

SECTION 210500 - BASIC FIRE SUPPRESSION REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.2 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.3 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authorities Having Jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.4 CODE COMPLIANCE

- A. Provide work in compliance with the following:
 - 1. 2020 Building Code of New York State.
 - 2. 2020 Fire Code of New York State.
 - 3. 2020 Plumbing Code of New York State.
 - 4. 2020 Mechanical Code of New York State.
 - 5. 2020 Fuel Gas Code of New York State.
 - 6. 2020 Property Maintenance Code of New York State.
 - 7. 2020 Energy Conservation Code of New York State

8. Accessible and Usable Buildings and Facilities, ICC A117.1 (2009).
9. New York State Department of Labor Rules and Regulations.
10. New York State Department of Health.
11. 2017 National Electrical Code (NEC).
12. Occupational Safety and Health Administration (OSHA).
13. Local Codes and Ordinances.
14. Life Safety Code, NFPA 101.

1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association

NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.
OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	Performance and Design criteria for Contractor provided professional services. Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the licensed design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.
Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative

	and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.
Submittals Defined (Technical)	Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.7 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.
- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to mealbasubmittalclerk@meengineering.com.
- C. Refer to Division 01 for additional requirements.

1.8 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.9 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of

Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.10 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.11 UTILITY COMPANY SERVICES

- A. Division 26 shall make arrangements with National Grid for electric service to the Owner's distribution equipment. Provide underground or overhead electric service as called for and transformers, meter sockets or meter compartments as required by the Utility Company. Coordinate all activities between the Owner and Utility Company. The installation of the electric service shall comply with the published Utility Company standards
- B. Division 22 shall make arrangements with National Grid for gas service to the Owner's distribution system. Provide service to the building as required by the Utility Company. Coordinate all activities between the Owner and Utility Company. The installation of the gas service shall comply with the published Utility Company standards

1.12 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.

- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.
- E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
 - 1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 - 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.13 COORDINATION DRAWINGS

- A. Before construction work commences, Divisions for all trades shall submit coordination drawings in the form of CAD drawing files, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:
 - 1. Division 23 shall prepare the base plan CAD coordination drawings showing all ductwork, all pertinent heating piping, and equipment. These drawings may be CAD files of the required Ductwork Shop Drawings. The drawings shall be coordinated with lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Owner's Representative. Provide adjustments to exact size, location, and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of contract. Minor revisions need not be redrawn.
 - 2. Division 23 shall provide CAD files and submit the base plan CAD Coordination Drawings to all Divisions.
 - 3. Divisions 21 and 22 shall draw the location of piping and equipment on the base plan CAD Coordination Drawings, indicating areas of conflict and suggested resolutions.

4. Divisions 26, 27 and 28 shall draw the location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan CAD Coordination Drawings, indicating areas of conflict and suggested resolution.
 5. The General Construction Trade shall indicate areas of architectural/structural conflicts or obstacles on the CAD Coordination Drawings, and coordinate to suit the overall construction schedule.
 6. The General Construction Trade shall expedite all Coordination Drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various trades as to how to revise their drawings as required to eliminate installation interferences.
 7. If a given trade proceeds prior to resolving conflicts, then if necessary, that trade shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Divisions.
- B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between trades, and between trades and existing or new building construction, before they occur in construction. Coordination drawings are intended for the respective trade's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.14 EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Provide materials that meet the following minimum requirements:
1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 2. All equipment and material for which there is a listing service shall bear a UL label.
 3. Potable water systems and equipment shall be built according to AWWA Standards.
 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 5. Fire protection equipment shall be UL listed and FM approved.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:

1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.15 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.16 PAINTING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Refer to Division 9 - Finishes, for additional information.

1.17 CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.18 CHASES

A. New Construction:

1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Trade. Mechanical and Electrical trades shall provide all other openings required for their contract work.
2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction trade.

1.19 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.

5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
 6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
 7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.
- B. Acceptable Manufacturers:
1. Dow Corning Fire-Stop System Foams and Sealants.
 2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
 3. S-100 FS500/600, Thomas & Betts.
 4. Carborundum Fyre Putty.
 5. 3-M Fire Products.
 6. Hilti Corporation.

1.20 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.21 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above.
- B. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- C. For finished areas without a finished ceiling system such as classrooms, offices, conference rooms, etc., where decking and structure is exposed, and ductwork/piping/conduit is exposed: All mounting brackets, channel support systems and mounting hardware for ductwork, piping, lighting, etc. shall be concealed and approved by the Architect/Engineer prior to the installation. AirCRAFT cable style hanging for ductwork is required. It is recommended that room mockups be done and receive Architect/Engineer approval prior to proceeding with installation.

- D. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- E. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.22 ACCESS PANELS

- A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.23 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.24 HVAC EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.

1.25 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

- B. Provide roughing and final connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.26 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.

1.27 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Division 01 for additional information.

1.28 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.29 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of

systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.30 OPERATION AND MAINTENANCE MANUALS

- A. Submit by email (preferred) or digital media, thru the normal project submittal process. Include a copy of each final approved Shop Drawing, wiring diagrams, piping diagrams, spare parts lists, final testing and balancing report, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Submit in a compiled and bookmarked PDF format as outlined below.
- B. Provide content for Operation and Maintenance Manuals as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Engineer and Commissioning Agent will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- C. Submit Operation and Maintenance Manuals in the following format:
 - 1. Submit by uploading to web-based project software site, or by email to Architect, as a formal project submittal in conformance with the project specific submittal procedures. Enable reviewer comments on draft submittals.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 3. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in the table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- D. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing Owner training. Engineer and Commissioning Agent will comment on whether general scope and content of manual are acceptable.

