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SECTION 210000 – FIRE PROTECTION GENERAL CONDITIONS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. All drawings and applicable provisions of Division 0 Bidding Requirements and Division 1 General Requirements apply to work of this Section.
- B. Should a conflict arise between Section 210000 General Conditions and other Sections, the General and Supplementary Conditions of Division 1 shall take precedence.
- C. The fire protection work shall comply with all provisions of the architectural, plumbing, fire protection, mechanical and electrical drawings and specifications.
- D. The word "FP Contractor" as used in these specifications shall be held to mean the person, firm or corporation contracting to do the herein described work.
- E. It shall be a part of this FP Contractor's bid that the submission of a proposal carries with it the agreement to all items and conditions referred to in the specifications and accompanying drawings.

1.2 RULES AND REGULATIONS

- A. The rules, regulations, ordinances of all applicable governing bodies in force at the time of execution of the Contract shall become a part of these specifications. These shall include the requirements of state, county, city and also the local utility companies.
- B. All materials furnished and work performed shall be in compliance with the latest applicable version of the following codes:

International Building Code (IBC) – 2015 Edition
International Fire Code (IFC) – 2015 Edition

Underwriters Laboratories (UL), "Fire Protection Equipment Directory", Latest Edition
Factory Mutual Systems (FM), "Approval Guide", Latest Edition

NFPA 13 – Installation of Sprinkler Systems – 2013 Edition
NFPA 24 – Private Fire Service Mains and their Appurtenances – 2013
NFPA 25 – Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, 2014

Local Code Amendments
Requirements of the Authority Having Jurisdiction

1.3 PERMITS AND FEES

- A. Cost of all fees, permits or licenses that may be required for the performance of the Contract shall be included.

1.4 PLANS AND SPECIFICATIONS

- A. The specifications and the accompanying plans (architectural, structural, mechanical, electrical, fire protection and plumbing) are mutually explanatory and anything described or shown on one, but not on the other, shall be considered as if shown or described on both. The intention of the plans and specifications is to provide complete functioning systems in every respect. FP Contractor shall furnish all material and equipment and shall perform all labor to achieve this intent, whether or not such material or equipment is indicated herein. Whenever the term "provide" is used, it shall mean "furnish and install." If a conflict exists between the drawings and the specifications or between one specification and another specification or between one

drawing and another drawing, the most demanding requirement shall apply unless otherwise authorized in writing by the Engineer.

- B. Data given herein and on the drawings is as exact as could be secured. Their absolute accuracy is not guaranteed and this FP Contractor shall obtain and verify exact locations, measurements, levels, space requirements, etc., at the site, and shall satisfactorily adapt the work to actual conditions at the building as constructed.
- C. The drawings shall be considered schematic and are not intended to indicate all changes in direction and necessary fittings to be installed by this FP Contractor. Ductwork, equipment, etc., shall be installed so all items clear the structure and other building elements and maintain appropriate clearances for access, service and maintenance.
- D. Some of the details on the plans are schematic or diagrammatic. These details are not intended to show all duct, fittings, etc., required to achieve the arrangement shown on the plan view, but instead are intended to show those items, such as curbs and sealing, etc., which are not shown on the plan view. This FP Contractor shall appropriately adapt these details to the actual conditions of the job.
- E. Routing of piping, location of equipment, and location of other devices are shown on plans for general guidance. This FP Contractor shall coordinate his work with other Contractors and shall provide necessary deviations in routing as far as 10 feet from those shown to provide systems as specified or implied, without interference and pursuant to these requirements at no additional cost to the Owner, Architect or Engineer.
- F. Contractor shall not scale the drawings. Refer to architectural and structural drawings for building construction and dimensions and to room finish schedule on architectural drawings for material, finish and construction method of walls, floors and ceilings in order to insure proper rough-in and installation of contractor's work.
- G. Changes, modifications or variations to the plans and specifications will be issued by the Engineer in writing.

1.5 DISCREPANCIES OR OMISSIONS

- A. During the bidding period, should a bidder find discrepancies or omissions in any of the documents or should he be in doubt as to their meaning, he should at once notify the Engineer who will, time permitting, issue a written instruction in the form of an addendum to all bidders of record. The Engineer will not be responsible for any oral explanations or interpretations of the documents.
- B. During construction, should a discrepancy or omission be found, it shall be brought to the attention of the Engineer at once for resolution.
- C. No changes in contract price will be allowed for minor changes in layout or location required to avoid interferences, obstructions, etc. Contract price changes will be considered only for changes in the scope of the project requirements. All such scope changes and price revisions must be authorized in writing.
- D. If discrepancies are found within the contract documents, the most demanding requirement shall take precedence unless otherwise agreed by the engineer in writing.

1.6 VISITING THE SITE

- A. This FP Contractor, before submitting his bid, shall visit the site and thoroughly acquaint himself with conditions under which the work will be performed.
- B. Failure to fully acquaint himself with existing site conditions under which the work is to be performed will not be justification for additional compensation after the award of the contract. See General Conditions for additional requirements.

1.7 HOISTING

- A. Contractor shall be responsible for hoisting of all materials and equipment furnished or installed under this Section of the Specifications, in accordance with all city, state and federal rules and regulations. See General Conditions for Advance Operation of Elevators.

1.8 SHOP DRAWINGS

- A. Contractor shall submit shop drawings in compliance with the General, Special Conditions, and NFPA 13. FP Contractor shall field verify exact locations, measurements, and space availability at the site, etc. prior to fabricating materials and shall notify the Engineer of discrepancies in writing.
- B. The FP Contractor shall submit copies of all required Shop Drawings and material and equipment lists.
- C. Submittals shall be transmitted to SSC Engineering as paper documents, electronic documents via email attachments, or electronic documents via FTP file transfers.
 - 1. All submittals shall include a transmittal form identifying the project name, date, contents of submittal package, and names of subcontractor, manufacturer, and supplier.
 - 2. On an attached separate sheet clearly identify deviations from requirements in the Contract Documents, including minor variations and limitations.
 - 3. Paper submittals shall be sent to

SSC Engineering, Inc.
Attention: Submittals
1820 Edison Ave.
Chesterfield, MO 63005
 - 4. Emails regarding submittals shall be sent to "submittals@sscengineering.com".
- D. Documents transmitted in paper format shall be sent to the Architect who will forward these to SSC. If approved by the Architect prior to submitting documents, these documents may be submitted simultaneously to the Architect and SSC. SSC will return all documents to the Architect only regardless of how they were transmitted to SSC. Submit four (4) paper copies of all required Shop Drawings and material and equipment lists for the Engineer's and Owner's sole use. The FP Contractor shall submit additional paper copies that will be required for his own use and the Operation and Maintenance Manuals. The additional copies will be reviewed by the Engineer and returned to the FP Contractor marked accordingly.
- E. If SSC is the prime consultant and there is no Architect, paper documents shall be transmitted directly to SSC.
- F. Documents transmitted as email attachments shall be sent simultaneously to the Architect and SSC. SSC will return one (1) electronic copy of these documents to the Architect only.
- G. Documents transmitted via FTP file transfers shall be retrieved from the FTP site after SSC has received an email notification that these documents have been posted to the site. SSC will return one (1) electronic copy of these documents to the Architect only unless another procedure is agreed to in writing by the Architect and the Engineer.
- H. Contractor shall review and correct all shop drawings before they are submitted. Shop drawings shall bear the signed and dated approval stamp of this FP Contractor.
- I. Shop drawings shall include the plan mark used on the plans.
- J. Shop drawings and product data for equipment shall give capacities at conditions specified and shall include manufacturer's catalog numbers and cuts. Shop drawings shall be clearly marked; shall indicate all accessories, items, conditions, etc., which are being furnished; and shall

indicate that all conditions of the plans and specifications are being met. Wiring diagrams shall be submitted.

- K. Submittals which do not provide the required information will be returned unchecked.
- L. Contractor shall be responsible for deviations, errors and omissions, quantities, and coordination dimensions in submittals, and this responsibility shall not be relieved by Engineers' review of submittals.
- M. This FP Contractor shall coordinate each submittal with the contract documents, work of other contractors, and job site conditions.
- N. The FP Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the FP Contractor has specifically informed the Engineer in writing of such deviation at the time of submittal and (1) the Engineer has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The FP Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer's approval thereof.

1.9 MAINTENANCE AND OPERATING INSTRUCTIONS AND MANUALS

- A. Upon completion of the job, the installing contractors and major suppliers shall instruct the Owner's representatives in the proper operation and maintenance of the systems installed by this FP Contractor. The installing FP Contractors shall submit documentation indicating the date of instruction; names and organization of persons providing and receiving the instructions; systems the instructions covered; and materials received.
- B. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - 1. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - 2. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
- C. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
- D. Contractor shall also submit one (1) electronic copy of properly bound operating manuals to the Engineer for review. These manuals shall include the following:
 - 1. Complete set of shop drawings.
 - 2. Copies of all submittals.
 - 3. Parts lists, wiring diagrams, piping diagrams, etc.
 - 4. Manufacturers' operating and maintenance instructions.
 - 5. As-built drawings.
 - 6. Written operating and maintenance instructions for the system.
 - 7. Copies of warranties.
 - 8. Parts list for each piece of equipment and name of local supplier.

- E. At a predetermined time, prior to the facility opening, an instructional session shall take place. The installing contractors and major suppliers shall instruct the Owner's operating personnel on operation and maintenance of the systems. The installing FP Contractor shall submit documentation indicating the date of instruction; names and organization of persons providing and receiving the instructions; systems the instructions covered; and materials received.

1.10 RELEASE OF CAD FILES

- A. See "Release of Cad Files" at the end of this section.

