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DIVISION 21 00 00 – FIRE SUPPRESSION SYSTEMS

21 00 00 Fire Suppression Systems

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Specification Index Divisions 21

Project Name: Orient Road Jail Fire Pump Replacement

Project Address: 1201 Orient Road Tampa, FL 33619

CODES APPLICABLE TO THESE SPECIFICATIONS:

Florida Building Code, Sixth Edition (2017):

Building
Accessibility
Energy Conservation
Mechanical
Plumbing
Fuel Gas

Florida Fire Prevention Code, Sixth Edition

Specifications written using Microsoft WORD Office 365

SECTION 21 00 00 – FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Bidding Requirements and Contractual Conditions set forth in Division 01 apply to this section.
- B. Examine other sections of the Project Manual for requirements which affect work of this section whether or not such work is specifically mentioned in this section.
- C. Bidders of work in Sections under Division 21 are expected to have read these requirements and, upon subcontracting work called for in such Sections, shall be responsible for compliance with such Sections.

1.2 DEFINITIONS

- A. Technical Definitions:
 - 1. "Piping" shall mean pipe, fittings, flanges, valves, controls, hangers, drains, and items customarily required in connection with the transfer of fluids.
 - 2. "Concealed" shall mean embedded in masonry or other construction, installed within or behind wall furring, within double partitions or hung ceilings, in attics, in crawl spaces, in chases, in shafts, buried in trenches, etc.
 - 3. "Exposed" shall mean not concealed.
 - 4. "Demolition" shall be the removal of any existing component, and the capping or plugging or any existing services. Adjacent surfaces shall be restored to existing conditions.
 - 5. "Furnish" means to purchase and deliver products and equipment to the project site and prepare for installation.
 - 6. "Install" means to assemble, erect, place, anchor and connect furnished products into satisfactory operation.
 - 7. "Provide" means to furnish and install.
 - 8. "Contract Documents" shall include the written Project Manual and the Drawings.
 - 9. Division 21 is the new CSI division replacing the old Division 15 nomenclature, and is hereby defined as interchangeable.
 - 10. Division 26 is the new CSI division replacing the old Division 16 nomenclature. They shall be hereby defined as interchangeable.

1.3 QUALITY ASSURANCE

- A. Whenever a reference is made to a standard, installation, or materials, the intention is that the Contractor shall comply with the latest published edition at the time project is bid, unless the edition is otherwise specified herein.
- B. Materials and equipment specified herein shall be new and standard catalogued items manufactured by reputable concerns regularly supplying such materials. Material shall bear the Underwriters' Laboratories, Inc. label or other appropriate label where such is required or allowed by code, by Contract Documents or by authorities having jurisdiction.
- C. Product deliveries shall be arranged in accordance with construction schedules and to avoid conflict with work and site conditions.
 - 1. Deliver and store products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately, on delivery, inspect shipments to assure compliance with the requirements of the Contract Documents and approved submittals, and that products are properly protected and undamaged.
3. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.4 AMPLIFICATION

- A. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of an item, in the Contract Documents, carries with it the intent to provide the item, regardless of whether or not this is explicitly stated as part of the indication or description.
- B. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.
- C. In case of discrepancy concerning quality and/or quantity within the Contract Documents, the better quality and/or the greater quantity shall be provided, at no increase to the Contract sum.
- D. No exclusions from, or limitations in, the language used in the Contract Documents shall be interpreted as meaning that the appurtenances or accessories necessary to complete any required system or item of equipment are to be omitted.
- E. The Drawings, of necessity, utilize symbols and schematic diagrams to indicate various items of work. The work shall be installed, in accordance with the diagrammatic intent expressed on the drawings, and in conformity with the dimensions indicated on final architectural and structural drawings.
- F. Where Contract Documents conflict, such conflict shall be brought to the attention of the Engineer for clarification. Any change from the Drawings necessary to make the work conform to the building as it is constructed, to fit the work of other trades, or to the rules of authorities having jurisdiction, shall be made at no expense to the Owner.
- G. No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete Work are excluded.
- H. Certain details appear on the Drawings, which are specific with regard to the dimensioning and positioning of the Work. These details are intended only for the purpose of establishing general feasibility. They do not obviate responsibility for field coordination for the indicated Work.
- I. The Engineer reserves the right to make minor changes in the location of fire protection work or equipment prior to "roughing-in" without additional cost to the contract. Engineer approval for deviations from drawing locations and layout shall be obtained prior to installation.
- J. The use of a word in the singular shall not be considered as limiting where other indications denote that more than one item is required.