- E. Final Manual Submittal: Submit O&M manual in final form prior to requesting inspection for Substantial Completion and at least 2 weeks before commencing Owner training. Engineer and Commissioning Agent will return copy with review comments.
 - 1. Correct or revise O&M manual to comply with Engineer's and Commissioning Agent's comments. Submit copies of each corrected manual within 2 weeks of receipt of Engineer's and Commissioning Agent's comments.
- F. Refer to Division 01 for additional requirements.

1.31 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.
- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall indicate "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. The Contractor shall have the marked up set scanned, if they are not already electronic files, and then submit them to the Engineer as the "Record Set".
- G. Refer to Division 01 for additional requirements.

1.32 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.33 COMMISSIONING

- A. Refer to General Commissioning Requirements in Division 01 for additional requirements.

1.34 TEMPORARY HEATING AND COOLING

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.

1.35 MAINTENANCE OF HVAC SYSTEMS DURING TEMPORARY USE PERIODS

- A. Provide each air handling system with a set of prefilters in addition to the permanent filters. Furnish four sets of prefilters for each system for use when system is operated for temporary heating or cooling. During such use, change prefilters as often as directed by Owner's Representative. Provide MERV-8 filters in all open ended ducts, return grilles and registers to keep dust out of ductwork. Change as often as necessary. Remove all such temporary filters upon completion. Use supply fans only. Do not operate return fans.
- B. Blank-off outside air intake opening during temporary heating period. Install first set of permanent filters and prefilters.
- C. Adjust dampers on supply system.
- D. Set all heating coil control valves for manual operation.
- E. Do not install any grilles or diffusers at room terminal ends of ducts until permission is given.
- F. Assume responsibility for systems and equipment at all times, even though used for temporary heat or ventilating. Repair or replace all dented, scratched or damaged parts of systems prior to final acceptance.
- G. Remove concrete, rust, paint spots, other blemishes, then clean.
- H. Just prior to final acceptance, remove used final filter and install new set. Deliver all unused sets of prefilters to the Owner and obtain written receipt. Properly lubricate system bearings before and during temporary use. Maintain thermostats, freeze stats, overload devices, and all other safety controls in operating condition.

1.36 TEMPORARY FACILITIES

- A. Refer to the Division 1 Sections, General Conditions and Supplemental General Conditions.

1.37 TEMPORARY LIGHT AND POWER

- A. Refer to the Division 1 Sections, General Conditions and Supplemental General Conditions.

1.38 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 2. Remove all debris caused by work.
 3. Remove tools, surplus, materials, when work is finally accepted.

1.39 SYSTEM START-UP AND TESTING

- A. Prior to commencement of work, the Division(s) effecting such system shall survey all building mechanical, plumbing, fire protection and electrical systems and components and make written notice to the Owner's Representative regarding any damage, missing items and/or incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Owner's Representative that all building systems have been returned to their original conditions.

1.40 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of sheetmetal shop drawings, coordination drawings, or record drawings related to the project, subject to a and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by utilizing the following website link:
<http://www.meengineering.com/contact-pages/contractor-request>.
 2. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. M/E Engineering, P.C. can only provide CAD files of M/E/P/FP drawing levels for which we are the Engineer of Record. CAD files of Architectural backgrounds, reflected ceiling plans, structural plans, etc. must be obtained separately from the Architect of Record.
 4. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E

Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.

5. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
6. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.41 ENERGY INCENTIVES

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as offered by the utility company or state sponsored incentive programs. This shall include at a minimum, receipts, and quantities and data sheets for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

END OF SECTION

SECTION 210523 - VALVES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Document.

1.2 SUBMITTALS

- A. Submit manufacturer's data in accordance with Basic Mechanical/Electrical Requirements. Obtain approval prior to ordering material.
- B. Provide submittals for all items specified under Part 2 of this section.

PART 2 - PRODUCTS

2.1 VALVES

- A. General: Valves shall have the following requirements:
 - 1. Working pressure stamped or cast on bodies.
 - 2. Stem packing serviceable without removing valve from line.
 - 3. UL listed and FM approved and labeled for intended fire protection service. Sprinkler systems 175 WWP; stamped/cast on body.
- B. Acceptable Manufacturers:
 - 1. Gate Valves: Kennedy, Mueller, Nibco, Stockham, Victaulic.
 - 2. Butterfly/Ball Valves, Indicating Type: Grinnell, Kennedy, Milwaukee, Stockham, Victaulic.
 - 3. Check Valves: Grinnell, Kennedy, Nibco, Stockham, Victaulic.

2.2 GATE VALVES

- A. 2-1/2 in. and Larger: IBBM, resilient wedge disc, OS&Y, flanged ends, stems grooved for tamper switch, 200 WWP; Stockham Fig. G-610.
- B. 2 in. and Smaller: Bronze body and bonnet, OS&Y, threaded ends, solid wedge, 175 WWP; Stockham Fig. B-133.

2.3 BUTTERFLY/BALL VALVE

- A. 2-1/2 in. and Larger: Butterfly style, ductile iron body, lug type, aluminum bronze disc, stainless steel trim, EPDM seat, bubbletight shutoff, suitable for dead end service, gear operator, provision to tamper switch, 200 WWP; Stockham #LD-72UF.

- B. 2 in. and Smaller: Bronze body, threaded ends; indicating gear operator, provision for tamper switch; Milwaukee "Butterball".

2.4 CHECK VALVES

- A. 2-1/2 in. and Larger: IBBM, swing type, rubber faced disc, bolted flange cap, flanged ends; Stockham #G-940.
- B. 2 in. and Smaller: Bronze body, swing type, rubber faced, threaded ends; Grinnell #3315.

2.5 PRESSURE REDUCING VALVES

- A. Ductile iron body construction, nylon reinforced diaphragm, nylon reinforced brass and stainless steel pilot valve, integral strainer, pressure relief valve, adjustable pressure range.
- B. Valve shall be UL listed and FM approved.
- C. Design Equipment: Tyco Model PRV-1.
- D. Acceptable Manufacturers: Cla-Val, Tyco, Viking.

