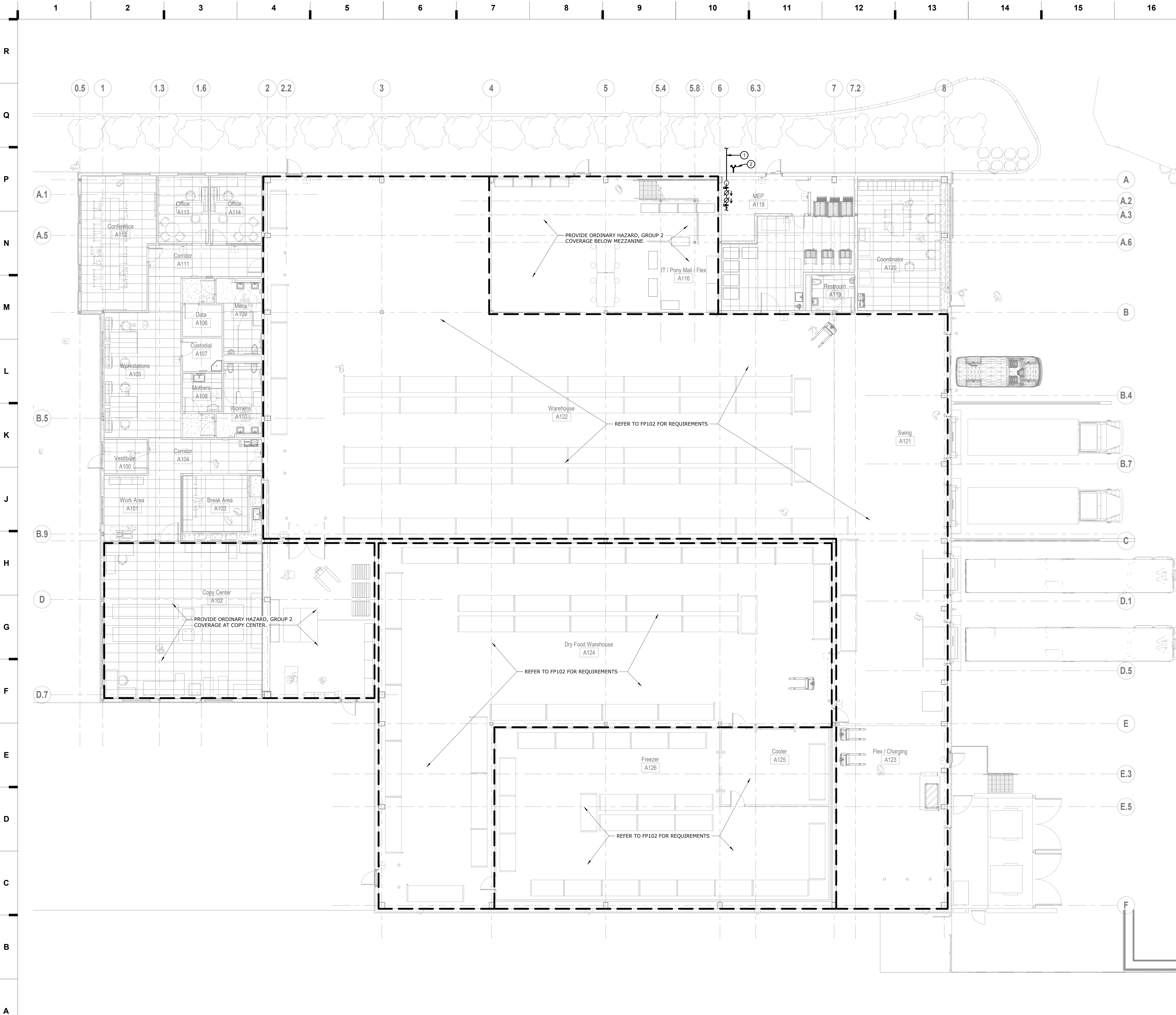
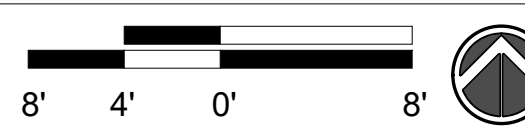


