

SECTION 15C - FIRE PROTECTION

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PART 1 - GENERAL

15C.00 GENERAL REQUIREMENTS

- A. Include General Conditions, Supplementary General Conditions and applicable parts of Special Conditions, and Division 1 as part of this Section.
- B. Examine all other Sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

15C.01 WORK INCLUDED

- A. The work under this Section shall include the furnishing of all material, labor, equipment and supplies and the performance of all operations to provide a complete working system as required by the Drawings and details and as specified herein, in general, to include the following items:
  - 1. A complete wet standpipe system in the building connecting to each and every valve and hose outlet. This system shall extend and connect to the 24" water main in Westford Street and shall include a wet tap. This system shall include a fire pump with controller with all pump accessories and excess pressure pump.
  - 2. A limited automatic wet sprinkler system. Sprinklers shall be installed in the Mechanical Room, Fire Pump Room, Storage Rooms, stairs and the top of the elevator shaft connecting to each and every sprinkler head. This system shall extend and connect to the standpipe.
  - 3. This Contractor shall include as part of his work a formal flow test to determine the static pressure (PSIG) and the residual pressure (PSIG) with water flow in gallons per minute.

15C.02 RELATED WORK IN OTHER SECTIONS

- A. The following work is not included as work in this Section and is to be performed under other Sections:
  - 1. All Cutting and Patching.
  - 2. Temporary Water, Heat and Fire Protection.
  - 3. Temporary Light and Power.

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4. Excavation and Backfilling.
5. Foundations and Trenching.
6. Concrete Bases for Equipment.
7. Painting.
8. Heating, Ventilating and Air Conditioning.
9. Plumbing.
10. Electrical.

15C.03 INTERPRETATION OF DRAWINGS

- A. All work shown on the Drawings is intended to be approximately correct to scale, but figures dimensions and detailed Drawings are to be followed in every case. The Drawings shall be taken in a sense as diagrammatic. Size of pipes or conduits and methods of running them are shown but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered.
- B. To carry out the true intent and purpose of the Drawings, all necessary parts to make complete, approved working systems ready for use shall be furnished without extra charge.
- C. Locations shown on the Drawings are approximate and it is intended that all equipment shall be located in accordance with the general and detail Drawings of the construction proper. All measurements shall be taken at the building before fabrication commences.

15C.04 OBTAINING INFORMATION

- A. Obtain from the manufacturer the proper method of installation and connection of the equipment that is to be furnished and installed. Obtain all information that is necessary to facilitate the work and to complete the project.

15C.05 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The work shall be so performed that the progress of the entire building construction, including all other trades, shall not be delayed and not interfered with. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as directed.
- B. Keep fully informed as to the shape, size and position of all openings required for all apparatus and give information in advance to build openings into the work. Furnish and set in place all sleeves, pockets, supports and incidentals.
- C. All distribution systems which require pitch or slope such as plumbing drains, steam and condensate piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid

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interferences.

15C.06 RECORD DRAWINGS

- A. Purchase and maintain at the job site a complete and separate black line set of prints of the approved Working Drawings on which accurately indicate daily progress by coloring materials and apparatus as installed. Schedules shall be modified to reflect data consistent with that of the installed equipment. Clearly show all changes to the work as a result of change orders, instructions issued by the Architect or conditions encountered in the field. Accurately indicate the location, size, type and elevation of new utilities and their relationship to existing utilities.
- B. The marked up and colored in prints will be used as a guide for determining the progress of the work installed. They shall be inspected weekly and shall be corrected immediately if found inaccurate or incomplete. Requisitions for payment will not be approved until the Drawings are accurate and up-to-date.
- C. At the completion of the work submit one (1) set of the marked up prints for review and approval. After approval these marked up prints shall be used in the preparation of the Record Drawings.
- D. Obtain and pay for one (1) set of reproducible prints applicable to this Section. These reproducible prints shall be made on 4 mil polyester base "Estar" or approved equal. Make all modifications to these reproducibles as shown on the marked up prints. Remove all superceded data to show the completed installation.
- E. The reproducibles may be made from the originals of the Contract Drawings. Arrange with the Architect to have these reproducibles made from the originals.
- F. Deliver the completed reproducible Record Drawings properly titled and dated to the Architect. These Record Drawings shall become the property of the Owner.