1.11 RECORD DRAWINGS

- A. During construction, a separate set of plans at the jobsite shall be maintained by the FP Contractor to keep a record of all changes of locations. See additional requirements in General Conditions and Supplementary Conditions.
- B. Locations of piping, ductwork and other concealed facilities are to be shown by the FP Contractor if and when they differ from the drawings. Underground piping shall be dimensioned on those drawings.
- C. "As built" drawings are to be submitted to Architect/Engineer for review prior to the time of request for final payment. Submit as-built record drawings in accordance with the General Conditions.
- D. For drawings that SSC has furnished to the FP Contractor in CAD format, FP Contractor shall prepare "As Built" drawings in CAD format. "As built" drawings in CAD format are to be submitted to Architect/Engineer, in addition to marked up paper documents for review prior to the time of request for final payment. Submit as-built record drawings in accordance with the General Conditions.

1.12 WORKMANSHIP AND MATERIALS

- A. All work shall be performed in a manner acceptable to the Engineer, Architect, and the Owner, by properly trained, supervised and experienced personnel using new and clean materials, supplies, equipment, and hardware.

1.13 MATERIAL AND EQUIPMENT HANDLING AND STORAGE

- A. It is recognized that space at the project for storage of materials and products is limited. Coordinate the deliveries of electrical materials and products with the scheduling and sequencing of the work so that storage requirements at the project are minimized. In general, do not deliver individual items of equipment to the project substantially ahead of the time of installation.

1.14 GUARANTEE AND WARRANTY

- A. This FP Contractor shall guarantee and warrant all equipment, materials, workmanship, installation, etc., for a period of one year in accordance with the General Conditions.
- B. During the guarantee period, this FP Contractor shall make all required repairs and replacements, and shall provide all necessary service, labor, tools, materials, parts, etc., required during this period at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIAL SUBSTITUTION

- A. Equipment selection has been based on one manufacturer to establish the desired type, style, quality, performance, etc. When other manufacturers are listed as equally acceptable, the product of those manufacturers will be accepted if their product complies with these

specifications and drawings. The listing of a manufacturer does not relieve that manufacturer from complying with the specifications and drawings.

- B. All equipment and materials are subject to the review and approval of the Engineer and Architect.
- C. All differences in cost involved in using an equally acceptable manufacturer shall be included in this FP Contractor's bid. This FP Contractor shall be responsible for any and all engineering and installation variations due to the substituted equipment. These include structural, electrical, architectural, plumbing, mechanical, fire protection, etc. changes.
- D. Deviations from these specifications are not solicited and are not encouraged. If a deviation between the specifications or drawings and items bid does exist, then that deviation must be clearly itemized and explained on the bid form.
- E. Solvent based adhesives or sealants shall not be substituted for water based adhesives or sealants.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor shall furnish all material, equipment, labor, services, supplies, etc., required to execute to completion all work shown on the mechanical, electrical, fire protection, and plumbing drawings, described in these specifications, or made necessary by the work shown on the drawings and/or described in these specifications.
- B. This FP Contractor shall schedule all work and furnish the required materials in such a manner that the work may progress from start to finish in an expeditious and efficient manner without undue interruption. This FP Contractor shall also schedule his work to coordinate with the construction staging for this project.
- C. Contractor shall hire the proper trades to accomplish the work described on the drawings or in the specifications.

3.2 COORDINATION OF TRADES

- A. Prior to the fabrication or installation of any materials, this FP Contractor shall review the drawings indicating work to be performed by each trade. If conflicts occur, they shall be brought to the attention of the Engineer for resolution.
- B. If this FP Contractor installs the work without coordinating with the other trades, then, if requested by the Owner, Architect, or Engineer, this FP Contractor shall remove and rework some installed work to resolve a conflict, and such change shall be done at no change in contract price.
- C. Control wiring is defined as that wiring which conducts electrical energy at a voltage of less than 100 volts. Interlock wiring is defined as that wiring which performs a control function, but at a voltage of 100 volts or greater. All other wiring shall be considered power wiring.
- D. The Electrical Contractor shall furnish and install all interlock wiring unless specifically noted otherwise.
- E. Contractor furnishing electrically-operated equipment (e.g. alarm bells or AV devices) shall furnish electrical characteristics to the Electrical Contractor so that the devices are properly installed.
- F. Unless specifically noted otherwise, pilot controllers (flow switches, tamper switches, pressure switches, etc.) shall be furnished and mounted by the FP Contractor furnishing the controlled equipment.

- G. Electrical Work For Fire Protection Equipment: Electrical Contractor shall wire all fire protection equipment furnished by various contractors in accordance with the following general provisions:
 - 1. Power and control wiring for flow switches, tamper switches, pressure switches, electric bells and audio visual devices.
- H. Fire Protection Contractors shall provide the following:
 - 1. Automatic control and interlock wiring diagrams as called for in the specifications.
 - 2. Complete and accurate wiring diagrams to Electrical Contractor for all equipment requiring electrical wiring.

3.3 PROTECTION OF EQUIPMENT AND WORK

- A. This FP Contractor shall, at all times, protect and preserve all materials, supplies, equipment, piping, etc., from damage due to weather, corrosion, dirt, vandalism, theft, etc., and shall further provide all enclosures or special protection as indicated by circumstances.
- B. Should any of the materials, equipment, etc., be damaged as a result of his negligence, then this FP Contractor shall be held responsible for all such damage and costs incurred for repair or replacement.

3.4 CONSTRUCTION STAGING

- A. See schedule in Division 0 and Division 1. This FP Contractor shall cooperate with and coordinate with the Owner's Representative to plan and schedule the work to satisfy the schedule.
- B. All work shall be so arranged that electrical power, sewer, water, and other services are available to the building at all times, except for short periods of interruption necessary for the performance of new work. Interruptions shall not be requested until the new services are complete and ready for final connection.
- C. All interruptions shall be scheduled, and services shall not be interrupted without written approval of the Owner's Representative. Notification to the Owner's Representative shall include the exact time and estimated duration of any interruption.
- D. Pipes which are shown to be installed or demolished in subsequent phases that are needed for earlier phases to make the earlier phase operational shall be installed or demolished in the earlier phase during non-business hours. Where later phase work is performed in an earlier phase, contractor shall remove and replace ceilings as required to perform the work.

3.5 MAINTENANCE OF WORK AREAS

- A. During the project, this FP Contractor shall maintain his work area in an organized manner, shall not allow debris to accumulate, and shall store equipment, tools and supplies in a manner which shall not cause interference with the activities of others engaged on the project.
- B. Open ends of pipe, equipment and specialties shall be kept properly closed during construction and installation so as to avoid contamination.

3.6 CLEANING AND CLEANUP

- A. Upon completion of this work, the FP Contractor shall clean all pipes and equipment. FP Contractor shall leave all work in a finished, clean, and satisfactory working condition.
- B. Each FP Contractor shall be responsible for his own cleanup to a central location designated by the Owner. FP Contractor shall periodically remove all rubbish, crating, unused material, outfall, and any other debris created by him during the course of the work as directed by the Owner.

END OF SECTION 210000

RELEASE OF CAD FILES

The drawings prepared by SSC Engineering have been prepared using AUTOCAD 2015. Files for plan drawings prepared by SSC Engineering will be made available to the successful HVAC, plumbing, electrical and fire protection contractor by email; no other drawings will be released. The files will have background files bound in, borders and title blocks removed, and all notes, details, diagrams, and schedules removed. A release form must be signed. Utilization of these documents for the development of shop drawings and submittals does not relieve the contractor from any of his responsibilities herein.

Release form that must be signed:

As requested, SSC Engineering will provide _____ (name of contractor) with electronic CAD files of the requested (M, E, P, FP) floor or ceiling plans on the terms set forth below. While SSC is not required under its contract to provide or update these electronic files for this purpose, they are being made available as a convenience to the contractor and as a substantial time saver in the preparation of submittals for this project.

The files contain information through the date when the drawings were issued for bidding and may or may not contain information from the addenda. The company using these files shall be responsible for the coordination of the information contained therein with the Plans, Specifications and other Contract Documents. In the event of any ambiguity, discrepancy or conflict between the information within the electronic files and the Contract Documents, the Contract Documents shall be used.

SSC will not be responsible for any error or malfunction in the translation, interpretation or use of this electronic information once it has been provided to the contractor. SSC does not assume any responsibility arising out of the use or adaptation of the information contained in these files or the sufficiency of any drawings prepared based upon the information included within. By accepting these drawing files, the contractor agrees to hold the Engineer harmless with regard to any errors or omissions in the drawing files. Nothing included in this release shall modify any requirements or responsibilities of either party under their respective contracts.

Signing below indicates understanding and acceptance of these terms. Upon receipt of a signed letter or fax, SSC will release the electronic CAD files.

Project Name and Number: _____

Specific Drawings Request: _____

Acknowledged and Agreed:

_____	_____
Company	Version of AutoCAD used
_____	_____
Name (Must be an officer of the Company)	E-mail address
_____	_____
Title	Maximum e-mail attachment size

Date	

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SECTION 210010 – BASIC FIRE PROTECTION MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. All drawings and applicable provisions of Division 0 Bidding Requirements and Division 1 General Requirements apply to work of this Section.
- B. Section 210000 - Fire Protection Conditions.
- C. This section covers basic fire protection materials and methods for Fire Protection work and applies to work of those sections.

PART 2 - PRODUCTS

2.1 PRODUCT CRITERIA

- A. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product for at least 5 years.
- B. Products shall be supported by a service organization which maintains an inventory of repair parts and is located within 100 miles of the jobsite.