1.5 QUALIFICATIONS

- A. All entities and personnel performing work for this project shall be regularly engaged and experienced in the type of work to be furnished and shall be licensed for such specialty trades, employ only properly qualified foremen, journeymen and apprentices as appropriate and in keeping with best trade practices.
- B. Each firm shall provide, upon request, a list of similar jobs it has completed. A minimum of 5 years' experience installing fire protection systems is required.

1.6 CONSTRUCTION REQUIREMENTS

- A. Locations of all pipes, etc., as shown on the Drawings are approximate only and are understood to be subject to such revisions as may prove necessary or desirable at the time the work is installed. All work shall be installed with relation to building conditions and shall be installed correct with reference to finished elevations, etc.
- B. The Contractor shall so coordinate the work so that it may be installed in the most direct and workmanlike manner.
- C. All parts of the system requiring adjustments shall be easily accessible.

1.7 PROJECT CONDITIONS FOR EXISTING BUILDINGS

- A. All existing utilities shall be located prior to the beginning of work.
- B. Adequate means of protection for all existing utilities shall be provided and, if utilities are damaged during working operations, such shall be repaired to the satisfaction of the utility Owner and at no cost to the contract.
- C. Where existing devices are permanently abandoned, each pipe, etc., shall be completely removed and the pipe plugged or capped at a point well behind the proposed new finished closures, at the nearest valve and within newly finished surfaces.

1.8 COORDINATION

- A. Coordinate the layout of fire protection work with other trades.

PART 2 – PRODUCTS

2.1 SUPPORTS

- A. Provide products which are Underwriters Laboratories listed and Factory Mutual approved.
- B. MSS Standard Compliance:
 - 1. Provide pipe hangers and supports of which materials, design and manufacture comply with ANSI/MSS SP-58.
 - 2. Select and apply pipe hangers and supports, complying with MSS SP-69. Size hangers and supports to support pipe weight and fluid conveyed.
 - 3. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
 - 4. Terminology used in this section is defined in MSS SP-90.
- C. Except as otherwise indicated, provide factory-fabricated horizontal piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by installer to suit horizontal piping system, in accordance with MSS SP-69 and manufacturer's published product

information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping.

Adjustable Steel Clevises: MSS Type 1.
Pipe Hangers: MSS Type 2.
Steel Double Bolt Pipe Clamps: MSS Type 3.
Steel Pipe Clamps: MSS Type 4.
Pipe Hangers: MSS Type 5.
Adjustable Swivel Pipe Rings: MSS Type 6.
Adjustable Swivel Rings, Band Type: MSS Type 10.
Split Pipe Rings: MSS Type 11.
Extension Split Pipe Clamps: MSS Type 12.
U-Bolt: MSS Type 24.
Clips: MSS Type 26.

2.2 PIPE HANGERS

- A. Pipe hangers for all piping shall be Anvil Star or Grinnell of a type suitable for each use. Perforated straps shall not be used in any work. For ferrous pipes up to and including four inches (4") in size, use Anvil Star Figure 69 carbon steel, adjustable, swivel ring hanger. For piping larger than four inches (4") diameter, use Anvil Star Figure 260 steel clevis hanger. Where several pipes are parallel at the same elevation, trapeze hangers may be used.

- B. Hanger rods sizes shall conform to the following schedule:

Pipe up to and including 4":	3/8" rod
Pipe 5" up to and including 8":	1/2" rod
Pipe 10" and 12":	5/8" rod

- C. Unless shown otherwise on the Plans, all horizontal runs of ferrous piping shall be suspended from the floor or roof construction, as the case may be, by means of hangers with the following maximum spacing:

Steel Pipe:

Pipe 1" up to and including 1-1/4":	12-0 feet
Pipe 1-1/2" thru 8":	15-0 feet

Threaded Light wall:

Pipe 1" up to and including 3":	12-0 feet
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2.3 VERTICAL PIPING CLAMPS

- A. General: Except as otherwise indicated, provide factory-fabricated vertical piping clamps complying with ANSI/MSS SP-58, of one of the following types listed, selected by installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe.
- B. Two-Bolt Riser Clamps: MSS Type 8.
- C. Four-Bolt Riser Clamps: MSS Type 42.