15C.07 PERMITS, FEES, RULES AND REGULATIONS

- A. Give the proper Authorities all requisite notices or information relating to the work under this Section. Obtain and pay for all fees, licenses, permits and certificates. Comply with the rules and regulations of all Local, State and Federal Authorities having jurisdiction, the rules and regulations of the National Board of Fire Underwriters and the Public Utilities Companies serving the building.

15C.08 PROTECTION OF WORK AND PROPERTY

- A. Be responsible for the care and protection of all work included under

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this Section until it has been tested and accepted.

- B. Protect all equipment and materials from damage from all causes including theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment.
- C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen and make good damage thus caused.

15C.09 SUBMITTAL REQUIREMENTS

- A. Refer to General Conditions and Supplementary Conditions for requirements all of which shall be included as part of this Specification.
- B. Submit for approval, within thirty (30) days after signing the Contract and prior to the submission of any shop drawings, an itemized list of manufacturers of material and equipment and of Subcontractors proposed to be used under this Section.
- C. After approval of the list, submit for review a minimum of eight (8) sets of detailed shop drawings. All shop drawings for equipment submitted for review shall include complete Specifications, including type of materials, operating pressures, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete for all equipment and shall apply only to this specific project.
- D. Regardless of any information included in the shop drawing submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the shop drawing review.
- E. Each submittal shall be reviewed, stamped and certified prior to submission to the Architect. Such certification shall be made by the Owner, or Corporate Officer of the Contractor, or by a person duly authorized by the Owner to sign binding agreements for the Contractor. The certification shall state that the data and details contained on each shop drawing, layout drawing, catalog data and brochure has been reviewed by the Contractor and that it complies with the Contract Documents in all respects. Shop drawings, layout drawings, catalog data and brochures will not be reviewed and will be returned to the Contractor unchecked unless they are certified.
- F. It is intended that the Contractor submit complete and accurate data at the first submission. If the shop drawing is returned marked "Resubmit", or "Not Accepted", only one (1) additional submission will be permitted.

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- G. Equipment shall be of proper size for its allotted space. Equipment shall be disassembled as required, without invalidating the manufacturers' warranty, so that it can be installed through regular window, door, and/or louver openings.
- H. The shop drawings and manufacturer's data shall be submitted in a timely manner sufficiently in advance to give ample time for checking, correcting, resubmitting and rechecking if necessary. No claim for delay will be granted for failure to comply with this requirement.
- I. A minimum period of two weeks, exclusive of transmittal time, will be required in the Engineer's office each time shop drawings, layout drawings, and catalog data and brochures are submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling his work.

15C.10 MATERIAL AND EQUIPMENT STANDARDS

- A. Refer to General Conditions and Supplementary General Conditions regarding substitution of materials as it relates to this project.
- B. Where materials or equipment are specified by patent proprietary name, or name of the manufacturer, such Specification shall be deemed to be used for the purpose of establishing a standard for that particular item. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified and only if the term "approved equal" appears.

15C.11 GUARANTEE

- A. Refer to General Conditions and Supplementary Conditions for requirements all of which shall be included as part of this Specification.
- B. Manufacturers shall provide their standard warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all liabilities which the manufacturer and Contractor may have by law or by provisions of the Contract Documents.
- C. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a period of one (1) year commencing with the date of Substantial Completion. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.
- D. Upon receipt of notice from the Owner of failure of any part of the

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systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

15C.12 CONTINUITY OF SERVICE AND SCHEDULING OF WORK

- A. Continuity of all services shall be maintained in all areas which will be occupied during the construction period. If an interruption of service becomes necessary, such shall be made only upon consent of the Owner and at a time outside normal working hours as he shall designate.
- B. Refer to the overall scheduling of the work of the project. Schedule work to conform to this schedule and install work to not delay nor interfere with the progress of the project.

15C.13 CERTIFICATES OF APPROVAL

- A. Upon completion of all work, furnish, in duplicate, certificates of inspections from the manufacturers stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be in satisfactory operating condition.