2.2 MATERIALS AND STANDARDS

- A. All equipment and materials furnished by this Contractor shall be new, and where two or more items of the same kind are required, they shall be the product of the same manufacturer.
- B. All materials, equipment, operations, procedures and installation of all materials and equipment shall conform to:

ADA	Americans with Disabilities Act
ASME	American Society of Mechanical Engineers
UL	Underwriters' Laboratories, Inc.
NFPA	Applicable sections of the National Fire Protection Association
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Administration
NEC	National Electrical Code
AMCA	Air Moving and Conditioning Association
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ARI	Air Conditioning and Refrigeration Institute
ANSI	American National Standards Institute, Inc.
ASTM	American Society for Testing Materials
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
IPCEA	Insulated Power Cable Engineers Association
HEW	U.S. Department of Health, Education and Welfare
PDI	Plumbing and Drainage Institute
NSF	National Sanitation Foundation
IEEE	Institute of Electrical and Electronic Engineers
AWWA	American Water Works Association

- C. All materials used shall be applied in compliance with the manufacturer's recommendations. If a discrepancy occurs between the application of materials as called for on the drawings or in the specifications and the manufacturer's recommendations, this discrepancy shall be called to the Engineer's attention before materials are purchased or applied.

D. Abbreviations

- | | | | | | |
|----|----|-----------------------|----|-----|------------|
| 1. | AC | Air Conditioning Unit | 2. | ADJ | Adjustable |
|----|----|-----------------------|----|-----|------------|

3.	AF	Anti-Freeze	41.	FS	Flow Switch
4.	AFF	Above Finished Floor	42.	FURN	Furnished
5.	AHU	Air Handling Unit	43.	FS	Flow Switch
6.	AP	Access Panel	44.	GAL	Gallons
7.	BFP	Back Flow Preventor	45.	GALV	Galvanized
8.	BHP	Brake Horsepower	46.	GC	General Contractor
9.	BTU	British Thermal Units	47.	HR	Hour
10.	BOD	Bottom of Duct	48.	HP	Horsepower
11.	BOP	Bottom of Pipe	49.	IE	Invert Elevation
12.	BOS	Bottom of Steel	50.	IN	Inches
13.	CAP	Capacity	51.	INST	Installed
14.	CONN	Connected	52.	KF	K-Factor
15.	CV	Control Valve	53.	KW	Kilowatt
16.	CC	Center to Center	54.	LRA	Locked Rotor Amps
17.	CFM	Cubic Feet per Minute	55.	MAX	Maximum
18.	CI	Cast Iron	56.	MC	Mechanical Contractor
19.	CL	Center Line	57.	MIN	Minimum
20.	CLG	Ceiling	58.	NO	Normally Open
21.	CPVC	Chlorinated Polyvinyl Chloride	59.	NC	Normally Closed
22.	D	Drain	60.	NO.	Number
23.	DIA	Diameter	61.	NTS	Not to Scale
24.	DISC	Disconnect	62.	PC	Plumbing Contractor
25.	DN	Down	63.	POC	Point of Connection
26.	EJ	Expansion Joint	64.	RND	Round
27.	EC	Electrical Contractor	65.	SW	Switch
28.	EFF	Efficiency	66.	STL	Steel
29.	EX	Existing	67.	SG	Sight Glass
30.	FCU	Fan Coil Unit	68.	SP	Static Pressure
31.	FDC	Fire Department Connection	69.	SPC	Sprinkler Contractor
32.	FH	Floor Hydrant	70.	SQ	Square
33.	FHV	Fire Hose Valve	71.	SQ FT	Square Foot
34.	FHC	Fire Hose Cabinet	72.	SS	Stand Pipe System
35.	FIN	Finish	73.	TOP	Top of Pipe
36.	FLR	Floor	74.	TS	Tamper Switch
37.	FM	Factory Mutual	75.	UH	Unit Heater
38.	FPC	Fire Protection Contractor	76.	VAV	Variable Air Volume Box
39.	FPM	Feet per Minute	77.	VFD	Variable Frequency Drive
40.	FT	Feet	78.	VTR	Vent Thru Roof
			79.	WC	Water Column
			80.	WS	Water Flow Switch

2.3 MISCELLANEOUS MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36. Interior applications shall be galvanized steel or black steel. Exterior applications shall be galvanized steel.
- B. Strut systems shall be painted steel equal to B-Line Systems or Unistrut. Where used in exterior applications, the materials shall be galvanized steel.

2.4 ACCESS PANELS

- A. Access panels shall be constructed of heavy gauge steel with factory applied prime coat of baked enamel.
- B. Panel doors shall be attached to the frame with concealed hinges.
- C. Cam locks shall be provided in not less than the following quantities:

Panel Height (Opposite side of hinges)

0 to 18"	1 cam lock
18-1/16" to 30"	2 cam locks
30-1/16" to 48"	3 cam locks
48-1/16" to 60"	4 cam locks

Panel Width

0 to 18"	No cam locks on top or bottom
18-1/16" to 30"	1 cam lock top and bottom
30-1/16" to 48"	2 cam locks top and bottom

- D. On the panel height, one of the cam locks described above shall be a key operated cylinder lock in lieu of the cam lock. One key shall operate all panels.
- E. Cam locks shall have tamper-proof heads. Provide 10 tools to the owner.
- F. For masonry, tile or wallboard surfaces, provide access panels with extruded aluminum frames, 3/4" border, aluminum piano hinges, screwdriver-operated cam lock, brushed satin aluminum finish. Final painting to match interior decor by others. Paintable finish to be provided when the adjacent construction is paintable.
- G. Access panels will not be required in accessible type ceilings.
- H. For plastered ceiling or wall, concealed flange, recessed door panel to receive plaster by others, continuous hinges, flush latch, white prime coat finish. Final painting to match interior decor by others.
- I. For locations concealed from public, snap catch latches may be used.
- J. Manufacturer - Panels shall be equal to Inryco/Milcor type K for plaster, type DW for drywall, type M for masonry.

2.5 SLEEVES

- A. Exterior And Foundation Walls: All piping through exterior or foundation walls shall pass through schedule 40 galvanized steel sleeves which shall be large enough to allow for caulking material. No sleeves are permitted through concrete structural members unless indicated on the structural drawings or approved by the Engineer.
- B. Interior Walls and Partitions: All piping through interior walls and partitions that are fire rated shall pass through either schedule 40 black steel or 20 gauge galvanized steel sheet metal sleeves. Schedule 40 steel pipe sleeves must be used when required for structural purposes.
- C. Floors: All piping through floors shall be provided with schedule 40 carbon steel pipe sleeves, extending 2 inches above floor except in finished areas. Sleeves in finished areas shall terminate flush with floor, and shall be schedule 40 carbon steel pipe.

2.6 BACKING AND SEALANTS

- A. Backing and sealant for piping and ducts passing through floors, plaster ceilings, partition, and walls shall be as follows:
 - 1. Backing Material:
 - a. A pure ceramic fiber made of alumina-silica; "Cerfiber- FS" by Manville or equal.
 - b. Insulation: Glass fiber type, non- combustible.

2. Sealant: Gun Grade. An 1-part modified polyurethane, gun applied, elastic sealant, "Dymonic" by Tremco, or Chem-Calk 900 by Bostik.
3. Mechanical Seal: Link-Seal or approved equal. A modular mechanical sealing assembly consisting of interlocking rubber links shaped to fill the annular space between the pipe and sleeve; corrosion-protected carbon steel bolts, nuts, and pressure plates. After the assembly is positioned in the sleeve, tightening the bolts shall cause the rubber links to provide a watertight seal between the pipe and the sleeve. Seal assembly shall be sized as recommended by the manufacturer. Provide sleeves of proper diameters.
4. Fire Retardant Sealants: Products used shall be U.L. Classified and approved for the application. Products shall produce non-toxic fumes and shall be PCB and asbestos free. Subject to compliance with requirements, provide fire retardant sealant products from one of the following: 1) "SpecSeal" by Specified Technologies Inc. 2) 3M, 3) Chase Technology Corporation, 4) Link-Seal, 5) Pyro-Pac by Thunderline Corporation, 6) "Fyre Seal" by Tremco, 7) Pensil 100 by General Electric, 8) Pensil by STI, or 9) "Flameseal" by G. S. Nelson Electric.
 - a. Acrylic 1-part silicone rubber, gun applied, fire retardant elastic sealant, "Fyre Seal" by Tremco.
 - b. Silicon foam sealant, CTC PR-855 by Chase Technology Corporation.
 - c. Fire stop putty. "Flameseal" by G. S. Nelson Electric.
 - d. Intumescence Sealant (SpecSeal SSS100) shall be one-part, two stage intumescent latex compound, expands a minimum of 8 times when exposed to 230°F to >1000°F, thixotropic. Sealant shall be capable of caulking or troweling on to vertical surfaces or overhead. Sealant shall be water-based, sandable, paintable, red in color, and safe for contact with plastics.
 - e. Flexible Sealant (SpecSeal LC150) shall be one-part, latex-based compound, flexible and non-shrinking when dry, thixotropic. Sealant shall be capable of caulking or troweling on to vertical surfaces or overhead. Sealant shall be water-based, sandable, paintable, blue in color, and safe for contact with plastics.
 - f. Flexible Silicone Sealant (SpecSeal Pensil 300) shall be one-part, neutral curing silicone, completely water resistant, contain no solvents nor inorganic fibers, allow movement of +/-50%. Sealant shall be auto-bonding, ozone and UV resistant, chemical resistant and capable of caulking or troweling on to vertical surfaces or overhead.
 - g. Intumescence Putty (SpecSeal Firestop Putty) shall be one-part, two stage intumescent, non-hardening compound, expands a minimum of 5 times when exposed to 230°F to >1000°F. Putty shall be soft and pliable with aggressive adhesion, contain no water-soluble intumescent ingredients, water-based, sandable, paintable, red in color, and safe for contact with plastics.
 - h. Putty Pads (SpecSeal Firestop Putty Pads) shall be one-part, two stage intumescent, non-hardening compound, expands a minimum of 5 times when exposed to 230°F to >1000°F. Putty shall be soft and pliable with aggressive adhesion, contain no water-soluble intumescent ingredients, water-based, sandable, paintable, red in color, and safe for contact with plastics.
 - i. Pillows (SpecSeal Firestop Pillows) shall be an intumescent pillow heat sealed in a fire-retardant poly bag with a monolithic core encapsulated by flexible intumescent coating and shall expand when exposed to 230°F to >1000°F.