2.6 MISCELLANEOUS

- A. Trim and Test Valves: Ball, plug, angle or globe type; bronze body; threaded ends; UL listed.
 - 1. Ball Valves: Bronze two-piece body, full port, threaded ends, chrome plated ball, blowout proof stem, reinforced TFE seats, 300 psi working pressure, UL listed, FM approved; Nibco Model KT-585-70-UL.
- B. Hose Thread Drain Valves:
 - 1. Ball Valve: Bronze body, hardened chrome ball with hose thread end, cap and chain; Watts #B6001CC (sweat connection), Watts #B6000CC (threaded connection).

2.7 UNDERGROUND VALVES AND ACCESSORIES

- A. Gate Valves 2 in and larger: IBBM, inside screw-in, wedge disc, resilient seat, "O" ring seals, 175 WWP, open counter-clockwise, 2 in. square wrench nut, mechanical joint ends, AWWA C509: Kennedy Ken Seal Fig. #4571
- B. Valve Boxes: Cast iron adjustable screw type box and cover extending from the valve to finish grade. Cast arrow and lettering on cover of box denoting direction of valve opening and service. Provide with each curb valve.
- C. Valve Key: Steel socket key for gate valve or curb valves.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide all shutoff, check, drain and other type valves as required by Code as indicated and as required for proper system maintenance, isolation and safety.
- B. Locate valves for easy access and provide separate support where necessary. Install valves with stems at or above the horizontal position. Install swing check valves in horizontal position with hinge pin level.
- C. Provide hose thread drain valves at all low points to enable complete drainage of all portions of the system.
- D. For underground valves: Valve boxes shall be placed vertically over each valve, and the top of the box adjusted to proper grade, and the valve and box immediately backfilled with crushed stone carefully tamped into place. Valves shall be checked for proper operation before installation and, unless otherwise instructed are to be left in the open position.
- E. Install valves per respective listing/approval.
- F. Use 250 WWP, FM approved anti-water hammer check valves at discharge and bypass of fire pumps, otherwise use swing type.
- G. Use ball valves for auxiliary drains and inspector test valves on dry pipe and pre-action systems.

END OF SECTION

SECTION 210553 - FIRE PROTECTION IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 QUALIFICATIONS

- A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles.

1.3 SUBMITTALS

- A. Submit manufacturer's technical product data and installation instructions for each identification material and device. Submit valve schedule for each piping system typewritten on an 8-1/2 in. x 11 in. paper (minimum), indicating code number, location and valve function. Submit schedule of pipe, equipment and name identification for review before labeling.

1.4 ACCEPTABLE MANUFACTURERS

- A. Allen Systems, Inc., Brady (W.H.) Co.; Signmark Div., Emedco, Industrial Safety Supply Co., Inc., Lab Safety Supply, Seton Name Plate Corp.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide manufacturer's standard products of categories and types required for each application. In cases where there is more than one type specified for an application, selection is installer's option, but provide single selection for each product category.
- B. All adhesives used for labels in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

2.2 PIPING IDENTIFICATION

- A. Identification Types:
 - 1. Snap-on type: Provide manufacturer's standard pre-printed, semi rigid snap-on, color coded pipe markers, complying with ANSI-A13.1.
 - 2. Pressure sensitive type: Provide manufacturer's standard pre-printed, permanent adhesive, color coded, pressure sensitive vinyl pipe markers complying with ANSI A13.1. Provide a 360° wrap of flow arrow tape at each end of pipe label.

B. Lettering:

1. Piping labeling shall conform to the following list:

PIPE FUNCTION	IDENTIFICATION
Fire Protection Water	FIRE PROTECTION WATER
Fire Sprinkler Water	FIRE SPRINKLER WATER

2.3 VALVE IDENTIFICATION

A. Valve Tags:

1. Standard brass valve tags, 2 in. diameter with 1/2 in. high black-filled numerals. Attach to valve with brass jack chain and "S" hook. Identify between fire protection, heating and plumbing services with 1/4 in. letters above the valve number.
2. Equal to Seton Style No. M4507.

B. Provide a sign for each control, sectional and drain valve identifying the portion of the building served in accordance with NFPA 13 Valve Chart:

1. Provide valve chart for all valves provided as a part of this project. Frame and place under clear glass. Mount in Mechanical Room.

2.4 ABOVE CEILING EQUIPMENT LOCATOR

- A. 3/4 in. diameter adhesive stickers placed on ceiling grid and color-coded.
- B. The color for all fire protection valves shall be RED.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide valve tags for all valves provided on project.
- B. Provide piping identification with directional flow arrows for all piping on project, maximum every 20'-0" or piping installed through rooms, provide at least one pipe label in each room, for each pipe function.
- C. Provide equipment tags for all equipment provided.

END OF SECTION

SECTION 211010 - PIPING SYSTEMS AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Provide a schedule of pipe materials, fittings and connections.
- B. Provide a detailed matrix listing the specific UL approved firestop system assembly to be used for each type of piping provided and each type of construction to be penetrated along with all associated UL assembly details.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.

2.2 STEEL PIPING AND FITTINGS

- A. Pipe: ASTM A53, or ASTM A106 seamless, Schedule 40 weight; black finish as called for; ends chamfered for welding or grooved for grooved mechanical connections.
- B. Fittings: Same material and pressure class as adjoining pipe.
 - 1. Welded Fittings: Factory forged, seamless construction, butt weld type chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets", "Thredolets" or "Sokolets" acceptable. Mitered elbows, "shaped" nipples, and job fabricated reductions not acceptable unless specifically called for. Socket weld type, 2000 psi wp, where called for.
 - 2. Threaded Fittings: Class 125, cast or malleable iron, black, as called for; UL listed and FM approved for fire protection systems. Street type 45° and 90° elbows are not acceptable.
- C. Flanges, Unions, and Couplings:
 - 1. Threaded Connections:
 - a. Flanges: Cast iron companion type; for sizes 2-1/2 in. and larger.
 - b. Unions: Malleable iron, bronze to iron seat, 300 lb. wwp; for sizes 2 in. and smaller.
 - c. Couplings: Malleable iron. Steel thread protectors are not acceptable as couplings.