15C.14 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Give detailed instructions, prior to the completion of the work, to the responsible personnel designated by the Architect in the operation and maintenance of all work installed under this Section. A letter with two (2) copies containing the name of the person or persons to whom the instructions were given and the dates of the instruction period shall be submitted to the Architect at the completion of the project.
- B. In addition, prepare three (3) sets of manufacturer's catalogs, other similar data including the necessary photographic equipment cuts, wiring diagrams covering all mechanical equipment and devices furnished and installed under this Section. These manuals shall provide complete instructions for the proper operation and use of the equipment together with instructions for lubrication and periodic maintenance and for trouble shooting. Operating instructions shall be specific for each system and shall include copies of posted specific instructions. This manual shall contain only that information which specifically applies to this project and all unrelated material shall be deleted. During the instruction period this manual shall be used and explained. The material shall be bound in note book form and indexed.
- C. Provide name, address and telephone number of the Manufacturer's Representative and service company for each piece of equipment so that the source of replacement parts and service for each item of equipment can be readily obtained.
- D. Furnish in accordance with DIVISION 1 - GENERAL REQUIREMENTS, operating

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and maintenance manuals and forward to the Architect for transmittal to the Owner.

15C.15 VALVE TAGS AND LISTS

- A. This Subcontractor shall provide on each gate valve, on each globe valve, and on all automatic control valves installed under this Section, a 2 inch diameter brass tag with stamped numerals and letters painted white. The tags shall be attached to the valve handle or stem with brass chains and properly secured. All numbers shall be prefixed by letters corresponding to those listed for piping identification.
- B. These numbers shall correspond with numbers indicated for valves and controls on the Record Drawings and on a minimum of two (2) printed valve lists. These printed lists shall state the number and locations of each valve and the section, fixture or equipment which it controls, and other necessary information, such as requiring the opening or closing of another valve where one (1) valve is to be opened or closed.
- C. Printed lists shall be prepared in a form to meet the approval of the Architect, framed under glass and displayed in rooms designated by the Architect.

PART 2 - PRODUCTS

15C.16 PIPE AND FITTINGS

- A. Type A: Mechanical joint ductile iron, Class 52, with mechanical joint cast iron fittings; fittings shall conform to AWWA Class D. Pipe and fittings shall be coated on the outside, cement lined on the inside. All changes in direction shall have tie rods and clamps anchored to thrust blocks.
- B. Type B: Cast iron flanged pipe and fittings; pipe shall conform to Federal Specification WW-P-421, Class 150; flanges faced and drilled for 125 psi service. Pipe and fittings shall be coated on the outside, cement lined on the inside.
- C. Type C: Schedule 40 black steel pipe, black cast iron screwed companion flanges and flanged cast iron fittings, all suitable for 175 psi working water pressure.
- D. Type D: Schedule 40 black steel pipe with black cast iron screwed sprinkler fittings suitable for 175 psi working water pressure.
- E. Type E: Schedule 10 welded and seamless steel pipe in accordance with ASTM-A135 joined with groove fittings and couplings approved for service with grooves rolled on the pipe by an approved groove rolling machine. Minimum wall thickness in accordance with Schedule 10 pipe

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for sizes up to 5 inch pipe; 0.134 inch for 6 inch pipe; and 0.188 inch for 8 inch pipe and 10 inch pipe. Pipe shall be as manufactured by Allied Tube and Conduit Corp. Fittings shall be Victaulic, Style 77 couplings, and Style 920 Mechanical-T.

- F. Type F: Schedule 40 seamless red brass pipe with brass screwed fittings suitable for 175 psi working water pressure.
- G. Pipe and fittings shall be in accordance with the following:
1. For Exterior Water Service Type A
  2. For Service Entrance into Building Type B
  3. For Above Ground Piping where Making Connections to Flanged Valves and to Underground Entrance Type C
  4. Standpipe System Type E
  5. Sprinkler System Type D or E
  6. Piping from sidewalk siamese to fire alarm pump room Type F

15C.17 PIPE SLEEVES, HANGERS AND SUPPORTS

- A. Hangers for piping of sizes 4 inches and smaller shall be Carpenter-Patterson Figure No. 800 adjustable swivel ring, Crane Company, Grinnell Company or approved equal, black steel and hanger rods with machine threads. Hangers for piping of sizes larger than 4 inches shall be the adjustable clevis hanger type, steel with extension rod to structure, Carpenter-Patterson Figure No. 100. All hangers shall be UL/FM approved.
- B. Floor construction will be 8" flexi-core panels.