- j. Mortar (SpecSeal Firestop Mortar) shall be light weight, fast drying, portland cement based, wet mortar density shall be ≤ 52 lb./cu.ft., dry mortar density shall be ≤ 45 lb./cu.ft., approved for combustible and noncombustible penetrants, have chemical adhesion, and be red in color.
- k. Silicone Foam (SpecSeal Pensil Silicone Foam) shall be two-part, silicone, room temperature curing foam, completely water resistant, contain no solvents nor inorganic fibers, allow movement of expansion, contraction and vibration.
- l. Intumescent Collars (SpecSeal Firestop Collar) shall be factory assembled collar utilizing a molded two stage flexible intumescent insert, insert shall expand a minimum of 15 times when exposed to 230°F to >1000°F, suitable for CPVC, ABS, ABS Foam Core, and FRPP pipes.
- m. Intumescent Wrap Strips
 - 1) (SpecSeal Firestop Red Wrap Strip) shall be highly flexible, two-stage intumescent material and shall expand a minimum of 15 times when exposed to 230°F to >1000°F.
 - 2) (SpecSeal Series Blu Wrap Strip) shall be highly flexible, two-stage intumescent material and shall expand a minimum of 30 times when exposed to 230°F to >1000°F.
- n. Intumescent coatings (SpecSeal Cable Coating) shall be water based, intumescent coating, expand a minimum of 5 times its dry applied thickness, flexible, water and weather-resistant film, contain no solvents or inorganic fibers. Coating shall be thixotropic and be capable of being applied by brush application or by airless spray.
- o. Urethane Joint Sealants
 - 1) Subject to compliance with requirements, provide one of the following:
 - a) Pacific Polymers International, Inc.; Elasto-Thane 230 LM Type II.
 - b) Polymeric Systems, Inc.; PSI-901.
 - c) Approved equal.
 - 2) Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS for vertical surfaces or Grade P for horizontal, Class 50, for Use "NT" for Non-Traffic.

2.7 FIRE PROOFING ON STRUCTURE

- A. Where fire proofing is existing or has been applied to the structure by others and the work of this contractor damages or removes this fire proofing while making attachments to the structure, this contractor shall include cost to repair the fire proofing to its original condition.

2.8 LINTELS

- A. Unless otherwise indicated on plans, all lintels required for the support of building construction above pipes, boxes, panels, etc., shall be furnished and installed by the Contractor requiring the opening.
- B. Lintels furnished shall be structural steel angles, channels, or tees of proper size and sections for the load being supported.

2.9 CUTTING

- A. All openings for conduit, pipes, etc., shall be provided by each Contractor by means of sleeves or framed openings.
- B. Each Contractor shall be responsible for any cutting required for conduits, pipes, etc., if sleeves or openings are not properly provided. Under no circumstances shall any structural members, load bearing walls, or footings be cut without first obtaining written permission from the Structural Engineer. All cutting and patching shall be done at the expense of the contractor requiring the cutting.
- C. Cutting shall be limited to the size necessary for working conditions. When cutting surfaces are difficult or costly to replace, such as marble, glazed tile, wood paneling, etc., each contractor shall obtain the Owner's approval in advance of the cutting and patching.

2.10 PATCHING

- A. Concrete or concrete block surfaces - Patch the opening with concrete, finished smooth with adjacent surface. Painting is the responsibility of the contractor doing the cutting and patching and shall be subcontracted to the Owner's Painting Contractor.
- B. Drywall or plastered surfaces - Patch with filler compound. Painting is the responsibility of the contractor doing the cutting and patching and shall be subcontracted to the Owner's Painting Contractor.
- C. Surfaces with finishing materials - Such as tiled, paneled, stone or marble surfaces, patch the opening with cement or plaster to the underside of final finishing material. Final patching is the responsibility of the contractor doing the cutting and patching and shall be subcontracted to the Owner's Interior Furnishing Contractor doing the specific finish work.

2.11 PIPING AND EQUIPMENT SYSTEMS MARKERS

- A. Markers shall be Allen Systems, Inc., W.H. Brady Co. - Signmark Div., or Industrial Safety Supply Co., Inc.
- B. Pipe banding shall consist of 1" wide single tape wrapped completely around the circumference of the pipe or insulation.
- C. All color coding shall comply with ANSI A13.1 1975.
- D. Pipe markers shall be manufacturer's standard pre-printed, semi-rigid plastic, snap-on type or vinyl, pressure-sensitive type with permanent adhesive.
- E. Valve tags shall be brass, plastic laminate, or plastic valve tags that are 1½" diameter or square. Indicate piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high letters. Provide 5/32" hole for fastener. Provide manufacturer's standard solid brass or plated steel chain, or plated steel S-hooks of the sizes required for proper attachment of tags to valves.
- F. Equipment markers shall be manufacturer's standard laminated plastic type. Include the following, matching terminology on schedules as closely as possible: 1) Name and plan number, 2) Equipment service. Provide approximate 2½" x 4" markers for control devices, dampers, and valves; and 4½" x 6" for equipment.

2.12 CEMENT GROUT

- A. Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix ratio shall be 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

2.13 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Acceptable manufacturers: Gunnebo Fastening Corp., Hilti, Inc., ITW Ramset/Red Head., or Masterset Fastening Systems, Inc.
- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Drilled Inserts: Self-drilling expansion shields and machine bolt expansion anchors: permitted in concrete not less than four inches thick. Applied load shall not exceed one-fourth the proof test load listed by the manufacturer. Phillips Red-head, wedge anchors or equal.
- D. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- E. Bolts and nuts, except as required for piping applications, shall be carbon steel in accordance with ASTM A 307 and shall be cadmium-plated, zinc-coated steel, or Type 304 stainless steel. Each bolt shall be provided with neoprene and cadmium-plated steel washers under the heads.

PART 3 - EXECUTION

3.1 EQUIPMENT SUPPORTS

- A. This Contractor shall furnish and install all bases, anchor bolts, and structural steel to support the equipment, piping, etc., furnished and installed by him. Any equipment legs, guy wire, anchors, etc., or any pipe that passes through the roof shall be sealed by a method approved by the Architect.
- B. Concrete housekeeping pads to be provided by Division 3. Concrete housekeeping pads shall be a minimum of 3-1/2" high, unless detailed otherwise, under all equipment, pumps, etc., in the equipment rooms where piping containing water is located. The horizontal distance from the equipment support to the edge of the pad shall be at least 2", but not more than 4". All exposed edges of each pad shall be 1/2" chamfer and all surfaces shall be smooth. The housekeeping pads shall be reinforced with wire mesh and shall be doweled to the floor.
- C. Plywood backboards shall be provided for all wall mounted equipment and controls (with the exception of surface mounted cabinets). Backboards shall be constructed of 3/4" plywood grade B-C. The "B" face shall be exposed. All boards shall be painted before attachment of any surface equipment. Plywood shall be fire resistant treated in Type I and Type II Buildings.

3.2 DRIVE AND COUPLING GUARD

- A. Contractor shall furnish and install coupling or belt guards on all drives which do not have guards factory installed. Belt guards shall enclose drive on all sides and shall comply with requirements of governing agencies.

3.3 BUILDING OPENINGS FOR ADMISSION OF EQUIPMENT

- A. This Contractor shall ascertain from his examination of the architectural and structural drawings whether any special temporary openings or supports in the building for the admission of apparatus furnished under the Contract will be necessary. The Contractor shall pay all cost of making such openings or providing such supports.

3.4 CUTTING AND PATCHING

- A. All cutting that may be necessary for the installation of the work and any required patching that results therefrom shall be done by the proper trade involved and shall be included in the work of

this Contractor. Columns, beams, girders or other structural members shall not be cut. No openings shall be cut without written approval of the Owner's Representative.

B. Repair of Spray Fire Proofing Materials

1. Where fireproofing materials are damaged during the installation of the fire protection system, fireproofing shall be corrected to meet specified requirements by adding fireproofing material to provide the proper thickness, or by removing defects and respraying with new fireproofing material. Repairs shall use same type of fireproofing material as originally applied or patching materials recommended by the manufacturer. Repaired areas shall be retested and re-inspected. Fireproofing material shall be applied by hand-trowel, or by respraying. Coordinate with General Contractor and Spray Fire Proofing contractor.

3.5 FLASHING

- A. Provide flexible flashing and metal counter flashing where piping penetrates weather or waterproofed walls, floors, and roofs.
- B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control where indicated on the drawings.

3.6 ACCESS

- A. All control devices, equipment, specialties, valves, plumbing traps, etc., shall be so located as to provide for easy access and proper clearance for operation, maintenance, and repair.
- B. Where items are located above non-accessible ceilings, in or behind walls, or in other similar concealed areas, contractor requiring access shall provide access panels.
- C. Contractor shall not provide access panel to equipment above drywall ceilings in sales areas or restrooms without written permission of Architect/Engineer.

