DOORS AND FRAMES

- A. Furnish access doors and frames for walls and ceilings to applicable trades for installation. Size for access and maintenance, minimum 16 by 16 inches .
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. J. L. Industries, Inc, Inc.
 - 2. Karp Associates, Inc.
 - 3. Larsen's Manufacturing Company.
 - 4. Milcor, Inc.
 - 5. Nystrom, Inc.
- C. Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
 - 1. Locations: Wall and ceiling surfaces as applicable.
 - 2. Door: Minimum 0.060-inch-thick sheet metal, set flush with surrounding finish surfaces.
 - 3. Frame: Minimum 0.060-inch-thick sheet metal with suitable bead flange.
 - 4. Hinges: Continuous piano.
 - 5. Lock: Cylinder, keyed alike.
- D. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
 - 1. Locations: Wall and ceiling surfaces as applicable.
 - 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch .
 - 5. Frame: Minimum 0.060-inch thick sheet metal with suitable bead flange.
 - 6. Hinges: Continuous piano.
 - 7. Automatic Closer: Spring type.
 - 8. Lock: Self-latching device with cylinder lock, keyed alike.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine rough-in for fire hose valves and cabinets to verify actual locations of piping connections prior to installing cabinets.
- B. Examine walls for suitable conditions where cabinets are to be installed.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PIPE APPLICATIONS

- A. Install piping in accordance with NFPA 13 for sprinkler systems, NFPA 14 for standpipe and hose systems, and NFPA 24 for service mains.
- B. Install Schedule 40 steel pipe with threaded joints and fittings for 2-inch and smaller, and with welded joints for 2-1/2 inch and larger.
- C. Install Schedule 40 steel pipe with roll-grooved ends and grooved mechanical couplings for piping 2-inch and smaller.
- D. Install Schedule 10 steel pipe with roll-grooved ends and grooved mechanical couplings for piping 2-1/2 inch and larger.

3.3 PIPING INSTALLATIONS

- A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated.
 - 1. Deviations from approved "Working Plans" for sprinkler piping, require written approval of the authority having jurisdiction. Written approval shall be on file with the Designer prior to deviating for the approved "Working Plans."
- B. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.
- C. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions in pipes 2-inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.
- E. Install flanges or flange adaptors on valves, apparatus, and equipment having 2-1/2 inch and larger connections.
- F. Hangers and Supports: Comply with the requirements of NFPA 13 and NFPA 14. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide protection from damage where subject to earthquake in accordance with NFPA 13.
- G. Make connections between underground and above-ground piping using an approved transition piece strapped or fastened to prevent separation.
- H. Install mechanical sleeve seal at pipe penetrations in basement and foundation walls. Refer to Section 220001 – PLUMBING.
- I. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.
- J. Install pressure gage on the riser or feed main at or near each test connection. Provide gage with a connection not less than 1/4 inch and having a soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and where they will not be subject to freezing.

- K. Water main shall require a drain down in order to connect fire service. Water main shall be refilled after connection has been valved and capped.

3.4 PIPE JOINT CONSTRUCTION

- A. Welded Joints: AWS D10.9, Level AR-3.
- B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:
 - 1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - 2. Align threads at point of assembly.
 - 3. Apply appropriate tape or thread compound to the external pipe threads.
 - 4. Assemble joint to appropriate thread depth. When using a wrench on valves, place the wrench on the valve end into which the pipe is being threaded.
 - 5. Damaged Threads: Do not use pipe with threads which are corroded, or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.
 - 6. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.
 - 7. Mechanical Grooved Joints: Cut or roll grooves on pipe ends dimensionally compatible with the couplings.
 - 8. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."
 - a. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.
 - 9. Soldered Joints: Comply with the procedures contained in the Copper Development Association "Handbook for Fire Sprinkler Systems."
 - 10. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.5 VALVE AND APPURTENANCES INSTALLATION

- A. General: Install fire protection specialty valves, fittings, and specialties in accordance with the manufacturer's written instructions, NFPA 13 and 14, and the authority having jurisdiction.
- B. Gate Valves: Install supervised-open gate valves so located to control all sources of water supply except fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating the portion of the system controlled by each valve.
- C. Install check valves in each water supply connection.
- D. Alarm Check Valves: Install valves in the vertical position, in proper direction of flow including the bypass check valve and retard chamber drain line connection. Install valve trim in accordance with the valve manufacturer's appropriate trim diagram. Test valve for proper operation.

- E. Dry-Pipe Valves: Install in the vertical position, in proper direction of flow, in the main supply to the dry-pipe system. Install the basic trim set, priming chamber attachment and fill line attachment in accordance with the manufacturer's written instructions. During hydrostatic test of system piping at pressures in excess of 50 psi, position the clapper in latched wide open position or removed from valve, to prevent injury to the valve. Test valve for proper operation.
- F. Hose Outlet Valves: Install 2-1/2 inch hose outlet valves with quick-disconnect 2-1/2 to 1-1/2 inch reducing coupling and flow restriction device at each standpipe outlet for hose connections.