15C.18 VALVES

- A. Type "A": Gate valve shall have iron body, bronze mounted, straightway pattern, OS&Y, flanged ends, suitable for 175 lbs. working pressure, similar to Jenkins Brothers Figure No. 825-C.
- B. Type "B": Gate valve shall have bronze body with screwed ends, OS&Y, for 175 lbs. working water pressure, similar to Jenkins Brothers Figure No. 275-U.
- C. Type "C": Globe valve shall be bronze body with screwed ends, suitable for 300 lbs. non-shock cold water, similar to Jenkins Brothers Figure No. 106-A.
- D. Type "D": Check valve shall be swing type with cast iron body, bronze mounted, flanged ends, suitable for 175 lbs. working water pressure, similar to Jenkins Brothers Figure No. 729C, tapped for automatic ball drip as required.
- E. Type "E": Check valve shall be of the silent type, No. 203-A-T as

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manufactured by Mueller Steam Specialty.

- F. Type "F": Double check valve assembly shall be No. 709 as manufactured by Watts.
- G. Type "G": Victaulic testmaster style 719 fit ends.
- H. Valves shall be installed in accordance with the following:
  - 1. Gate Valves 2-1/2" and Larger Type "A"
  - 2. Gate Valves 2" and Smaller Type "B"
  - 3. Globe Valves Type "C"
  - 4. Check Valves 2-1/2" and Larger Type "D"
  - 5. Check Valves 2" and Smaller Type "E"
  - 6. Inspector Test Connection Type "C"
  - 7. Siamese Connection Type "D"
  - 8. Fire Pump Discharge Type "F"
  - 9. Inspector Test in Stairwell Type "G"
  - 10. Water Entrance into Building Type "F"
- I. All threads shall meet the requirements of the Local Fire Department.

15C.19 FLOW SWITCHES

- A. Water flow switch shall be Autocall Model No. 4160; Type WF-5 FM approved, UL listed equipped with two (2) SPDT contacts, adjustable retard dial, cast aluminum saddle, flexible polyethylene paddle, rubber gasket and dust proof cover.

15C.20 ELECTRIC ALARM BELL

- A. Electric alarm bell shall be 8" diameter 24 volt, 60 Hz, as manufactured by Notifier.

15C.21 SUPERVISORY SWITCHES

- A. Supervisory switches for OS&Y valves shall be Autocall Model No. OSYS-U, FM approved, UL listed equipped with two (2) SPDT contacts, housed in a cast aluminum case with a red enameled finish tapped for a 1/2 inch NPT conduit connection.

15C.22 INSPECTORS TEST AND DRAIN CONNECTIONS

- A. Wet system test pipe shall not be less than 1 inch in diameter terminating in a smooth bore corrosion resistant orifice giving a flow equivalent to one sprinkler shall be provided for each system. Each test connection valve shall be readily accessible and labeled. The discharge shall be to an open drain connection capable of accepting full flow under system pressure, provided under Section 15A.



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- horizontal split case fire pump. Unit shall include a pump, base, coupling, coupling guard, electric motor, necessary fittings and an automatic motor controller.
- B. The pump shall be rated at 500 GPM. Unit shall be designed to deliver not less than 150 percent of rated capacity at 65 percent of rated head. Maximum permissible pump speed shall not exceed 1770 RPM. Design head pressure will be determined after flow test has been taken by this Contractor.
- C. Pump shall be of the double suction horizontal split case design, with Class 30 cast iron casing, bronze casing wearing rings, bronze impeller, bronze impeller wearing rings, high quality steel shaft with renewable bronze shaft sleeves through the packing boxes and grease lubricated cartridge type anti-friction bearings. Packing box glands shall be split bronze type. Pump shall be hydrostatically tested at 1-1/2 times the maximum working pressure but in no case to less than 250 psi.
- D. Electric motor shall be of the ODP type with 1.15 Service Factor wound for 208 volts and sized so as not to exceed the permissible loading limits of NFPA No. 20 (or Factory Mutual Loss Prevention Data Sheet 3-7N) at any point on the pump performance curve. Maximum motor horsepower shall be 20.
- E. Furnish pump with the following fittings or accessories:
1. 3-1/2 Inch Dial Compound Suction Gauge.
  2. 3-1/2 Inch Dial Discharge Pressure Gauge.
  3. 1/2 Inch Automatic Air Release Valve.
  4. 3/4 Inch Minimum Circulating Relief Valve.
  5. Concentric Discharge Increaser, as Required by NFPA No. 20 - 4"x5".
  6. Pressure Recorder, as Required by Factory Mutual.
- F. Furnish the following fittings common for all pumps:
1. Hose valve manifold with a set of 2-1/2 inch hose valves, caps and chains.
- G. All equipment furnished and the complete installation shall be in accordance with NFPA No. 20 (or Factory Mutual Loss Prevention Data Sheet 3-7N). Pump and controller shall bear the UL and FM.
- H. Fire pump controller shall be Firetrol, Incorporated Model No. FTA-1250, factory assembled, wired and tested unit and shall conform to all the requirements of the latest edition of NFPA 20 Centrifugal Fire Pumps and NFPA 70 National Electrical Code.
- I. The controller shall be listed by Underwriters' Laboratories,