3.7 PAINTING

- A. All pieces of mechanical equipment shall be factory finished machinery-grey or standard color as furnished by the manufacturer, or as called for in the technical section. Scratches shall be touched up in the field after equipment is installed with a paint which matches the original color.
- B. This Contractor shall paint the following items:
 1. Items specified under "Demolition and restoration of facilities", Section 210000 shall be painted.
 2. No other painting is required unless specifically called for on the plans.
 3. Coordinate with Architect for painting of exposed piping.

3.8 SLEEVES AND ESCUTCHEONS

- A. This Contractor shall be responsible for locating, placing and maintaining in proper position all sleeves required for the work. In the event that failure to do so requires cutting and patching of finished work, it shall be done at this Contractor's expense.
- B. Sleeves through outside walls shall be cut smooth and shall be flush with each side of the wall.
- C. Sleeves through floors shall extend 2" above finished floors.

- D. Sleeves in foundation walls or footings shall be as detailed on the plans. No sleeves, other than those shown on the drawings, shall be installed through footings or foundations without obtaining approval from the Structural Engineer.
- E. Where pipes pass through existing concrete floors or walls, the hole shall be core drilled. Sleeves shall be grouted in place.
- F. Where pipes pass through existing foundation walls or concrete walls below grade, the hole shall be core drilled.
- G. Where pipes pass through firewalls composed of plaster or drywall, fire sealant shall be applied around the outside of the sleeve to seal between sleeve and wall per UL requirements.
- H. The internal diameter of sleeves shall be 1" larger in diameter than the outside diameter of the pipe or pipe insulation. Insulation shall be continuous through sleeve.
- I. The space between the pipe and the sleeve shall be sealed with fire resistant silicon foam sealant, CTC PR-855 by Chase Technology Corporation, or equal. Link-Seal, Pyro-Pac by Thunderline Corporation is acceptable in lieu of the silicon foam sealant listed above. "Flameseal" fire stop putty by G. S. Nelson Electric is also acceptable. Products used shall be U.L. Classified, shall produce non-toxic fumes, and shall be asbestos free.
- J. Where pipes pass through concrete walls below grade, the space between the pipe and the core drilled hole or sleeve shall be completely filled. Caulk outside with lead wool packed watertight. Caulk outside surface between pipe and sleeve or hole with General Electric, or equal, silicon caulking. Link-Seal as described above is acceptable in lieu of lead wool.
- K. Chrome plated escutcheons shall be provided at all locations where pipes penetrate walls in exposed locations.
- L. Interior Non-Rated Walls/Partitions:
 - 1. Concealed locations: Limit the size of the space between the wall and the outside of the pipe to 1" maximum. The space between the pipe and the wall may be left open.
 - 2. Visible Locations: Openings between pipes and wall shall be covered with chrome plated escutcheons.
- M. Interior Fire-Rated Walls/Partitions/Floors/Ceilings:
 - 1. Where pipes pass through rated assemblies (walls, floors, ceilings, etc.), the pipes shall be sealed per approved methods to meet U.L. Classifications.

3.9 PIPING AND EQUIPMENT SYSTEMS MARKERS

- A. All piping shall be identified with color coded banding. This color banding shall be applied at the following locations:
 - 1. Adjacent to each valve.
 - 2. At each branch or riser take-off.
 - 3. Where piping goes through floors, walls or ceilings.
 - 4. On horizontal pipe runs at 80 foot intervals, but not less than one per room.
- B. All color coding shall comply with ANSI A13.1 1975.
- C. Pipe marking shall also include printed markers indicating the service and flow arrows indicating direction of flow.

- D. Provide valve tag on every valve and control device in each piping system; exclude check valves and valves within factory-fabricated equipment units. List each tagged valve in valve schedule for each piping system and include valve schedule in O & M Manual.
- E. Provide equipment markers on all scheduled equipment. Provide manufacturer's standard laminated plastic markers. Provide approximate 2½" x 4" markers for control devices, dampers, and control valves; and 4½" x 6" for equipment. Include the A) Name and plan number and) B Equipment service, matching terminology on schedules as closely as possible.

3.10 LINES AND GRADES

- A. This Contractor shall set all construction stakes required for establishing the lines and grades for underground piping and equipment. He shall assume full responsibility for dimensions and elevations measured from such stakes and reset all stakes displaced or moved while the work is in progress.
- B. This Contractor shall coordinate all elevations and dimensions shown on the drawings with the General Contractor and other subcontractors and report any discrepancies to the Engineer. No work shall be installed until all discrepancies have been resolved.

3.11 EXCAVATION

- A. Excavate, as necessary, for all underground piping, conduit, etc., as indicated on drawings and/or necessary.
- B. Material to be excavated shall be non-classified and shall include all earth or other materials encountered. The contract price shall cover the removal of all such material to the depth and extent indicated on the drawings and/or herein specified.
- C. Unless otherwise shown, provide separate trenches for each utility. Lay all piping in open trench except when the Engineer gives written permission for tunneling.
- D. Excavation of trenches from surface to top of pipe shall be kept to a minimum but shall be of sufficient width for proper installation of the work. The excavation from bottom of trench to top of pipe shall be not more than twenty (20) inches wider than the outside diameter of the pipe to be laid therein, or where depth of backfill over pipe exceeds ten (10) feet, width of trench at top of pipe shall not exceed 4/3 of nominal diameter of pipe, plus eight inches. For larger pipe, the bottom of trench shall be shaped to conform to the lower half of pipe, and recesses four (4) inches in length shall be cut for pipe bells as required, to give uniform bearing making certain that the pipe is properly supported throughout. Provide ample excavation under and around all pipe joints to permit proper caulking, sealing, welding or thread tightening.
- E. All excavations shall be properly protected by the necessary bracing and timbers to prevent any cave-ins or injury to adjacent improvements and workmen. The sides of all trenches shall be securely held by bracing or sheeting, which bracing and sheeting shall not be removed until the level of the backfill has reached the point where such removal can be safely carried out. The thickness of the sheeting and the dimensions of the cross-braces, shoes, etc., to be used by this Contractor shall be satisfactory to protect properly the sides of the trench and to prevent injurious cave-ins or erosions.
- F. Grading in the area of the excavation will be such that it shall prevent surface water from flowing into the excavated trench. Under no circumstances lay, pipe or install appurtenances in water. Keep trench free from water until pipe joint materials have hardened. The presence of ground water in the soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which an increase may be made in the contract price.

- G. Where underground lines cross, the trench of the lower pipe shall be backfilled with sharp sand, well tamped, to provide bed for higher pipe. Lines which run parallel and at different levels shall be adequately separated to provide firm bedding for the lines. Sewer, water and gas lines shall be run in completely separate trenches, and at least three (3) feet apart at center lines, except as approved by the Engineer. Whenever possible, water lines shall be installed above sewer lines and gas piping above water and sewer lines.

3.12 BACKFILLING

- A. All excavations by this Contractor shall be promptly backfilled.
- B. Trenches for sewers, piping, conduit, etc., shall be backfilled for a depth of at least one (1) foot over the top of pipe with sand. It shall be carefully deposited in uniform layers not exceeding six (6) inches in depth. Each layer shall be carefully and solidly tamped with appropriate tools in such a manner as to avoid injuring or disturbing the completed work. Backfill shall be placed beneath haunches of piping and thoroughly compacted to prevent lateral displacement.
- C. Backfill from 1'-0" above the top of the pipe to the surface shall be with clean on-site materials. Large rocks (over 3/4") or other materials shall be removed. Backfill shall be compacted. Compaction shall be at least 90% measured by the Proctor Test (ASTM D 698). Backfill shall be constructed in uniform layers of approximately 6 to 8 inches in loose dimension. Each layer shall be compacted.
- D. Backfill from 1'-0" above the top of the pipe, sewer, conduit, etc., to the bottom side of sidewalks, parking areas, streets, floor slabs or other paved areas shall be with crushed stone or gravel with maximum size of 1/2".
- E. Do not place fill during rainy or freezing weather or on subgrade softened by rain or thawing action. When filling is interrupted by weather, top surface of fill shall be scarified, re-compacted, and tested before placing new fill. Each day's fill shall be constructed with a slope that will ensure free and rapid drainage.
- F. If the soils are too wet during construction of the fill, dry by discing or other similar methods. If the soils are too dry during construction of the fill, add water in such a way as to permit uniform dispersion of the moisture through the layer to be compacted.
- G. The Owner shall have the option of requiring compaction tests. If the material tested does not meet these tests, this Contractor shall bear the cost of retesting and remedial work.

END OF SECTION 210010

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SECTION 210020 – SEISMIC CONTROLS FOR FIRE PROTECTION PIPING & EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide seismic restraints as indicated for each type of equipment and for piping systems. This section applies to Fire Protection Systems.
- B. Scope of work
 - 1. Flexible pipe connectors are specified in the appropriate piping section of these specifications.
 - 2. Seismic control manufacturer shall have the following responsibilities:
 - a. Determine seismic restraint sizes and locations.
 - b. Provide piping and equipment seismic restraints as scheduled or specified.
 - c. Provide installation instructions and drawings.
 - d. Provide calculations to determine restraint loads resulting from seismic forces in accordance with the Local Building Code (see below), governing codes, and project seismic requirements. Seismic calculations shall be certified by a licensed engineer, experienced in the design of restraints for flexibly mounted equipment.
 - 3. Friction from gravity loads shall not be considered resistance to seismic forces.
 - 4. All piping shall be restrained per NFPA 13. At a minimum, the seismic restraint manufacturer shall provide documentation on maximum restraint spacing for various cable sizes and anchors, as well as 'worst case' reaction loads at restraint locations.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 210000 - Fire Protection General Conditions.
- C. Section 210010 - Basic Fire Protection Material and Methods.
- D. Section 210500 – Fire Protection.