2.4 HANGER ROD ATTACHMENTS

- A. General: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by installer to suit horizontal piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger rod attachments to suit hanger rods
- B. Steel Clevises: MSS Type 14.
- C. Swivel Turnbuckles: MSS Type 15.
- D. Malleable Iron Sockets: MSS Type 16.
- E. Steel Weldless Eye Nuts: MSS Type 17.

2.5 BUILDING ATTACHMENTS

- A. General: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
- B. Concrete Inserts: MSS Type 18.
- C. Top Beam C-Clamps: MSS Type 19.
- D. Side Beam or Channel Clamps: MSS Type 20.
- E. Center Beam Clamps: MSS Type 21.
- F. Welded Attachments: MSS Type 22.
- G. C-Clamps: MSS Type 23.
- H. Top I-Beam Clamps: MSS Type 25.
- I. Side I-Beam Camps: MSS Type 27.
- J. Steel I-Beam Clamps with Eye Nut: MSS Type 28.
- K. Steel WF-Beam Clamps with Eye Nut: MSS Type 29.
- L. Malleable Beam Clamps: MSS Type 30.
- M. Steel Brackets: Heavy Duty: MSS Type 33.
- N. Side Beam Brackets: MSS Type 34.
- O. Plate Lugs: MSS Type 57.
- P. Horizontal Travelers: MSS Type 58.

2.6 MISCELLANEOUS MATERIALS

- A. Metal Framing: Provide products complying with NEMA STD ML 1.

- B. Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.
- C. Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.
- D. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.
- E. Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacing complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork, other supported mechanical systems, or electrical items.
- F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping. Provide section drawing for hanger locations to avoid duct interference.
- G. Support fire suppression piping independently of all other piping.

2.7 MANUFACTURERS AND INSTALLATION OF PIPE, HANGERS, AND SUPPORTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturer's offering hangers and supports which may be incorporated in the work include, but are not limited to, the following: Anvil Star and Tyco-Grinnell Corp.

2.8 PIPE PAINTING

<u>TYPE OF SERVICE</u>	<u>BACKGROUND COLOR</u>
Fire Protection Water	Red
Sprinkler-Fire	Red

2.9 BASIC PIPE, TUBE AND FITTINGS

- A. Interior Piping:
 - 1. Black Steel Pipe:
 - a. Pipe Weight: Schedule 40 up to 2"; Schedule 10 for 2-1/2" and larger.
 - b. Fittings: Class 125, cast-iron threaded.
 - c. Fittings: Mechanical grooved pipe couplings and fittings; cut-groove type.
 - d. Fittings: Mechanical grooved pipe couplings and fittings; roll-groove or mechanical locking type.

2.10 BASIC SUPPORTS, ANCHORS AND SEALS

- A. Provide supports, anchors, and seals in accordance with the following listing:
 - 1. Adjustable steel clevises, adjustable steel band hangers, adjustable band hangers, for horizontal piping hangers and supports.

2. Two-bolt riser clamps for vertical piping supports.
3. Steel turnbuckles, and malleable iron sockets for hanger-rod attachments.
4. Concrete inserts, top-beam C-clamps, side beam or channel clamps, and center beam clamps for building attachments.

2.11 BASIC VALVES

A. Interior Valves:

1. Sectional: Butterfly valves, Gate valves, O, S & Y UL listed, supervised.
2. Check: Swing check valves, UL listed.

2.12 SPECIAL VALVES

- ### A. Provide valves, UL listed, of sizes and types which mate and match piping and equipment connections.

2.13 BASIC METERS AND GAUGES

- ### A. General: Provide meters and gauges in accordance with the following listing:

Pressure gauges: 0-250 PSI range.

2.14 FIRE PROTECTION SPECIALTIES

- A. Provide fire protection specialties, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.
- B. Water Flow Indicators: Provide vane-type water flow detectors with retard switch adjustable up to 2 minutes.
- C. Supervisory Switches: Provide products recommended by manufacturer for use in service indicated.