2. Welded Connections:

- a. Flanges: Welding neck type. Slip-on type not allowed unless noted and shall not be installed in conjunction with butterfly valves.

3. Grooved Mechanical Connections:

- a. Couplings: Ductile iron, ASTM A395 and ASTM A536, with painted coating, designed for rolled grooved piping, hot dipped galvanized finish complying with ASTM A153 where called for.
- b. Gaskets: Grade "E" EPDM synthetic rubber, -30°F to 230°F temperature range, suitable for water service.
- c. Bolts and Nuts: Heat treated, hex head carbon steel, ASTM A183, cadmium plated or zinc electroplated.
- d. Fittings: Elbows, tees, laterals, reducers, adapters as required shall be fabricated from carbon steel pipe conforming to ASTM A53. Fittings shall have grooves designed to accept grooved end couplings of the same manufacturer.
- e. Victaulic, rigid system, Style 005 couplings cast with offsetting angle pattern bolt pads to provide system rigidity and support in accordance with ANSI B31.1 and B 31.9. UL listed and FM approved; 300 psi wwp; follow all terms of listings/approvals.
- f. Acceptable Manufacturers: Grinnell, Gruvlok by Anvil, Victaulic or approved equal.

D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

E. Base Elbows:

- 1. Cast iron or steel type, flange connections; Crane 500 or equivalent made from welding elbows, with welded pipe support and steel base. Reducing elbows where necessary.

ELBOW SIZE	SUPPORT SIZE	BASE PLATE
4 in. to 6 in.	2-1/2 in.	8 in. x 8 in. x 1/4 in.

- 2. Anchor bolt holes in each corner of base for securely bolting to floor or concrete base; minimum 3/4 in. bolts.

2.3 DIELECTRIC PIPE FITTINGS

A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.

- B. Unions: Factory fabricated, for 250 psi minimum working pressure at 180°F, threaded or solder ends, insulating material suitable for system fluid, pressure and temperature.
- C. Flanges: Factory fabricated, companion flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.
- D. Acceptable Manufacturers: EPCO, Capitol Manufacturing, Victaulic, Watts or approved equal.

2.4 HANGERS, INSERTS AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing.
- B. Hangers:
 - 1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping. Hot-dipped galvanized finish for exterior locations.
 - 2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
 - 3. Adjustable steel clevis type for piping 4 in. and larger.
 - 4. Nuts, washers and rods with electroplated zinc or cadmium finish. Hot-dipped galvanized finish for exterior locations.
- C. Spacing Schedule (Maximum Distance between Hangers (ft.-in.):

NOMINAL PIPE SIZE (IN.)	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4
Steel Pipe	N/A	12-0	12-0	15-0	15-0	15-0	15-0	15-0	15-0
Rod Size (in.)	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8

- D. Beam Attachments:
 - 1. C-Clamp style, locknut, restraining strap, electroplated finish, UL listed, FM approved for pipe sizes 2 in. and smaller, complying with NFPA 13.
 - 2. Center loaded style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements, complying with NFPA 13.
- E. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1300 lbs., for 3/8 in. to 3/4 in. rod sizes, reinforcing rods on both sides, MSS-SP-69 Type 19 or approved equal, complying with NFPA 13.

F. Supports:

1. For all piping larger than 2 in., provide intermediate structural steel members for hanger attachment. Members shall span across the bar joists at panel points of joists. Secure member to structure. Select size of members based on a minimum factor of safety of four.
2. For weights under 1,000 lbs.: "Drill-In" inserts, "U" shaped Channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
3. For Metal Decks: Drill hole through for hanger rods and imbed a welded plate in concrete or use devices designed for this application, with a safety factor of four.
4. Acceptable Manufacturers: Hilti, ITW Ramset, Phillips "Red Head" or approved equal.

- G. Hangers for fire protection piping as specified and in accordance with NFPA 13 and NFPA 14. Hangers and building attachments shall be UL listed and FM approved for fire protection service. Adjustable swivel ring type hangers are permitted for 3 in. and smaller piping.

2.5 PIPING ACCESSORIES

- A. Escutcheon Plates: Steel or cast brass, split hinge type with setscrew, high plates where required for extended sleeves. Chrome plated in finished areas.
- B. All bushings and nipples required for instruments and gauges shall be brass.

2.6 SLEEVES

A. Standard Type:

1. Schedule 40 black steel pipe sleeves for structural surfaces, two (2) pipe sizes larger than the pipe, and as recommended by the sealing element manufacturer. Provide full circle water stop collar for sleeves located within below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.
2. Schedule 40 PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing.

2.7 SEALING ELEMENTS

- A. Expanding neoprene link type, watertight seal consisting of interlocking links with zinc plated bolts.
1. Acceptable Manufacturers: Thunderline "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

2.8 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL AND FLOOR ASSEMBLIES

- A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Through-Penetration Firestop Systems". The system shall meet the standard fire test for Through-Penetration Firestop Systems designated ASTM E814. Firestop system seals shall be provided at locations where piping pass through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform to the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.9 PIPING MATERIALS AND SCHEDULE

- A. See Exhibit "A" - Piping Materials at end of this Section for Fire Protection piping.
- B. See Exhibit "B" - Testing at end of this Section for Fire Protection piping.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

- A. Install equipment and systems in accordance with provisions of each applicable section of these Specifications, and Local/State Codes/Regulations having jurisdiction. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing, except where specifically called for, making proper allowance for expansion and anchoring. Changes in size shall be made with reducing fittings. Reducing couplings are not acceptable. Arrange piping at equipment with necessary offsets, unions, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required, to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting systems. Conceal piping unless otherwise called for.
- B. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings. Do not install valves, unions and flanges in inaccessible locations. Materials within a system and between systems shall be consistent. If this is not possible, install dielectric fittings.