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Incorporated, Underwriters' Laboratories, Incorporated of Canada, New York Board of Standards and Appeals, approved by Factory Mutual Research Corporation and certified by the Canadian Standards Association. The controller shall bear the labels of UL, ULC, CSA, FM and NYB of S and A.

- J. The controller shall be of the combined manual and automatic type design for part winding of the fire pump motor having the horsepower, voltage, phase and frequency rating shown on the Plans and Drawings. The controller components shall be housed in a NEMA Type 3I wall mounted enclosure.
- K. All controller components, including circuit breakers and contactors, shall be front mounted, front wired and front accessible for maintenance. The circuit breaker interrupting capacity shall not be less than 50,000 AIC ASYM (42,000 AIC STM) at 208 volts.
- L. The controller shall include a motor rated combination isolating disconnect switch/circuit breaker mechanically interlocked and operated with a single externally mounted handle. When moving the handle from "OFF" to "ON" the interlocking mechanism shall sequence the isolating disconnect switch on first and then the circuit breaker. When the handle is moved from "ON" to "OFF", the interlocking mechanism shall sequence the circuit breaker open first and then the isolating disconnect switch.
- M. The isolating disconnect switch/circuit breaker shall be mechanically interlocked so that the enclosure door can not be opened with the handle in the "ON" position except by a hidden tool operated defeater mechanism. The isolating disconnect switch/circuit breaker shall be capable of being padlocked in the "OFF" position with up to three (3) padlocks for installation and maintenance safety, and shall also be capable of being locked in the "ON" position without affecting the tripping characteristics of the circuit breaker. The controller door shall have a locking type handle and three (3) point cam and roller type vault hardware.
- N. The circuit breaker trip curve adjustment shall be designed so that removal of any trip rating plug, button or knob shall cause the circuit breaker to trip so that proper circuit protection cannot be bypassed.
- O. The circuit breaker shall be capable of being field tested to verify actual pick up, locked rotor, and instantaneous trip points after field installation without disturbing incoming line and load conductors.
- P. The controller shall have externally mounted "Power ON" pilot light, "Start" push button and "Emergency Run" mechanism shall be separate units and not combined.
- Q. The "Power ON" pilot light shall be wired through contacts on the power

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available relays to give true power on indication. Loss of power in any phase or loss of control circuit transformer shall cause the light to go out.

- R. The controller shall be supplied with a pressure switch with a range of 0 psi to 300 psi and have independent high and low pressure settings. The pressure switch shall be mounted inside the controller to prevent unauthorized adjustment and/or accidental damage. The pressure switch shall be directly pipe mounted to a solidly welded bulkhead pipe coupling without any other supporting members and field connections shall be made externally at the controller coupling to prevent distortion of the pressure switch element and mechanism. The adjustment knobs shall be capable of being sealed after final adjustment. The controller shall have a minimum running period timer set for one (1) minute for each 10 HP, seven (7) minutes maximum. The maximum run timer shall include an internal timer running pilot light to indicate when the run timer is in the timing mode. Terminals shall be provided to field convert the controller from automatic to manual shut down. Terminals shall be provided so that standard duty rated normally open remote "Start" push buttons stations can be wired to the controller. Terminals shall be provided so that a remote deluge valve contract may be wired to the controller to start the unit.
- S. "Power Failure" and "Pump Operating" alarm contacts shall be wired to terminals. These contacts shall be both normally open and normally closed and be electrically isolated for wiring to either remote alarm panels as supplied by the controller manufacturer, or for use with remote telephone drop out type alarm systems, or with both systems simultaneously.
- T. A UL, ULC, FM and CSA labeled factory built in alarm shall be provided in the fire pump controller, requiring only 120 volt supervisory power. This alarm shall give an audible alarm for "Supervisory Power Available". This alarm shall be electrically isolated from the remote alarm contacts so that VDC or separate 120 VAC remote alarms can be utilized.
- U. The controller shall be supplied with interlock and shut down circuits as standard.
- V. No push buttons or pilot lights shall be mounted on the enclosure door.
- W. All alarm contacts shall be rated 125 VAC maximum 3 amperes pilot duty. They shall also be suitable for direct switching and allow energy alarm circuits 6 VDC minimum, 10 MA, 0.6 VA minimum.
- X. The control circuit transformer shall be of the molded winding construction with built in molded terminals and shall be fuse protected from external loads. The fuse shall be built into the transformer.