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**A1** Scale FIRE PROTECTION PLAN - LEVEL 1  
1/8" = 1'-0"



## SHEET KEYNOTE LEGEND

### GENERAL NOTES - FIRE PROTECTION:

1. THE FIRE SUPPRESSION SYSTEM IS A DELEGATED DESIGN. PROVIDE NFPA 13 COMPLIANT SPRINKLER SYSTEM DESIGNED BY A LICENSED PROFESSIONAL ENGINEER, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED ON DRAWINGS AND WITHIN SPECIFICATIONS.
2. PROVIDE LIGHT HAZARD COVERAGE FOR OFFICE AND RESTROOM AREAS. PROVIDE ORDINARY HAZARD, GROUP 1 COVERAGE FOR ALL OTHER AREAS THAT ARE NOT OTHERWISE SPECIFICALLY DESIGNATED ON DRAWINGS.
3. CAREFULLY COORDINATE ALL SPRINKLER HEAD TYPES, COLOR, AND EXPOSED PIPING LOCATIONS WITH ARCHITECT FOR DESIRED AESTHETICS OF THE SPACES PRIOR TO INSTALLATION.
4. REFER TO ARCHITECTURAL RCP LAYOUT FOR CEILING TYPES AND SPACES OPEN TO STRUCTURE.
5. GYP. CEILINGS REQUIRE CONCEALED HEADS WITH COVER.
6. ACT CEILINGS REQUIRE SEMI-RECESSED PENDANT HEADS.
7. CAREFULLY COORDINATE PIPE ROUTING WITH STRUCTURE AS WELL AS ALL OTHER TRADES TO MAINTAIN EQUIPMENT CLEARANCES AND DESIRED CEILING HEIGHTS.
8. COORDINATE ALL PIPING PENETRATIONS WITH STRUCTURAL PRIOR TO CORE DRILLING.
9. PROVIDE FIRESTOPPING AT PENETRATIONS OF ALL RATED WALLS. REFER TO CODE PLANS FOR LOCATIONS OF RATED WALLS.
10. EXTERIOR AWNING COVERAGE NOT REQUIRED.
11. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

### PLAN NOTES - FIRE PROTECTION:

- ① 6" (MIN) FIRE PROTECTION SERVICE ENTRANCE LOCATION. COORDINATE EXACT LOCATION AND DEPTH WITH SITE UTILITIES CONTRACTOR PRIOR TO INSTALLATION. PROVIDE DOUBLE CHECK DETECTOR ASSEMBLY INSIDE BUILDING.
- ② FDC LOCATION. 4" STORZ CONNECTION WITH A 30-DEGREE DOWNTURN ADAPTOR AND A KNOX BOX COMPANY LOCKING 4" STORZ FDC CAP.

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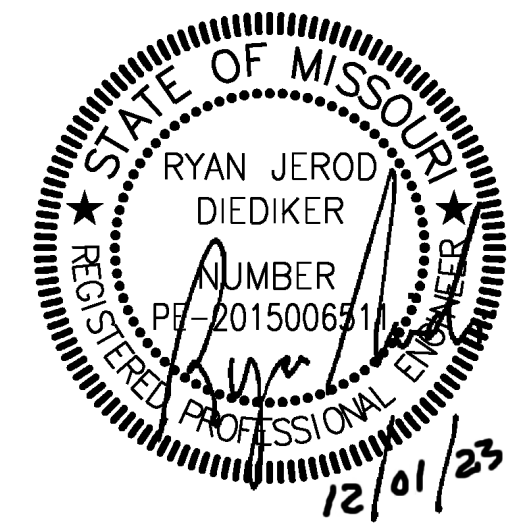
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Springfield, MO 65802  
417.862.0812 phone

**Distribution Center**  
Liberty Public Schools  
1142 Southview Dr, Liberty, MO 64068

REVISIONS:

#	Description	Date
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CHECKED BY: RJD  
DATE: 12.01.2023

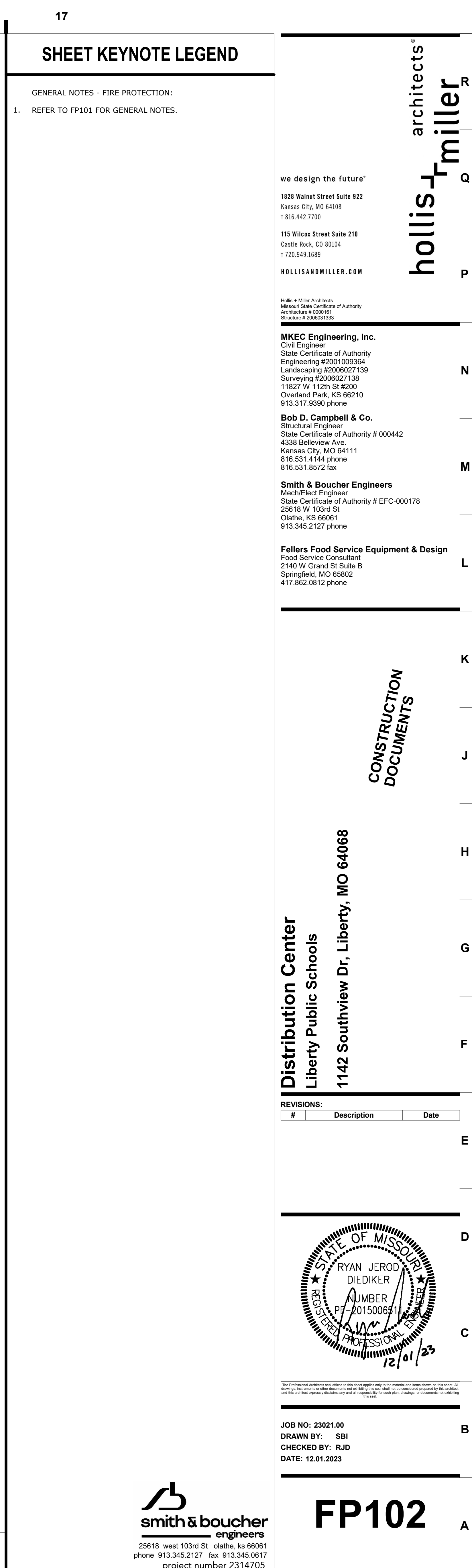
**smith & boucher**  
engineers  
25618 west 103rd St. olathe, ks 66061  
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project number 2314705

# FP101

OVERALL FIRE PROTECTION PLAN - LEVEL 1

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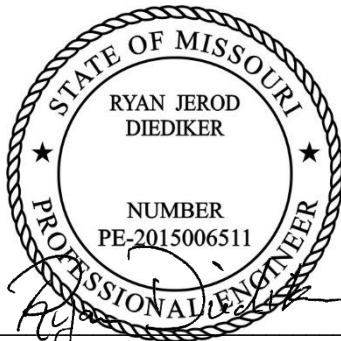
**SECTION 000105 - CERTIFICATIONS PAGE-MEP**

MEP ENGINEER

I HEREBY, PURSUANT TO RSMO 327.411, STATE THAT THE SPECIFICATIONS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATIONS LISTED BELOW:

DIVISION 21 SECTIONS:	210500, 211313
-----------------------	----------------

I HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, DRAWINGS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT OR SURVEY.



\_\_\_\_\_  
RYAN J. DIEDIKER, PE, RCDD, LEED AP

\_\_\_\_\_  
12.01.2023

DATE



## **SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Mechanical sleeve seals.
  - 3. Sleeves.
  - 4. Escutcheons.
  - 5. Grout.
  - 6. Concrete bases.
  - 7. Supports and anchorages.

#### **1.2 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

#### **1.3 SUBMITTALS**

- A. Welding certificates.

#### **1.4 QUALITY ASSURANCE**

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

#### **1.5 COORDINATION**

- A. Coordinate layout and installation with all other trades. Refer to section 230500 'Common Work Results for HVAC', paragraphs 1.3 and 1.4 for specific requirements regarding coordination procedures required.