3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.
- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3ft. to 9 ft. depending on the voltage.

3.3 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, from other piping, or by vertical expansion bolts. Support piping with individual hangers from concrete inserts, wood construction, welded supports, or beam clamps of proper configuration and loading design requirements for each location; replace if not suitable. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size called for, using four (4) nuts per rod. Provide additional structural steel members, having one coat rustproof paint, where required for proper support. Provide oversized hangers on diesel engine exhaust piping where insulation/supports must pass between pipe and hanger. Hangers, when attached to joists, shall only be placed at the top or bottom chord panel point. Only concentric type hangers are permissible on piping larger than 2-1/2 in.; "C" types are permitted for piping 2 in. and smaller on joists. Provide riser clamps for each riser at each floor.

3.4 PIPE CONNECTIONS

- A. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specifically selected for each application.
- B. Grooved Mechanical Joints: Pipes joined with grooved fittings shall be joined by a listed combination of fittings, couplings, gaskets and grooves of a single manufacturer. Lubricate and install gasket and couplings. Follow manufacturer's recommendations. Grooved ends shall be clean and free of indentations, projections and roll marks in the area from pipe end to groove.
- C. Dielectric Pipe Fittings: Protect fittings from excessive heat.

3.5 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded piping fabricated by qualified welder. Use certified welder where specifically required by code or insurance company. If indicated and permitted for fire protection systems, all provisions for welded pipe shall additionally be in accordance with NFPA Standard 13. Use full length pipe where possible; minimum distance between welds, 18 in. on straight runs. Welds must be at least full thickness of pipe with inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 in., maximum 1/4 in., for butt welds. Overlaps on position and bench welds to be not less than 3/4 in. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe.

3.6 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings. Not required for floors that are core-drilled, except where floor is waterproofed. Extend 1/8 in. above finished floor in finished areas. In above grade Mechanical Rooms and other areas with floor drains use steel pipe sleeves 2 in. above floor. Use steel pipe sleeves in bearing wall, structural slabs, beams and other structural surfaces, and where called for. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating. Fill abandoned

sleeves with concrete. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

3.7 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
 - 1. Interior locations: Firmly pack with fiberglass and caulk.
 - 2. Exterior walls above grade: Use sealing element.
 - 3. Exterior walls below grade and above floors: Use sealing element.
 - 4. Cored holes: Use sealing element.
 - 5. Fire rated, partitions and floor slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.
 - 6. Waterproofed walls/floors: Use waterproof sealing element, device or compound.

3.8 ESCUTCHEON PLATES

- A. Provide polished chrome setscrew type escutcheon plates for all exposed piping passing through floors, walls or ceilings, in all rooms except in Boiler, Fan and Mechanical Rooms.

3.9 TESTS

- A. Fire suppression systems shall be hydrostatically tested at 200 psi for two (2) hours in accordance with NFPA 13.
- B. Provide all necessary items to complete proper testing of work. Perform all testing in accordance with governing Codes, local utilities and other agencies having jurisdiction and as specified. Pay all costs to perform tests. Perform all testing in a safe manner. Isolate existing systems.

3.10 PIPE LINE SIZING

- A. Pipe sizes called for are to be maintained. Pipe size changes made only as reviewed by Owner's Representative and shall be justified by hydraulic calculations. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Fire service	SEE "UNDERGROUND PIPING AND ACCESSORIES" SECTION 221020		
Sprinkler (wet)	Schedule 40, black steel, 4 in. and smaller	Cast or malleable iron	Threaded

EXHIBIT "B" - TESTING

<u>SERVICE</u>	<u>TEST REQUIREMENTS</u>
Sprinklers	Test hydrostatically at 200 psi for two (2) hours in accordance with NFPA 13.

END OF SECTION

SECTION 211300 - FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.
- B. Wet pipe sprinkler system to be provided throughout new building. All spaces are required to be covered with sprinkler heads per NFPA 13 requirements and New York State Building and Fire Codes for a Type "I" institutional occupancy. Attic spaces will require full sprinkler coverage as required.
- C. Fire Protection/Sprinkler system requirements and installation for this project are performance base per this specification design criteria. Fire Protection/Sprinkler contractor will be required to provide the following:
 - 1. Flow test and flow test data of the existing municipal water main being the source of the fire water service line (4").
 - 2. Hydraulic Calculations and associated "shop" installation plans for complete building system layout.
 - 3. Complete Sprinkler system installation from the 4" water source. Include service riser, 4" alarm check valve, floor control valves (tamper, flow switch, drain), alarm devices for valves and flow indication. Include Horn/strobe type device for water flow alarm, mounted on exterior above/adjacent to FDC.
 - 4. Fire Department Connection (FDC). Exterior connection / Inlet type per local Fire Department requirements.
 - 5. "As-Built" sprinkler plans for final close out documentation.
 - 6. Areas subject to freezing including unheated attic spaces to be protected with an auxillary dry pipe sprinkler system with a dry pipe riser and air compressor located at main 4" water service entrance.

1.2 QUALITY ASSURANCE

- A. Comply with the 2020 Fire Code of New York State referenced edition of the following National Fire Protection Association (NFPA) Standards:
 - 1. NFPA 13: Standard for the Installation of Sprinkler Systems.
 - 2. NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - 3. NFPA 25: Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.