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- Y. It shall be possible to add after installation up to one (1) normally open and one (1) normally closed timing contact block on each control relay or up to two (2) normally open and two (2) normally closed auxilliary contact blocks on each control relay for future use.
- Z. The manufacturer shall test the entire controller assembly prior to shipment. This test shall include, but not be restricted to, each function the controller may be required to perform including remote alarms, remote start, automatic start with manual shut down, remote deluge valve start, pressure drop start, manual start/stop.
- AA. The manufacturer shall test the circuit breaker at 300 percent full load, 600 percent full load, and short circuit current settings.
- BB. The manufacturer shall perform a high potential test of the controller power circuits at not less than two (2) times the rated voltage plus 1,000 volts.
- CC. Excess pressure pump shall be as manufactured by Gamewell, Model 26615-7 Watchman kit. Kit shall have M2700-11 pressure switch, kit shall be factory assembled and tested prior to shipment.
- DD. The fire pump, fire pump controller, and excess pressure pump shall be installed in accordance with the manufacturer's recommendations and where shown on the Drawings.
- EE. Fire protection equipment shall be installed in accordance with the manufacturer's recommendations.

15C.28 PIPE IDENTIFICATION

- A. Label each piece of mechanical equipment with a 1-1/2 inch by 4 inch long aluminum nameplate with a black enamel background and with the designated equipment and area or system served engraved in natural aluminum letters. Secure with two (2) "Phillips head" brass screws or machine bolt with lock nuts. Nameplates shall be manufactured by Seton Nameplate Company, by Dennison Manufacturing Company, Markem Company or approved equal.
- B. Identify piping as specified herein. Identification markers for piping 3/4 inch up to and including 5 inch shall be Setmark Type SNA. Piping 5 inch and above shall be identified with Setmark Type STR laminated plastic markers.
- C. Exposed piping and piping above removable ceiling shall be identified at intervals of 20'-0" and at each change of direction together with an arrow showing the direction of flow.
- D. Legend and colors shall conform to the following, with all lettering and arrow colored black:

<u>Service</u>	<u>Band Color</u>	<u>Legend</u>
Fire Protection	Red	FP

15C.29 TESTS AND APPROVALS

- A. Upon completion and prior to acceptance of the installation and before any piping is concealed, the Fire Protection Contractor shall subject the system to tests required by NFPA 13, 14, 20 and 24 and the Insurance Underwriters and shall arrange for approval of installation. A certificate of approval and acceptance by authorities having jurisdiction shall be submitted to the Architect. All tests shall be witnessed by the Architect and Underwriters' Representative.

PART 3 - EXECUTION

15C.30 FIRE PROTECTION SYSTEMS

- A. All piping shall be cut accurately to measurements obtained at the site of the system and shall be installed without springing or forcing. All piping shall be protected against mechanical injury in manner satisfactory to authorities having jurisdiction.
- B. All piping shall be located to avoid conflict with structure, all other trades and as required to maintain the maximum possible headroom. All service pipes, fittings and valves shall be kept at sufficient distance from other work to permit not less than 1/2" from finished coverings and such other work and not less than 1/2" between finished coverings on the different services.
- C. Pipe shall be run parallel and graded evenly to draining points. Provide a drain valve at each low point in piping so that all parts of the sprinkler system can be drawn off.

15C.31 SPRINKLER HEADS

- A. The Fabrication Drawings are to be prepared by the Fire Protection Contractor and shall indicate all light fixtures, ductwork and diffusers in relation to the proposed location of sprinkler heads.