2.15 FIRE PROTECTION VALVES

A. VALVES

Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.

B. GATE VALVES

1. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.
2. For Fire Protection Service:
 - a. Threaded Ends 2" and Smaller: Class 175, bronze body, screwed bonnet, rising stem, OS&Y, solid wedge, UL listed.
 - b. Flanged Ends 2-1/2" and Larger: Class 175, iron body, bolted bonnet, rising stem, OS&Y, solid wedge, UL listed.

- c. Mechanical Joint Ends 4" and Larger: Class 175, iron body, bolted bonnet, non-rising stem, indicator post flange, solid wedge, UL listed.
- 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gate valves which may be incorporated in the work include, but are not limited to, the following: Kennedy, Tyco-Grinnell, NIBCO, Inc., United Brass Works, Inc.

C. DRAIN VALVES

- 1. For Low Pressure Drainage Service:
 - a. Threaded Ends 2" and Smaller: Class 150, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
 - b. Soldered Ends 2" and Smaller: Class 150, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
- 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drain valves which may be incorporated in the work include, but are not limited to, the following: NIBCO, Inc., AGF.

D. BUTTERFLY VALVES

- 1. Comply with MSS SP-67. Provide gear operators on butterfly valves 6" and larger. Butterfly valves shall have a minimum working pressure rating of 150 psig at 150°F and be capable of bubble tight shut-off without a downstream flange at full rated pressure. Available Manufacturers: Subject to compliance with requirements, manufacturers offering butterfly valves which may be incorporated in the work include, but are not limited to the following: Tyco-Grinnell, NIBCO, Inc., Kennedy, and Viking.

E. SWING CHECK VALVES

- 1. Construct pressure containing parts of valves as follows:
 - a. Bronze Valves, 150 PSI: ANSI/ASTM B 62.
- 2. Comply with MSS SP-71 for design, workmanship, material and testing.
- 3. Construct valves of pressure castings free of any impregnating materials.
- 4. Construct valves of bronze, regrinding with seating angle 40 degrees to 45 degrees, unless composition disc is specified.
- 5. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.
- 6. Construct disc and hanger as separate parts, with disc free to rotate.
- 7. Support hanger pins on both ends by removable side plugs.
- 8. For Fire Protection Service:
 - a. Threaded Ends 2-1/2" and Larger: Class 175, iron body bronze mounted, bolted cap, horizontal swing, malleable iron disc, UL listed.
 - b. Flanged Ends 2-1/2" and Larger: Class 175, iron body bronze mounted, bolted cap, horizontal swing, malleable iron disc, UL listed.
- 9. Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated into the work include, but are not limited to, the following: Tyco-Grinnell, NIBCO, Inc., Kennedy, United Brass Works, Inc., and Viking.

2.16 IDENTIFICATION OF VALVES

- A. All control, drain, and test connection valves shall be provided with a permanently marked weatherproof metal or rigid plastic identification signs.
- B. The identification sign shall be secured with corrosion-resistant wire, chain, or other approved means.

- C. The control valve sign shall identify the portion of the building served.

2.17 CENTRIFUGAL FIRE PUMPS

A. FIRE PUMP ASSEMBLY

1. The fire pump system consists of a fire pump, fire pump driver and fire pump controller, factory assembled and tested and shipped on a common steel base as follows:

Horizontal Split-case: Bronze fitted centrifugal type, UL listed and FM approved, Standard 125# suction flange and 250# discharge flange, bronze shaft seals, case wearing rings, packed stuffing boxes with langern ring, deliver not less than 150% of rated capacity at 65% of rated head and shut-off pressure not exceeding 120% of rated pressure.

2. Fire Pump Driver: Fire pump driver shall be electric motor with the following physical and operating characteristics:

Electric Motor: UL approved, horizontal, ball bearing, open drip-proof, locked rotor amperes not exceeding NFPA-20 valves, induction design. Refer to schedule on the drawings for electrical requirements.

3. Fire Pump Controller: Provide a fully automatic, UL labeled, completely assembled, wired and tested at the factory, mounted on the common base with the fire pump and fire pump driver unless indicated on the drawings as remotely located.