4. NFPA 72: National Fire Alarm Code.
- B. Follow all requirements, recommendations and appendices to comply with the latest edition of the following publications, codes, standards, and listings/approvals:
1. Factory Mutual Engineering Corporation (FM) Approval Guide.
 2. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory.
 3. 2020 Fire Code of New York State.
 4. OSHA Rules and Regulations.
 5. Requirements of Insurance Underwriter and other Authorities Having Jurisdiction.
- C. Equipment, devices, hangers and components shall be UL listed and FM approved and labeled for the intended fire protection service.
- D. The fire protection work shall be performed by an experienced firm regularly engaged in the installation of fire protection sprinkler systems.
- E. Preparation of working plans, calculations and site observation of systems shall be completed by a NICET Level III technician under the direction of a qualified New York State Registered Professional Engineer.

1.3 SYSTEM DESCRIPTION

- A. The fire protection system shall be a wet pipe automatic sprinkler system arranged to properly protect all spaces.
- B. Water is supplied from a unknown size / TBD. Municipal water main located in West Clarkstown Road, through a 4 in. underground water main to the system's main riser. Water supply data / flow test at the municipal main needs to indicate the following:
1. X psi static.
 2. X psi residual with X gpm flowing.
- C. The residual hydrant is located at West Clarkstown Road with the flow hydrant located at West Clarkstown Road. This contractor shall arrange for a new flow test on the municipal main prior to performing hydraulic calculations. Fire department connection(s) shall be provided to allow the servicing fire department to augment the system's normal automatic water supply.
- D. The system shall be hydraulically calculated in accordance with all provisions of the Contract Documents and any Authority Having Jurisdiction.
- E. Calculations shall be based upon the specific hazard for the areas being protected. The following minimum requirements shall be provided as actually installed in the protected spaces.

1. Light hazard: These areas shall include: All occupied rooms.
 - a. Water density: 0.10 gpm/sq. ft.
 - b. Maximum coverage per sprinkler = 168 sq. ft.
 - c. Hydraulic remote area: 1500 sq. ft.
 - d. Interior hose demand: 100 gpm.
 2. Ordinary Hazard Group 1: These areas shall include: Mechanical Rooms and Attic Space.
 - a. Water density: 0.15 gpm/sq. ft.
 - b. Maximum coverage per sprinkler = 130 sq. ft.
 - c. Hydraulic remote area: 1500 sq. ft.
 - d. Interior hose demand: 100 gpm.
- F. Maximum coverage for any sprinkler head shall not exceed NFPA requirements and the listing for the sprinklers provided.
- G. A minimum 10 psi safety factor shall be provided between the available municipal water supply curve and the total system demand point. The total system demand point shall be at the municipal water main and include the calculated sprinkler and interior hose stream demands plus the exterior hose stream demand at the residual pressure required for proper system operation.
- H. The maximum flow velocity shall not exceed 20 ft. per second in the piping system and 15 ft. per second in mains with paddle type waterflow indicators.
- I. Water supply control valves shall be electrically supervised and mechanically locked for proper position. Waterflow and supervisory circuits shall be in accordance with the requirements of electrical specifications. Electric connections to sprinkler system shall be by Division 26. Furnish wiring diagrams for all equipment.
- J. Provide 3/16 in. x 1 in. cadmium plated carbon steel chains and master keyed all brass case hardened padlocks to lock water supply valves in the proper position.

1.4 SUBMITTALS

- A. Product Data:
1. Submit manufacturer's catalog cut, specifications and installation instructions for each item or component of fire protection system. Clearly indicate pertinent information such as, but not limited to:
 - a. Manufacturer's model number.
 - b. Materials, size, finish and type of connection.

- c. Pressure ratings of components.
 - d. FM approval/UL listing.
- B. Certification: Submit Contractor's NICET certification and number.
- C. Samples:
 - 1. If requested, submit sample of sprinklers.
- D. Drawings and Calculations:
 - 1. All drawings and calculations shall be signed and sealed by a New York State Registered Professional Engineer.
 - 2. Submit complete NFPA 13 drawings and hydraulic calculations with cross reference to applicable drawings, water supply data, and equipment schedule with ratings for the system to the Owner's Representative, Insurance Underwriter, and other Authorities Having Jurisdiction.
 - 3. Submit hydraulic calculations for each design density/remote area with items in NFPA 13 incorporated including sketches to indicate flow quantities, sprinklers operating and direction of flow for pipes in looped and gridded systems.
 - 4. Drawing shall be fabrication drawings provided to indicate actual sprinkler, and equipment layouts. Drawings shall be 1/4" = 1'-0" scale on reproducible sheets of uniform size. Drawings shall show all data required by NFPA 13.
 - 5. Submit drawings in one (1) complete package.
- E. Record Drawings and Documents:
 - 1. Submit Record Drawings, hydraulic calculations, test reports, and NFPA Above and Below Ground Material and Test Certificates to the Owner's Representative, Insurance Underwriter and other Authorities Having Jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Mixing of manufacturers or models of the same or similar component will not be acceptable.

2.2 FIRE DEPARTMENT CONNECTION

- A. Cast brass; straight or angle body as required; two-way lug swivel inlets with individual drop clappers; cast brass; raised letter escutcheon labeled "AUTOSPKR"; matching brass plugs and chains.
 - 1. 2-1/2 in. x 2-1/2 in. x 4 in. Or Storz type. Confirm type with local Fire Department.