## PART 2 - PRODUCTS

### 2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.2 JOINING MATERIALS

- A. Refer to individual Division 21 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining CPVC Plastic Piping: ASTM F 493.

### 2.3 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Carbon steel or stainless steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

### 2.4 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## 2.6 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
    1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
  - P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
  - Q. Verify final equipment locations for roughing-in.
  - R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

### 3.3 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.
  1. Construct concrete bases a minimum of 4 inches and a maximum of 6 inches deep, but not less than 4 inches larger in both directions than supported unit.
  2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
  3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.



7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete" or "Miscellaneous Cast-in-Place Concrete."

#### 3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

#### 3.5 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor fire-suppression materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

#### 3.6 GROUTING

- A. Mix and install grout for fire-suppression equipment base bearing surfaces, and other equipment base plates, and anchors
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

**END OF SECTION 210500**



## SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Pipes, fittings, and specialties.
  - 2. Fire-protection valves.
  - 3. Fire-department connections.
  - 4. Sprinklers.
  - 5. Alarm devices.
  - 6. Pressure gages.

#### 1.2 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
  - 1. Engage utility for a flow test to confirm pressures and flows.
- C. Sprinkler system design shall be approved by authorities having jurisdiction.
  - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
  - 2. Sprinkler Occupancy Hazard Classifications:
    - a. Building Service Areas: Ordinary Hazard, Group 1.
    - b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
    - c. General Storage Areas: Ordinary Hazard, Group 1.
    - d. Laundries: Ordinary Hazard, Group 1.
    - e. Libraries except Stack Areas: Light Hazard.
    - f. Library Stack Areas: Ordinary Hazard, Group 2.
    - g. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
    - h. Office and Public Areas: Light Hazard.
    - i. Repair Garages: Ordinary Hazard, Group 2.
    - j. Restaurant Service Areas: Ordinary Hazard, Group 1.
    - k. Solvent Cleaning Areas: Extra Hazard, Group 2.
  - 3. Minimum Density for Automatic-Sprinkler Piping Design:
    - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
    - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
    - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
    - d. Special Occupancy Hazard: As determined by authorities having jurisdiction.
  - 4. Maximum Protection Area per Sprinkler: Per UL listing.
  - 5. Maximum Protection Area per Sprinkler:
    - a. Office Spaces: 225 sq. ft.
    - b. Storage Areas: 130 sq. ft.
    - c. Mechanical Equipment Rooms: 130 sq. ft.
    - d. Electrical Equipment Rooms: 130 sq. ft.
    - e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
  - 6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Qualification Data: For qualified Installer and professional engineer.
- E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- F. Welding certificates.
- G. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- H. Field quality-control reports.
- I. Operation and maintenance data.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
    - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
  - 1. NFPA 13, "Installation of Sprinkler Systems."
  - 2. NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."
  - 3. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

### 2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight, Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 30, Galvanized- and Black-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E; or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.

- C. Thinwall Galvanized- and Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
- D. Galvanized and Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- E. Galvanized and uncoated, Steel Couplings: ASTM A 865, threaded.
- F. Galvanized and uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- G. Malleable- or Ductile-Iron Unions: UL 860.
- H. Cast-Iron Flanges: ASME 16.1, Class 125.
- I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- K. Grooved-Joint, Steel-Pipe Appurtenances:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anvil International, Inc.
    - b. Tyco Fire & Building Products LP.
    - c. Victaulic Company.
    - d. Pre-approved equal.
  - 2. Pressure Rating: 175 psig minimum.
  - 3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
  - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

## 2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.
  - 1. Class 125, Cast-Iron Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
  - 1. Valves shall be UL listed or FM approved.
  - 2. Minimum Pressure Rating: 175 psig.
- B. Check Valves:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
    - b. Anvil International, Inc.
    - c. Clow Valve Company; a division of McWane, Inc.
    - d. Crane Co.; Crane Valve Group; Crane Valves.
    - e. Crane Co.; Crane Valve Group; Jenkins Valves.
    - f. Crane Co.; Crane Valve Group; Stockham Division.
    - g. Fire-End & Croker Corporation.
    - h. Fire Protection Products, Inc.
    - i. Globe Fire Sprinkler Corporation.
    - j. Kennedy Valve; a division of McWane, Inc.
    - k. Metraflex, Inc.