1.3 REFERENCES

- A. NFPA 13 (Reference Specification Section 210000 for Edition)

1.4 DEFINITIONS

- A. IBC: International Building Code.
- B. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.5 PERFORMANCE REQUIREMENTS

- A. Seismic Restraint Loading:
 - 1. Site Class as Defined in the IBC: C
 - 2. Assigned Occupancy Category or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: See Schedule on drawings.
 - b. Component Response Modification Factor: See Schedule on drawings.
 - c. Component Amplification Factor: See Schedule on drawings.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 54%.
 - 4. Design Spectral Response Acceleration at 1-Second Period: 18%.

5. Seismic Design Category: C.

1.6 SUBMITTALS

A. Product Data: For the following:

1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by OSHPD or an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.

B. Delegated-Design Submittal: For seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, and seismic restraints.
2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.
3. Seismic Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.
 - c. Preapproval and Evaluation Documentation: By OSHPD or an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Coordination Drawings: Show coordination of seismic bracing for piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.

D. Welding certificates.

1.7 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings shall be based on independent testing. If preapproved ratings are not available, submittals shall be based on independent testing. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 SEISMIC-RESTRAINT DEVICES

- A. Manufacturer and model number given are intended to establish desired type, quality and performance. Equivalent products of the following manufacturers are equally acceptable:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti, Inc.
 5. Kinetics Noise Control.
 6. Loos & Co.; Cableware Division.
 7. Mason Industries.
 8. TOLCO Incorporated; a brand of NIBCO INC.
 9. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by OSHPD or an agency acceptable to authorities having jurisdiction.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least 4 times the maximum seismic forces to which they will be subjected.
- C. Specification SC: Restraint Cables:
1. ASTM A 603 galvanized for interior locations and ASTM A 492 stainless for outdoor locations -steel cables with end connections made of galvanized/stainless steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement. Accessories shall be the same material as the cable. Mason Industries, Type SCB Seismic Slack Cables and Type SRC Seismic Rod Clamps.
 2. Strut System: MFMA-3, shop or field-fabricated support assembly made of slotted steel channels (struts), 1-5/8 wide, in varying lengths and combinations to meet load capacities, with accessories for attachment to braced component at one end and to building structure at the other end and other matching components; and rated in tension, compression, and torsion forces. 12 gage channels unless otherwise indicated in the approved submittals. Cooper B-Line model B22 strut systems, pipe hangers, and accessories.
- D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod. Mason Industries Seismic Rod Clamps or B Line SC-228 or SC-UB Hanger Rod Stiffener.
- E. Specification SG: Seismic Grommets. Resilient Isolation Washers and Bushings. One-piece, molded, oil- and water-resistant neoprene, with a flat washer face. The grommets shall be used with a steel washer between the bolt head (or nut if studs are used) and the grommet face. All anchor bolts shall be tightened until there is obvious grommet distortion and the bolt is torqued to 80% of allowable. In no case, shall the anchor bolt torque be less than 50% of the allowable. Mason Industries, Inc. Type HG.
- F. Specification SAB: Seismic Anchor Bolts
1. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter. Mason Industries, Inc. Type SAB.

2. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Mason Industries, Inc. Type SAA.

2.2 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and tested equipment before shipping.
 1. Powder coating on springs and housings.
 2. All hardware shall be galvanized. Hot-dip galvanized metal components for exterior use except as otherwise indicated.
 3. Baked enamel or powder coat for metal components on isolators for interior use.
 4. Color-code or otherwise mark vibration isolation and seismic/wind control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive seismic control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Comply with requirements in Section 210010 for installation of equipment supports.
- B. Equipment Restraints:
 1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 2. Install seismic-restraint devices using methods approved by the manufacturer, the Engineer and the approved submittals for the component.
- C. Piping Restraints:
 1. Comply with requirements in MSS SP-127 and NFPA 13.
 2. Space lateral supports and longitudinal supports at no more than the maximum of spacing indicated on the drawings or the local building code.

3. Brace a change of direction as indicated on the drawings or the local building code.
- D. Install cables so they do not bend across edges of adjacent equipment or building structure.
 - E. Cables shall be installed with sufficient slack to avoid short circuiting the vibration isolators. Attachment brackets at each end of the cable shall permit free cable movement in all directions up to a 45-degree misalignment. Protective thimbles shall be used at sharp connection points. Attachment bolts and anchors shall exceed the design load of the wire cable by a minimum of 50 per cent. Single sided "C" beam clamps shall not be allowed. Wire rope connectors shall be approved by the wire rope manufacturer. Vertical suspension rods shall be braced to avoid buckling due to up forces.
 - F. Install seismic-restraint devices using methods approved by the manufacturer, the Engineer and the approved submittals for the component.
 - G. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
 - H. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
 - I. Attachment to Structure:
 1. Attachments shall be as indicated on the drawings and the approved submittals. If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
 2. Provide restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the seismic restraint vendor's calculations.
 3. Capacity for concrete inserts used for support attachment shall not exceed the combination of gravity and seismic loads on the support.
 - J. Drilled-in Anchors:
 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Architect, Engineer, and Structural Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 210500 "Fire Protection Systems" for piping flexible connections.

3.5 ADJUSTING

- A. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.6 FIRE PROTECTION VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE SCHEDULE

- A. See schedule on plans.

END OF SECTION 210020

SECTION 210500 – FIRE PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all labor, services, material and related items necessary to complete the fire protection work indicated on the drawings and/or specified herein. Sprinkler locations are shown on the drawings; contractor shall design the piping to feed the sprinklers and perform hydraulic calculations of the system in accordance with NFPA 13. Sprinkler systems shall comply with performance requirements and design criteria; include analysis data signed and sealed by the qualified professional engineer, licensed in the jurisdiction of the project, and responsible for their preparation.
- B. The contractor shall include in this contract, at no additional cost, any sprinklers not shown on the drawings, but required by NFPA 13 or the local authority having jurisdiction.
- C. Provide a working installation complete in every detail with all items necessary for such an installation whether or not specifically mentioned herein or shown on the drawings.
- D. Provide all labor, services, material and related items necessary to complete the fire protection work indicated on the drawings and/or specified herein, in accordance with NFPA 13.
- E. Work to be performed shall include, but not be limited to the following fire protection systems:
 - 1. Wet-pipe sprinkler system
 - 2. Private Fire Service Mains

1.2 RELATED SECTIONS

- A. All drawings and applicable provisions of Division 0 Bidding Requirements and Division 1 General Requirements apply to work of this Section.
- B. Section 210000 - Fire Protection General Conditions
- C. Section 210010 - Basic Fire Protection Material and Methods
- D. Section 210020 - Seismic Controls For Fire Protection Piping and Equipment
- E. Division 26 – Electrical

1.3 REFERENCES

- A. All work shall be designed and installed in accordance with all applicable codes and referenced design standards.
 - 1. Underwriters Laboratories (UL), "Fire Protection Equipment Directory", Latest Edition
 - 2. Factory Mutual Systems (FM), "Approval Guide", Latest Edition
 - 3. NFPA 13 – Installation of Sprinkler Systems – 2013 Edition
 - 4. NFPA 14 – Installation of Standpipes, Private Hydrants and Hose Systems – 2013 Edition
 - 5. ASTM F442 Specification for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe F (SDR-PR)

1.4 QUALITY ASSURANCE

- A. All materials and equipment under this section of the specifications shall be approved by Factory Mutual and Underwriter's Laboratories for fire protection systems installation.

1.5 REGULATORY REQUIREMENTS

- A. All work shall be installed in accordance with the currently enforced edition of the National Fire Protection Association 13, 14 and shall meet the requirements of the Owner, the local Fire Marshal and the municipal Department of Building Regulations.

- B. The system shall not be accepted until final testing and receipt of the Contractor's Material and Test Certificate, Part "A" General.

1.6 SUBMITTALS

- A. The fire protection drawings have been prepared using AUTOCAD 2018. The fire protection plan drawing files will be made available to the successful automatic sprinkler contractor either in the form of a diskette or by email; no other drawings will be released. The files will have background files bound in, borders and title blocks removed, and all notes, details, diagrams, and schedules removed. A release form must be signed; see Section 210000. Utilization of these documents for the development of shop drawings and submittals does not relieve the sprinkler contractor from any of his responsibilities herein. By accepting these drawing files, the sprinkler contractor agrees to hold the Engineer harmless with regard to any errors or omissions in the drawing files.
- B. Complete shop drawings shall be submitted for their approval as follows:
 - 1. Through the General Contractor to the Engineer
 - a. Quantities of shop drawings shall be as indicated in Section 210000. Submittal must be comprehensive of the entire project, complete in all details and at the same scale as the Architectural plans. Submit shop drawings and hydraulic calculations that have been sealed by the qualified professional engineer responsible for their preparation. Hydraulic calculations shall include velocity, end pressure and flow at each sprinkler in the remote areas, in addition to other NFPA 13 criteria.
 - b. Manufacturer's literature on all system equipment, pipe and fittings. Literature shall clearly identify exactly what components are being provided including finish, size, type and options.
- C. Shop drawings shall also be submitted to all local authorities and the Owner's insurance carrier prior to fabrication and the start of work.
- D. Certificate of Installation: Submit certificate upon completion of fire protection piping work which indicates that work has been tested in accordance with NFPA 13, NFPA 14, and also that system is operational, complete, and has no defects.
- E. Operation and Maintenance Data: Submit operation and maintenance data and parts lists for fire protection material and products. Include this data, product data, shop drawings, approval drawings, approval calculations, certificate of installation, and record drawings in Maintenance Manual in accordance with requirements of Division 1.
- F. Shop Drawings: Shall include plans, pipe elevations, riser sections, stairway/standpipe sections, details, and attachments to the structure, prepared according to NFPA 13. Include a hydraulic summary for each remote area and clearly labeled hydraulic nodes corresponding to the hydraulic calculations. Shop Drawings shall be signed and sealed by the qualified professional engineer, licensed in the jurisdiction of the project, and responsible for their preparation.
- G. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Domestic water piping, sanitary piping, and storm piping.
 - 2. HVAC ductwork and hydronic piping.
 - 3. Electrical conduits over 2" diameter.
 - 4. Structural steel.
- H. Submit product data for all equipment, piping, sprinklers, hangers, structural attachment devices, etc. Product data submittals shall indicate the specific model number of products to be provided. Finish colors of sprinklers and exterior equipment shall be indicated. Items that are

shown on combined data sheets that will not be provided shall be marked to indicate they are excluded from the product submittal.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide piping materials and factory-fabricated piping products of sizes, type, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide size and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection piping systems. Where more than one type of material or products are indicated, selection is Installer's option.