2. 2-1/2 in. hose threads shall match those in use by the local Fire Department.
3. Polished brass escutcheon, inlets, plugs, and chains.
4. Design Equipment:
 - a. Horizontal Flush Wall Type: Potter-Roemer 5020 Series.
- B. Storz quick connect type with 30 degree elbow, cap, chain and escutcheon labeled "AUTOSPKR".
 1. 4 in. Storz x 4 in. NPT.
 2. Polished brass escutcheon, inlets, plugs and chains.
 3. Design Equipment: Potter-Roemer Fig. No. 5795-01 connection with Fig. No. 5799-01 cap and chain.
- C. Acceptable Manufacturers: Badger-Powhatan, Croker, Elkhart, Potter-Roemer.

2.3 PRESSURE GAUGES

- A. Water Pressure Gauge:
 1. Anodized aluminum case, 3-1/2 in. diameter, glass lens, brass movement, 1/4 in. NPT male bottom connection with gauge cock.
 2. 0 to 300 psi range, in 5 psi increments with accuracy to meet ANSI B40.1.
- B. Air Pressure Gauge:
 1. Anodized aluminum case, 3-1/2 in. diameter, glass lens, brass movement, 1/4 in. NPT male bottom connection with gauge cock.
 2. 0 to 80 psi range, in 1 psi increments with accuracy to meet ANSI B40.1.

2.4 SPRINKLER EQUIPMENT

- A. Alarm Check Valve: Vertical style with grooved ends, cast iron body, replaceable clapper facing, right or left hand alarm trim for variable pressure operation.
 1. Trim:
 - a. Main drain and valve.
 - b. Gauges with gauge cocks.
 - c. Galvanized pipe and trim fittings.
 - d. Retard chamber and pressure switch.
 - e. Horn/Strobe flow device.

2. Design Equipment: Reliable Model E (175 psi).
 3. Acceptable Manufacturers: Reliable, Tyco, Victaulic, Viking.
- B. Riser Check Valve: Vertical style, grooved end, cast iron body and stainless steel clapper with replaceable facing.
1. Trim:
 - a. Main drain and valve.
 - b. Gauges with gauge cocks.
 - c. Galvanized pipe and trim fittings.
 2. Design Equipment: Reliable Model G (250 psi).
 3. Acceptable Manufacturers: Reliable, Tyco, Victaulic, Viking.
- C. Dry Pipe Valve: Vertical style with grooved ends, cast iron body, replaceable clapper facing with right or left hand trim and controls for automatic operation.
1. Trim:
 - a. Main drain and valve.
 - b. Gauges with gauge cocks.
 - c. Galvanized pipe and trim fittings.
 - d. Low air and waterflow alarm switches.
 - e. Automatic air pressure maintenance device.
 - f. Air relief valve set at 5 psi in excess of maximum pressure that should be on system.
 - g. Horn/Strobe Flow Device.
 - h. Anti-flooding type accelerator with trimmings.
 2. Design Equipment: Reliable Model D 4 in.
 3. Acceptable Manufacturers: Reliable, Tyco, Victaulic, Viking.
- D. Air Compressor - Riser Mounted Type: Direct drive, air cooled, single stage, oil less compressor, air filter, safety relief valve, field adjustable pressure range, 1/3 HP, 120 volt, 1 phase electric motor, mounting bracket, sized to pump system to 40 psi in less than 30 minutes, with air maintenance device.
1. Design Equipment: Reliable Model A.

2. Acceptable Manufacturers: General, Reliable, Viking.

2.5 SPRINKLERS AND ACCESSORIES

- A. Brass or bronze, 1/2 in. orifice, 1/2 in. NPT. 165°F ordinary temperature classification for light and ordinary hazards. Use 286°F sprinklers in Mechanical, Electrical and Elevator Rooms; in vicinity of heat equipment/sources; and in accordance with NFPA 13.
 1. Finished Ceiling Areas: White finish sprinklers Concealed pendent sprinklers with matching coverplate, color white.
 2. Unfinished Ceiling Areas: Natural brass/bronze finish pendent or upright sprinklers as required.
- B. Sprinkler Types and Design Equipment:
 1. Quick Response Upright: Reliable Model F1FR.
 2. Quick Response Concealed Pendent: Reliable Model G4A.
 3. Quick Response Horizontal Sidewall: Reliable Model F1FR-HSW1.
 4. Quick Response Dry Pendent and Horizontal Sidewall: Reliable Model F3QR.
 5. Attic Sprinklers: Tyco Model BB (Back-to-Back), SD (Single Directional), HIP, AP Attic Plus.
- C. Flexible Sprinkler Drops:
 1. FM Approved braided Type 304 stainless steel tube with union joints, factory tested to 400 psi and listed for up to three (3) 90° bends including bracket for mounting to ceiling or building structure.
 - a. Design Equipment: Victaulic "VicFlex".
- D. Sprinkler Cabinets and Spare Sprinklers:
 1. Steel or aluminum construction with shelves and shell holes to accommodate the number of spare sprinklers required by NFPA 13.
 2. Bright red finish with hinged front door and label.
 3. Sprinkler wrenches compatible for each type used.
 4. Spare sprinklers for each system of the type and proportion of those used in each system.
 5. Design Equipment: Reliable Model A-4.
- E. Acceptable Manufacturers: Reliable, Tyco, Victaulic, Viking.

2.6 ALARM EQUIPMENT

A. Waterflow Pressure Switch:

1. Pressure activated waterflow alarm switch with retard, steel enclosure and cover, adjustable differential type, SPDT contacts, 24 volt DC, 1/2 in. pressure connection, 250 psi rated.
2. Design Equipment: Potter Electric #WFSR-F.

B. Air Pressure Supervisory Switch:

1. For remote low air pressure supervisory alarm and for air compressor operation, steel enclosure and cover, adjustable differential type, SPDT contacts, 24 volt DC, 1/2 in. pressure connection compatible with system devices, 250 psi rated.
2. Design Equipment: Potter Electric #PS40A.

C. Paddle Waterflow Detectors:

1. Adjustable retard feature, SPDT contacts, 24 volt DC, 250 psi rated.
2. Design Equipment: Potter Electric #VSR Series.