Controller for Electric Motor Driven Fire Pump: The controller shall have an interrupting capacity of 25,000 ampere, specifically approved for fire pump use, drip tight enclosure and designed for across-the-line starting.

4. Fire Pump Controller with transfer switch: Provide a fully automatic, UL labeled, completely assembled, wired and tested at the factory, Metron or equal.

Controller for Electric Motor Driven Fire Pump: The controller shall have an interrupting capacity of 25,000 ampere, specifically approved for fire pump use, drip tight enclosure and designed for across-the-line starting, full voltage.

B. JOCKEY PUMP SYSTEM

1. Provide a jockey pump system that is fully automatic consisting of a jockey pump, jockey pump controller and other appurtenances and specified as follows:
2. The jockey pump to be the Vertical type, multi-stage, cast-iron casing, bronze impeller and wear rings, packing or mechanical seals, threaded suction and discharge connections and a close coupled, open, drip-proof motor.
3. Provide a UL/FM approved jockey pump controller that is fully automatic, enclosed in a NEMA 1 general purpose cabinet, across-the-line starter with three-leg overcurrent protection, 3-pole fusible disconnect switch, HOA selector switch, bourdon tube type pressure regulator and a minimum running period timer.

C. ACCESSORIES

1. The accessories required for a complete fire pumping system shall be furnished by the fire pump manufacturer and include, but not necessarily be limited to, the following:

UL/FM OS & Y Gate Valves
Eccentric Tapered Suction Diffuser

Commercial Tee
Concentric Discharge Increaser
Pipe Tee
Ball Drip Valve
Outside Hose Valve Head
Compound Type Suction Gauge - 3-1/2" diameter
Umbrella Cock
Automatic Air Release Valve
Discharge Pressure Gauge - 3-1/2" diameter
Pump Casing Relief Valve
Flanged Enclosed Cone (If Vertical In-line pump is specified)
Hose Valves
Hose Valve Caps and Chains

PART 3 - EXECUTION

3.1 ORGANIZATION OF THE WORK:

- A. All work shall be installed as required to meet all construction schedules.
- B. Prior to starting the work, carefully verify all measurements at the site and determine that the work will properly clear openings, structural members and work of other trades. Correlate the time of each work item with all other trades to the best advantage of the completed job. Furnish, in ample time to avoid delays in the work, all information required to revise footing elevations, structural elements, chases and openings in floors and walls, and to provide clearances which may be required to accommodate the work.
- C. Should uncharted or incorrectly charted piping or other utilities be encountered during work operations, notify the Architect/Engineer immediately for clarification.
- D. Immediately act to put any damaged utilities back in functioning conditions.
- E. At all times while work is taking place, a competent Superintendent in charge shall be on site.
- F. Maintain a complete file of all Contract Documents and approved shop drawings at the site.
- G. Installation and shop drawings shall be initialed and dated upon installation. This procedure will enable the Architect/Engineer to verify the work in progress.
- H. The Contractor shall be responsible for the work until its completion and Substantial Completion. Replace any work which may be damaged, lost or stolen without additional cost to the Owner, while the site is under the control of the contractor.
- I. Provide all scaffolding, rigging, hoisting, and services necessary for erection of the work and for delivery to and removal from the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.
- J. Keep the premises free from accumulations of waste material or rubbish.
- K. Minimize construction noise levels in all locations adjacent to or in occupied areas.
- L. The Owner reserves the right to prevent use of any tools which cause detrimental vibration or noise when the facility is occupied.

- M. Protect equipment and materials during construction from damage from water, dirt, welding and cutting splatter, paint drippings, etc., by use of shields and drop cloths. Damaged materials shall be repaired or replaced to the Architect's satisfaction.
- N. Products stored outside shall be covered with waterproof drop cloth or tarpaulins. Condensation shall be prevented by heating and ventilating as may be required.
- O. Provide the following accessory materials for sprinkler systems:

All pipe penetrations of rated floors and walls shall be properly sealed in accordance with UL and UL approved details. Coordinate penetrations with the appropriate detail as referenced on the Architectural Drawings.
- P. Provide written copy of the approval of the authority having jurisdiction.