2.2 IDENTIFICATION

- A. Install fire protection signs on piping in accordance with NFPA 13 and NFPA 14 requirements.

2.3 MATERIALS

- A. All material and equipment furnished shall be listed by Underwriter's Laboratories, Inc. as approved for the fire protection services and installed in accordance with the recommendations of the specific manufacturer.
- B. All materials used outside of the building envelope shall be designed for exterior use in a wet environment and shall be protected via material composition or coatings from corrosion / rusting.

2.4 DESIGN

- A. Refer to the Fire Protection Coversheet for densities which have been established by NFPA 13 and shall be used by the Sprinkler Contractor in the design and hydraulic calculations.
- B. Refer to Fire Protection Coversheet for flow test information and requirements.
- C. The information given herein and on the plans is as exact as could be secured for bidding purposes, but its accuracy is not guaranteed. This Subcontractor must examine the job conditions and verify all measurements, distances, elevations, clearances, pipe sizes, etc. before starting his work.
- D. The Contractor shall provide all necessary offsets, raises or drops in piping and auxiliary drains required by building conditions whether or not shown on the plans.
- E. Piping is to be held as high as possible and maintain natural drainage back to the main system risers whenever possible.

2.5 HYDRAULIC CALCULATIONS

- A. Hydraulic calculations shall be prepared on form sheets that include a summary sheet, a graph sheet, a water supply analysis, a node analysis, and detailed worksheet per NFPA 13.
- B. Hydraulic calculations shall be signed and sealed by the qualified professional engineer, licensed in the jurisdiction of the project, and responsible for their preparation.
- C. Contractor shall verify safety factor requirements with the local Authority Having Jurisdiction.
- D. Hazard classifications for fire protection system design, installation and water supplies shall be in accordance with NFPA Standards. Shop drawings shall indicate the Hazard Classification for each area.

2.6 COORDINATION AND PIPE SIZING

- A. Pipe sizes and routing, and exact sprinkler location shall be based on hydraulic calculation and spacing requirements. This Contractor shall be responsible for total coordination of the reflected ceiling plan using the engineered HVAC, electrical and architectural plans.

2.7 OVERHEAD PIPE AND FITTINGS

A. Black Steel Pipe

1. Feed mains and standpipes 2-1/2" and larger shall be Schedule 10 black steel pipe designed to withstand a working pressure of not less than 175 P.S.I.
2. Cross mains and branch lines 2" and smaller shall be Schedule 40 black steel pipe designed to withstand a working pressure of not less than 175 P.S.I.
3. Fittings shall be 175 P.S.I. threaded or flanged black cast iron or approved equivalent such as mechanical groove or welded construction. Plain end fittings such as "Vic Fitt" shall not be allowed.
4. Piping is to be held as high as possible where exposed.
5. Wet system pipe may be installed level as per NFPA 13.

2.8 UNDERGROUND PIPING

A. Piping to 5' from building exterior:

1. Piping shall be cement lined ductile iron, AWWA 151, working pressure psi, exterior bituminous coated. Fittings shall be ductile iron, bolted flanged or mechanical joint type, class 150 fittings. Rubber gaskets, AWWA C111. Piping shall be listed for fire protection service.

B. Piping beyond 5' from building exterior:

1. Provide one of the following materials:
 - a. Piping shall be cement lined ductile iron, AWWA 151, working pressure psi, exterior bituminous coated. Fittings shall be ductile iron, bolted flanged or mechanical joint type, class 150 fittings. Rubber gaskets, AWWA C111. Piping shall be listed for fire protection service.
 - b. High Density Polyethylene, ASTM D3350, rated at a minimum of 200 psi.
 - 1) HDPE joining methods shall be one of the following:
 - a) Butt fusion
 - b) Electrofusion couplings PE3608 HDPE, rated at minimum 200 psi
 - c) Provide installer's Heat Fusion Training certificate
 - c. HDPE Pipe joining methods, installation, bedding and backfill shall be per manufacturer's installation requirements.

C. All underground piping shall be installed in accordance with the latest edition of NFPA 24.

D. Piping shall be listed for fire protection service.

E. All bends and tees are to be adequately supported with thrust blocks to prevent rupture of joints due to movement of pipe.

F. All underground piping shall be flushed in accordance with NFPA 24. The underground shall be flushed while flowing the required GPM for a sufficient time to ensure thorough cleaning. Flushing shall be witnessed by an authorized representative of the Owner or the authorities have jurisdiction and shall require advance notice of 24 hours.

- G. All underground pipe shall be tested in accordance with NFPA 24 and NFPA 13. Contractor's Material and Test Certificate, Part "A" General and Part "B" Underground Piping as shown on NFPA 13 shall be completed and submitted to the Engineer. (Also see "TESTING" under Part 3 below.)

2.9 HANGERS AND SLEEVES

- A. All hangers to be of approved materials and spaced in accordance with NFPA 13. The section modulus required by NFPA 13 shall be provided for all trapeze members supporting piping.
- B. Sleeves shall be set for all pipes passing through concrete floors, foundations and masonry walls.
- C. Provide escutcheon plates at all wall penetrations.
- D. See Section 210010, BASIC MATERIALS AND METHODS, for requirements for sleeves in both new and existing construction.
- E. Piping and support systems shall be seismically braced in accordance with Section 210020 and NFPA 13 and its appendices.
- F. Horizontal pipe supports shall be spaced as specified NFPA 13 and a supports shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves. Pipe hanger loads in excess of 50 pounds, suspended from steel joists, shall have the hanger loads suspended from panel points. Where local codes require closer spacing than indicated on the plans or specifications, the supports shall conform to the local code requirements. For buildings built with steel joists before 1985, pipe supports shall be attached to the top leg of the joist.
- G. Vertical pipe shall be supported at each floor, except at slab-on-grade, and at intervals of not more than 15 feet, not more than 8 feet from end of risers.

2.10 TEST AND DRAIN CONNECTIONS

- A. Provide combination inspector's test/main drain valve with pressure relief, 2" diameter with a 1/2" test orifice.
- B. Auxiliary drains consisting of plugs, or globe valves and plugs where capacity of trapped pipe section exceeds five gallons, shall be provided to drain all points in the system that cannot be drained back to a main riser as shown on the plans.
 - 1. A label shall be provided below ceiling indicating location of auxiliary drain.

2.11 INSPECTOR'S TEST CONNECTION

- A. Provide inspector's test connections for the system as required. UL Listed, bronze body, with chrome plated bronze ball, brass stem, steel handle, Teflon seat and site glasses. Connect to drain riser and route to standpipe in sprinkler room.

2.12 EXTERIOR VALVES - None.

2.13 INTERIOR VALVES

- A. Gate valves shall be 175 P.S.I. working pressure, approved indicating type, rising stem, O.S. & Y valve. Acceptable manufacturers: Milwaukee, Mueller, Nibco, Stockham, Viking or approved equal.
- B. Butterfly valves shall be 175 P.S.I. working pressure, approved indicating valve. Acceptable manufacturers: Victaulic, Nibco, Gruvlok, Tyco, Viking or approved equal.

- C. Check valves shall be 175 P.S.I. working pressure horizontal swing or wafer check valves. Acceptable manufacturers: Mueller, Nibco, Stockham, Tyco, Gruvlok, Victaulic, Viking or approved equal.
- D. Globe valves shall be 175 P.S.I. working pressure, bronze threaded globe valves with renewable composition disc. Acceptable manufacturers: Crane, Milwaukee, Nibco, Stockham or approved equal.
- E. Hose valves on the standpipes shall be equal to Potter Roemer Model #4065, UL listed, 175 lb., 2-1/2" hose valves, polished brass, complete with cap and chain.

2.14 SUPERVISORY SWITCHES

- A. All valves on the sprinkler system shall be supervised. Valve switches to be furnished and installed by the Sprinkler Contractor and wired by the Electrical Contractor to the fire alarm control panel. Valve supervisory switches shall be Potter, Guardian, System Sensor or approved equal.

2.15 SPRINKLERS

- A. Acceptable sprinkler manufacturers: Tyco, Globe, Reliable, Victaulic, and Viking. Only sprinklers manufactured after January 1, 2004, shall be acceptable.
- B. Furnish and install sprinklers as shown in "Sprinkler Schedule" on Fire Protection Coversheet.
- C. Sprinkler guards are to be provided on all sprinklers located less than 7'-0" from finished floor and where subject to mechanical injury.
- D. High temperature sprinklers of proper degree rating shall be installed in boiler room, storage areas or where necessary.
- E. All sprinklers shall be provided with the appropriate temperature and response rating based on location and occupancy. Contractor shall verify the location and temperature of all heat producing equipment.
- F. Extended coverage sprinklers shall be provided only where the water supply is sufficient to supply the listed pressure. Where the water supply is not sufficient, standard coverage sprinklers shall be provided.
- G. Furnish and install at the system riser twelve-head sprinkler cabinet(s), each stocked with a sprinkler wrench and extra sprinklers as required by NFPA 13. The quantity, types and temperature rating of extra sprinklers shall be in proportion to those installed on the system.