D. Tamper Switches:

1. Integral with valve or separate device installed on valve to actuate alarm upon valve movement, steel enclosure, SPDT contacts, 24 volt DC, mounting brackets and hardware.
2. Design Equipment: Potter Electric #OSYSU (for OS&Y valves) and #PIVSU-A (for post indicator and butterfly valves).

E. Acceptable Manufacturers: Autocall, Potter Electric, System Sensor.

2.7 INSPECTOR'S TEST EQUIPMENT

A. Test and Drain Valve:

1. Combined test and drain valves, sight glass and interchangeable restricting orifice, sized for smallest orifice in sprinkler zone.
2. Design Equipment: AGF Manufacturing "Test and Drain".
3. Acceptable Manufacturers: AGF Manufacturing, Viking, Victaulic.

2.8 MANUAL AIR VENTS

A. Manual air vent shall include 1 in. isolation valve with forged brass body, stainless steel 20 mesh strainer, ball float, hose connection, threaded cap and lanyard.

1. Design Equipment: AGF Manufacturing, Inc. Model 7910MAV.

2. Acceptable Manufacturers: AGF Manufacturing, Inc.

2.9 AUTOMATIC AIR VENTS

- A. Automatic air vent shall include 1 in. NPT isolation valve with forged brass body and stainless steel 20 mesh strainer, adjustable purge valve with hose connection, threaded cap and lanyard and automatic air release valve with conical body, recessed venting valve, single float on rigid shaft and bubble breaker.
- B. Provide with end cap and close nipple (AGF Model 7930ECA)
 1. Design Equipment: AGF Manufacturing, Inc. Model 7900AAV.
 2. Acceptable Manufacturers: AGF Manufacturing, Inc.

2.10 SYSTEM COMPONENT IDENTIFICATION

- A. At control, test and drain valves, provide permanently marked identification signs constructed of 18 gauge steel with baked enameled finish. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains which permits easy removal of the sign. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves. Additional signs, shall be provided at each alarm check and dry pipe valve to clearly indicate hydraulic calculation data.

2.11 ADDITIONAL SPRINKLERS AND SPRINKLER GUARDS

- A. Include allowance for providing 6 additional sprinklers with related piping, fittings, hangers installed at locations where job conditions or equipment selections may be required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor's risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor's expense. The installation shall be performed in a workmanlike manner as determined by the Owner's Representative and in accordance with the Contract Documents, manufacturer's printed installation instructions, and submitted and Owner's Representative reviewed drawings.
- B. Piping shall not pass directly over electric panelboards, switchboards, motor control centers, and similar electric and telephone equipment. However, protection for these spaces shall be provided.
- C. Piping shall be installed concealed above finish ceiling area with sprinklers located in the center of ceiling tiles where ceiling tiles are used.
- D. Provide a readily removable flushing connection consisting of a cap at each end of cross mains.

- E. Each sprinkler system shall be provided with an automatic vent valve or a manual vent valve located near the high point of the system in accordance with NFPA requirements.
- F. Pipe ball drip valves at a floor drain or to the exterior. Pipe 2 in. main drains and water motor gong drains to discharge to the exterior at approximately 2 ft. above finished grade.
- G. Securely install the spare sprinkler cabinets to the building wall at the main riser.
- H. Inspector's test valves and dry system auxiliary drains shall be installed 7 ft. or less above the finished floor.
- I. Fire department connections shall be installed 3 ft. above finished grade and water motor gongs approximately 10 ft. above finished grade.
- J. Upright sprinklers directly on branch lines shall be installed with their frame parallel to the piping.
- K. Provide sprinkler protection under ductwork, groups of ductwork and other obstructions to water spray and distribution. Use intermediate level sprinklers if subject to waterspray from above.
- L. Exposed pipe shall be left clean for painting.
- M. Coordinate and activate the systems or portions of the system to operational status as soon as possible.

3.2 PIPING, VALVES AND HANGERS

- A. Refer to other applicable sections.
- B. All piping shall be installed to permit drainage of the system through a main drain valve. Where a change in piping direction prevents drainage of the system, auxiliary drains shall be provided. The auxiliary drain assembly shall consist of a lockable ball valve, nipple and cap or plug and shall be located 7 ft. or less above the finished floor. Pipe drain to an accessible location.

3.3 TESTS

- A. General:
 - 1. Pipe installation shall be inspected by Owner's Representative prior to being covered by building construction or backfill.
 - 2. Give the Owner's Representative advance notice of final tests. Perform tests in a safe manner. Provide written certification that tests have been successfully completed. Use NFPA Above and Below Ground Material and Test Certificate Forms.
 - 3. Correct system leaks prior to final test. Do not utilize water additives, caulking, etc. to correct leaks. Provide appliances, equipment, instruments, devices and personnel.

4. Flushing: Follow Contract Documents and utilize open end pipe sections if possible.
- B. Pressure Tests:
1. Hydrostatic Tests: Minimum 200 psi and in accordance with NFPA 13 for two (2) hours.
 - a. Air test not accepted as final test.
 2. Air Test: Minimum 40 psi for 24 hours with loss not to exceed 1.5 psi within 24 hour duration.
 3. Do not subject existing systems to excess pressures.
- C. Alarm Tests:
1. Demonstrate activation of alarms and operational trip test and water delivery time for dry systems by use of Inspector's test valve.

3.4 SYSTEM TURNOVER

- A. Prior to final acceptance, instruct the Owner's Representative in the proper operation, maintenance, testing, inspection and emergency procedures for all systems furnished, for a period of time as needed. Provide one (1) new original pamphlet of NFPA 25. Indicate in writing to the Owner's Representative the provisions for proper maintenance, testing, and inspection of the systems as required by local fire codes.

END OF SECTION