3.2 SHOP DRAWINGS AND SUBMITTALS

- A. The Architect/Engineer shall have the authority to determine the method of submitting shop drawings.
- B. Submittals are required for all Fire Protection items.
- C. For items reviewed and marked "Rejected" or "Revise and Resubmit", only one additional submittal will be reviewed to verify product compliance with the Contract Documents. Should further submittals be required for the Design Professional to verify the submittal with the requirements of the Contract Documents, the hourly rate of \$150.00 will be billed to the Contractor for the Professional(s) time spent on the review.
- E. Manufacturer's catalog cuts may be submitted for all standard cataloged equipment, provided that the item required to meet the project specification is not modified in any way from the standard catalog version. Where multiple products are included on the same cut sheet, clearly identify the product proposed for installation by striking through all sections not applicable to the proposed product.
- F. Cuts shall be clearly marked to indicate the exact size, type, rating, capacity, etc., of the item to be provided.
- G. Submit shop drawings and cut sheets all at one time. Allow space for Contractor, Project Architect and Engineer review stamps.
- H. All submittals must bear the handwritten signature of the Contractor and his stamp of approval before being considered for review by the Architect/Engineer.
- I. Shop drawings that deviate from the requirements of the contract documents shall list all differences in a cover letter attached to top of the submittal. Any unlisted deviations found during review will result in the rejection of the entire submittal. Pipe routes may not be altered strictly for the Contractor's convenience.

3.3 EXAMINATION OF EXISTING CONDITIONS

- A. Visit and carefully examine those portions of the site and/or present buildings affected by this work so as to become familiar with existing conditions and difficulties that will affect the execution of the work, before submitting proposals.

- B. Submission of a proposal will be construed as evidence that such examination has been made. Later claims for labor, equipment, materials, etc. required because of difficulties encountered, which could have been foreseen had such examination been made, will not be recognized.

3.4 PAINTING

- A. All work shall be left clean and free from oil, dirt and grease prior to field painting.
- B. Upon completion, thoroughly clean all piping and other work to remove all dirt, grease, rust and oil. Thoroughly prepare all such work for painting.
- C. All exposed fire protection piping shall be painted red.

3.5 CHASING, CUTTING AND PATCHING

- A. When it becomes necessary to cut finished materials, submit to the Engineer for approval, drawings showing the work required and obtain approval before doing such cutting.
- B. No cutting or altering the work of others will be permitted without the approval of the Engineer. No structural members shall be cut without the previous written approval of the Engineer.

3.6 CLEANING

- A. Upon completion, piping and equipment shall be thoroughly cleaned of dirt, grease, rust and oil, primed where necessary, and made ready for painting.
- B. Clean gauges and fittings.

3.7 TEST AND INSTRUCTIONS

- A. Make tests necessary to establish the adequacy, quality, safety, completed status and satisfactory operation of all systems and components. Tests shall be made to the satisfaction of the Engineer and the authority having jurisdiction.
- B. Provide a letter addressed to the Owner advising that the completed systems have been installed in accordance with the Contract Documents and that such are in proper operating condition. The Owner shall receive a written guarantee covering all defects in workmanship and material for a period of one (1) year from date of Substantial Completion.

3.8 INSTRUCTIONS

- A. After the systems are in operation, and tests are complete, instruct the designated personnel of the Owner on the operation and maintenance of all equipment and systems in accordance with NFPA Standards.

3.9 PROJECT CLOSEOUT

- A. Prior to request for substantial completion, all fire protection systems shall be verified for proper operation. Substantiation of complete and operational systems shall be verified by submission of the following documents and forms:
 - 1. Completed Operation and Maintenance Manuals.
 - 2. Fire pump certification reports signed by the authority having jurisdiction (AHJ).

3.10 FIELD QUALITY CONTROL

- A. Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of two hours, at not less than 200 PSI or at 50 PSI in excess of maximum static pressure when maximum static pressure is in excess of 150 PSI. Check system for leaks. Measure hydrostatic pressure at low point of each system or zone being tested.
- B. Repair or replace piping system as required to eliminate leakage in accordance with ANSI/NFPA standards for "little or no leakage", and retest as specified to demonstrate compliance.

END OF SECTION 21 00 00