2.16 BACKFLOW PREVENTER

- A. Provide where shown on drawings a U/L listed double gate valve, double check detector assembly backflow preventer. Gate valves to be O.S.&Y. type. Unit to be Febco, Hershey or Watts, equal to Watts Model #709 DCDA. Provide supervisory (tamper) switches on gate valves. Switches shall be wired to the fire alarm by the Electrical Contractor.
- B. Where backflow preventers for the sprinkler system are provided by the Plumbing contractor, tamper switches for these backflow preventers shall be provided by the Sprinkler contractor.

2.17 FIRE DEPARTMENT CONNECTION

- A. Fire department connection shall be equal to Croker No. 6010, UL 405, cast brass body; NH-standard thread inlets according to NFPA and matching local fire department threads; and threaded NPS outlet. Include lugged cap, gasket and chain; lugged swivel connection, extension pipe nipples, and clappers for each hose connection inlet; and wall extension plate with marking.

1. Connections: Two 2-1/2" inlets and 4" outlet.
2. Inlet alignment: In line, horizontal.
3. Clapper Type: Drop clappers in body.
4. Clapper Type: Female clapper snoots.
5. Direction of outlet: Back.
6. Escutcheon Plate: Rectangular.
7. Finish: Coordinate finish with Architect.

2.18 WATER FLOW SWITCHES

- A. Vane water flow detectors shall be designed to signal any flow of water that equals or exceeds 10 GPM. Detector switch mechanism shall incorporate an instantly recycling mechanical retard element with an adjustable range of 0 to 60 seconds. Two single pole, double throw switches shall be provided suitable for operation on 24-volt D.C. or 110-volt A.C. Detectors shall be of dust tight construction. Detector switch enclosure shall be tamperproof.
- B. The detectors shall be furnished and installed by the Sprinkler Contractor and be wired complete by the Electrical Contractor to local fire district alarm service.

2.19 ELECTRIC ALARM: Electrically operated audio/visual horn and strobe device.

2.20 EXPANSION LOOPS

- A. Expansion Loops shall comply with the following:
 1. U bend design expansion loop equal to Metraloop as manufactured by the MetraFlex Company.

2.21 PIPE ALIGNMENT GUIDES

- A. Alignment guides shall be factory fabricated with split steel guiding cylinder with anchor case and split steel spider. Guiding cylinders shall be split at 45 degrees and shall be designed to accommodate specified insulation thickness. Allow 1/8" minimum clearance between I.D. of guiding cylinder and O.D. of insulation.
- B. Guides shall be equal to ADSCO Model E for steel piping. Equal guides by MetraFlex are acceptable.

2.22 PRESSURE GAUGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. AMETEK; U.S. Gauge Division.
 2. Ashcroft, Inc.
 3. Brecco Corporation.
 4. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gauge Range: 0 to 250 psig minimum.
- E. Water System Piping Gauge: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gauge: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 INSTALLATION OF FIRE PROTECTION SYSTEMS

- A. All items necessary for a working installation complete in every detail shall be furnished and installed whether specifically mentioned or not.
- B. Pipe sizes shown on drawings are minimum required pipe sizes only. Contractor shall provide pipe sizes required for a code compliant and fully functional system. Pipe sizes shall be determined by the contractor's hydraulic calculations and show on the contractor's Shop Drawings.
- C. Sprinklers shall be located in a symmetrical pattern related to ceiling features such as grid, beams, light fixtures, diffusers, etc. and where applicable, heads shall be located symmetrically with the ceiling grid, centered in two directions. Locate heads to provide code required distances away from lights, exit signs, etc., and all other items that could interfere or effect sprinkler discharge.
- D. Apply temporary protective covers during construction to ensure that sprinklers and escutcheons do not receive field paint.
- E. Route piping in orderly manner, plumb and parallel to building structure and concealed above ceilings where possible. Locate concealed valves, switches and alarm connections in accessible location, and coordinate size and location of access panels/doors with General Contractor.
- F. Provide an electrically operated audio/visual horn and strobe device.
 - 1. At the building exterior, directly above the fire department connection.
- G. This Contractor's work shall extend to 5 feet beyond exterior wall as indicated on drawings.
 - 1. Where a free-standing fire department connection or free-standing fire pump test header is provided, this contractor's work shall include piping to this equipment.
- H. No work shall be concealed where it is inaccessible unless inspected and approved by the authorities having jurisdiction.
- I. Install piping to conserve building space and not interfere with use of space and other Work. Coordinate with other trades to avoid conflicts and provide all required offsets, piping, auxiliary drains, etc. to properly install system. Where piping installation conflicts with the installation of other trades during construction, piping shall be removed and re-routed at no additional cost.
- J. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- K. Penetrations through fire rated walls, floors and partitions shall be sealed to provide a U.L. rating equal to or greater than the wall, floor or partition.
- L. Install sprinklers in lay-in ceilings with return bend, or flexible connection.
- M. Install drain piping at low points of piping system.
- N. Install drain risers as indicated and as required by NFPA 13.
- O. Install a main shut-off valve at the fire protection service entrance.
- P. Install pressure gauges on both the outlet piping of backflow preventers.
- Q. Mount supervisory switches on each shut-off valve.
- R. Electrical contractor shall wire supervisory switches the building fire alarm panel.

- S. Install manual Water flow detectors shall be installed as required in these specifications and shall be mounted in accordance with the manufacturer's instructions.
- T. Install Inspector's test connection where indicated, or at most remote point from riser.
- U. Provide a wall mounted fire department connection as required, including check valve with 1/2" automatic ball drip valve to serve sprinkler system.
- V. Sprinkler Piping Flushing: Prior to connecting sprinkler risers, flush water feed mains and lead-in connections.
- W. Piping is to be held as high as possible where exposed.
- X. Wet system pipe may be installed level as per NFPA 13.
- Y. Provide return bends connected to the top of branch lines, or flexible sprinkler drops connected to the side of branch lines, to all pendent sprinklers as shown on drawing details.
- Z. Contractor shall arm-over from existing branch line outlets to new sprinkler locations.
- AA. Provide identification sign for fire department connections, alarms, hydraulically designed systems, sectional valves, riser control valve, drain valves, test and drain connections in accordance with NFPA 13, 14 and 72.

3.2 ELEVATOR SPRINKLER PROTECTION

- A. Contractor shall coordinate the following with the Fire Alarm Contractor:
 - 1. When sprinklers are installed in elevator equipment rooms, the electrical power to the elevator controller must shut down prior to sprinkler activation. A heat detector shall activate an independently controlled shunt trip circuit breaker when the temperature in the machine room exceeds the setting of the heat detector. The detector shall have both a lower temperature rating and a higher sensitivity (lower Response Time Index) as compared to the sprinkler. Sprinklers shall be rated at 212°F and heat detectors shall be rated at 135°F. Heat detectors used to shut down elevator power prior to sprinkler operation shall be placed within two feet of each sprinkler and connected to the fire alarm control panel.
- B. No sprinkler risers shall be permitted inside any hoistway. Sprinkler branch lines shall enter hoistways only where a sprinkler is required.
- C. Contractor shall coordinate with Fire Alarm Contractor for wiring and integration of detectors to the building fire alarm system.

3.3 PIPING AND FITTINGS

- A. All piping shall be installed in accordance with good commercial practices.
- B. Fire seal all penetrations through fire rated assemblies per specification section 210010.
- C. Piping systems shall be securely supported by U. L. listed hangers with allowance for pipe expansion and contraction; agent thrust forces, and shall not be subjected to mechanical vibration or other damage. Consult ANSI B-31.1.0 for guidance on this matter. Hangers shall be spaced according to manufacturer's recommendations.
- D. Install building attachments within concrete or to structural steel. Piping shall not be supported from joist bridging or a roof metal deck.
- E. All pipe lengths shall be reamed, blown clear and swabbed with suitable solvents to remove butts, mill varnish and cutting oil before assembly.

- F. After cutting, pipe ends shall be thoroughly cleaned. Before installing nozzles, piping shall be blown out with dry air or dry nitrogen to ensure the system is free of debris.
- G. For threaded fittings, teflon tape dope only shall be used and applied to male pipe threads only.

3.4 TESTING

- A. The entire automatic sprinkler system shall be tested in the presence of an authorized representative of the Engineer and the governing agencies having jurisdiction for approval. Advance notice of 24 hours is required.
- B. The installing Contractor shall complete and sign the appropriate Contractor's Material and Test Certificates included within NFPA 13.
- C. All interior sprinkler piping shall be pressure tested hydrostatically at not less than 200 P.S.I. for two (2) hours. Hydrostatic testing shall be performed in accordance with NFPA 13. Interior sprinkler piping shall be installed in such a manner that there will be no visible signs of leakage or pressure drop for the duration of the hydrostatic pressure test.
- D. Hose Threads. All hose connection and fire department connection threads shall be tested to verify their compatibility with threads used by the local fire department. The test shall consist of threading coupling samples, caps, or plugs onto the installed devices.
- E. The Contractor's Material and Test Certificate as shown in NFPA 13 must be completed and submitted to the Engineer before final approval may be given.
- F. Preliminary testing procedures shall be conducted as mentioned above to assure proper operation when the final testing is performed.
- G. Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards and retest as specified to demonstrate compliance.

END OF SECTION 210500