15C.32 PIPE SLEEVES, HANGERS AND SUPPORTS

- A. Pipe sleeves, hangers and supports for all piping shall be furnished and set by this Contractor shall be responsible for their proper and permanent location.
- B. Pipe sleeves shall be installed and properly secured at all points

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where pipes pass through masonry, concrete or wood. Pipe sleeves shall be of sufficient diameter to provide approximately 1/4 inch clearance around pipe. Pipe sleeves through masonry partitions and floors shall be screws or clips for firmly holding in place. Sleeves in floors shall extend 1 inch above floor and after installation of pipe shall be packed and made water tight. Sleeves through walls shall end flush with surface of walls.

- C. All piping shall be rigidly supported from the building structure by means of approved hangers and supports. Pipes shall be supported to maintain required grading and pitching of lines to prevent vibration and to secure piping in place and shall be arranged so as to provide for proper expansion and contraction of pipe.
- D. All horizontal piping shall be hung with approved adjustable, malleable iron pipe hangers, unless otherwise specified and spaced not over the following distances:
- |                                 |                  |
|---------------------------------|------------------|
| 1. Copper Tubing and Brass Pipe | 6'-0" on Center  |
| 2. Steel Pipe                   | 10'-0" on Center |
- E. Rod size shall be the same as the approved for use with the hanger assembly, and the size of the rods shall not be less than given in the following table:
- |                    |          |
|--------------------|----------|
| 1. 1/2" to 4" Pipe | 3/8" Rod |
| 2. 5" and Larger   | 1/2" Rod |
- F. Floor construction will be 8" flex-core panels.

15C.33 VALVES

- A. All valves shall be located in a manner to allow proper access for service and repair.
- B. In no case shall valve stems and handles be installed below the center line of the pipe it serves.

15C.34 FLOW SWITCHES

- A. All flow switches shall be located in a manner to allow proper access for service and repair. All switches shall be set with the control box on the top of the pipe.

15C.35 SUPERVISORY SWITCHES

- A. All supervisory switches shall be located in a manner to allow proper access for service and repair.

15C.36 FIRE DEPARTMENT CONNECTION

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- A. Siamese connection shall be set no less than 1'-6" or more than 3'-6" above outside grade.

15C.37 FIRE DEPARTMENT VALVES

- A. Valves shall be located in a manner to allow proper access and shall be set 5'-0" above finished floor.

15C.38 FIRE PUMP

- A. Concrete foundation for the fire pump shall be reinforced concrete 12 inches high. Base plate shall be bolted to the foundation in accordance with NFPA 20.

15C.39 ALTERNATE BID(S) - FIRE PROTECTION

- A. The Bidder shall submit on the Bid Form the amount to be added to or deducted from his Bid for the following Alternate Bid(s). Where the Alternate Bid does not result in an addition to or deduction from the base bid, there shall be written on the space provided in the Bid Form for the Alternate Bid, the words "NO CHANGE".
- B. Each Bidder shall carefully compare specifications and details pertaining to the Alternate, with the requirements for the Base Bid, and shall include in his Alternate Bid all changed in related work necessary to accomplish the Alternate work.
- C. The Owner reserves the right to accept or reject any or all Alternate Bids.
- D. Materials and equipment incorporated in the Alternate work shall conform to the requirements of the Contract Documents. Guarantee furnished in connection with Alternate items shall in every way conform to the Base Bid items with any necessary modifications to such Alternate items.

15C.40 BASE BID

- A. The Base Bid in general shall consist of the construction of the Fire Suppression System, exclusive of the Alternate Bids as hereinafter set forth and as specified.

15C.41 ALTERNATE BID NO. 1

- A. Under this Alternate, state the amount to be added to the Base Bid if the sprinklers are installed in the corridors.

15C.42 ALTERNATE BID NO. 2

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- A. Under this Alternate, state the amount to be deducted from the Base Bid if the fire pump and controller and all accessories, three (3) 6" OS&Y gate valves, three (3) 5" OS&Y gate valves, two (2) 5" check valves, two 6" check valves and four (4) supervisory switches are deleted.

15C.43 ALTERNATE BID NO. 3

- A. Under this Alternate, state the amount to be added to the Base Bid for one (1) 4" OS&Y gate valve, two (2) 4" check valves and change 6" pipe to 4" pipe, in place of Alternate No. 2.