3.6 SPRINKLER HEAD INSTALLATIONS

- A. Use proper tools to prevent damage during installations.

3.7 FIRE HOSE AND CABINET INSTALLATIONS

- A. Install fire hose and cabinet installations in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.
 - 1. Prepare recesses in walls by type and size and to comply with manufacturer's instructions.
 - 2. Securely fasten to structure, square and plumb, to comply with manufacturer's instructions.

3.8 FIRE DEPARTMENT CONNECTION INSTALLATIONS

- A. Install automatic drip valves at the check valve on the fire department connection to the mains.
- B. Install mechanical sleeve seal at pipe penetration in outside walls.

3.9 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler systems in accordance with NFPA 13.
- B. Flush, test, and inspect standpipe systems in accordance with NFPA 14.
- C. Flush, test, and inspect underground fire protection piping in accordance with NFPA 24.
- D. Replace piping system components which do not pass the test procedures specified, and retest repaired portion of the system.

3.10 TESTING

- A. Testing and flushing of the fire protection systems shall be done at the expense of this Subcontractor and with equipment furnished by him. Testing shall be done in the presence of duly authorized inspectors and representatives of the Designer and Owner's Project Manager within forty-eight (48) hour notice given those authorities. Prior to testing, the system shall be thoroughly flushed with clean water.
- B. The system shall be repaired and retested until made perfect, without additional expense to Owner.

- C. To test piping, subject it to a three-hour hydraulic test of 200 psi, as required by N.F.P.A. and the User Agency's Insurance Underwriter. Piping shall be repaired until such tests show no leaks. Where required, and depending on the building timing and schedule, the system may be required to be tested without final swing elbows and heads installed. In this case, a second test will be required upon installation of swing elbows and heads.
- D. Material and test certificates must be signed by the Owner's Project Manager prior to and upon completion of testing. Final test reports must be approved in writing by local authorities.
- E. Results of tests shall be recorded and submitted using the forms in NFPA #13 & #14, for review by the Engineer. The Material and Test Certificate shall also be sent to the Owner's Project Manager and User Agency's Insurance Underwriter.
- F. This Subcontractor shall include in his bid proposal, the cost for the manufacturer of the fire protection equipment to adjust all 2-1/2" pressure reducing valves set so the normal hydrostatic pressure does not exceed 65 psig and the 1-1/2" valves so the pressure does not exceed 80 psig. This work shall be accomplished and attested to in writing to the Designer by the Fire Protection Subcontractor.
- G. This Subcontractor shall ensure that the underground piping from the street main and service entry piping has been tested to 200 psig in accordance with NFPA 24 requirements. This shall be recorded separately from the interior piping. Coordinate this with the site water piping installer.
- H. Provide all necessary and appropriate personnel to participate in and coordinate fire protection systems with all fire alarm testing, or other systems testing which may interface with fire protection system. Participation shall include all preliminary testing, walk-through testing prior to official walk-through testing and any re-testing if required.
- I. Where Insurance Service Office (ISO) approval is required, the Sprinkler Contractor shall be sure that:
 - 1. That plans and calculations are sent for review to ISO, 100 Newport Avenue, CS1700, Quincy, MA 02269, and that all required changes are made.
 - 2. The certificate covering materials and tests is filed with ISO.
 - 3. That ISO has been given the proper notification, and that they are present for the 2" main drain test.
 - 4. That the underground test certificate is filed with ISO. Coordinate with the Site Contractor.

3.11 BACKFLOW PREVENTER PERMIT AND INSTALLATION

- A. All backflow prevention devices shall be approved, permitted, installed, maintained and tested in accordance with the requirements of the State and the Local Water Authority. A full size brass discharge line shall be extended to the nearest floor drain.
- B. Prior to installation, the Subcontractor shall submit through the Owner's Project Manager, a design data sheet, with plans showing the method of protecting the water system, and secure approval from the Local Water Authority, or its designee. This shall not be done until the Subcontractor has secured the permit for the work, by their Inspector of Plumbing, and shop drawings have been approved.

- C. Immediately upon installation, the Subcontractor shall have the backflow preventer tested by a "Certified Backflow Prevention Device Tester", and the results recorded on the Local Water Authority's Inspection and Maintenance Report Forms. Within 14 days after the installation, the Subcontractor shall notify, through the Owner's Project Manager, the reviewing authority to arrange inspection of the installation.
- D. Three (3) copies of each application and all subsequent correspondence, including the final permit, shall be forwarded to the Designer for record. Availability of final approvals or permits shall be prerequisite to scheduling a final inspection of the fire protection work.

END OF SECTION