- l. Milwaukee Valve Company.
  - m. Mueller Co.; Water Products Division.
  - n. NIBCO INC.
  - o. Potter Roemer.
  - p. Reliable Automatic Sprinkler Co., Inc.
  - q. Tyco Fire & Building Products LP.
  - r. United Brass Works, Inc.
  - s. Venus Fire Protection Ltd.
  - t. Victaulic Company.
  - u. Viking Corporation.
  - v. Watts Water Technologies, Inc.
  - w. Pre-approved equal.
- 2. Standard: UL 312.
  - 3. Pressure Rating: 250 psig minimum
  - 4. Type: Swing check.
  - 5. Body Material: Cast iron.
  - 6. End Connections: Flanged or grooved.
- C. Bronze OS&Y Gate Valves:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Crane Co.; Crane Valve Group; Crane Valves.
    - b. Crane Co.; Crane Valve Group; Stockham Division.
    - c. Milwaukee Valve Company.
    - d. NIBCO INC.
    - e. United Brass Works, Inc.
    - f. Pre-approved equal.
  - 2. Standard: UL 262.
  - 3. Pressure Rating: 175 psig.
  - 4. Body Material: Bronze.
  - 5. End Connections: Threaded.
- D. Iron OS&Y Gate Valves:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
    - b. American Valve, Inc.
    - c. Clow Valve Company; a division of McWane, Inc.
    - d. Crane Co.; Crane Valve Group; Crane Valves.
    - e. Crane Co.; Crane Valve Group; Jenkins Valves.
    - f. Crane Co.; Crane Valve Group; Stockham Division.
    - g. Hammond Valve.
    - h. Milwaukee Valve Company.
    - i. Mueller Co.; Water Products Division.
    - j. NIBCO INC.
    - k. Tyco Fire & Building Products LP.
    - l. United Brass Works, Inc.
    - m. Watts Water Technologies, Inc.
    - n. Pre-approved equal.
  - 2. Standard: UL 262.
  - 3. Pressure Rating: 250 psig minimum
  - 4. Body Material: Cast or ductile iron.
  - 5. End Connections: Flanged or grooved.
- E. Indicating-Type Butterfly Valves:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anvil International, Inc.
    - b. Global Safety Products, Inc.
    - c. Kennedy Valve; a division of McWane, Inc.
    - d. Milwaukee Valve Company.
    - e. NIBCO INC.
    - f. Tyco Fire & Building Products LP.
    - g. Victaulic Company.
    - h. Pre-approved equal.
  - 2. Standard: UL 1091.
  - 3. Pressure Rating: 175 psig minimum.



4. Valves NPS 2 and Smaller:
  - a. Valve Type: Ball or butterfly.
  - b. Body Material: Bronze.
  - c. End Connections: Threaded.
5. Valves NPS 2-1/2 and Larger:
  - a. Valve Type: Butterfly.
  - b. Body Material: Cast or ductile iron.
  - c. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch or electrical, 115-V ac, prewired, two-circuit, supervisory switch and visual indicating device.

## 2.5 TRIM AND DRAIN VALVES

- A. General Requirements:
  1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  2. Minimum Pressure Rating: 175 psig.
- B. Ball Valves:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anvil International, Inc.
    - b. Conbraco Industries, Inc.; Apollo Valves.
    - c. Fire-End & Croker Corporation.
    - d. Fire Protection Products, Inc.
    - e. Flowserve.
    - f. Kennedy Valve; a division of McWane, Inc.
    - g. Milwaukee Valve Company.
    - h. NIBCO INC.
    - i. Potter Roemer.
    - j. Red-White Valve Corporation.
    - k. Tyco Fire & Building Products LP.
    - l. Victaulic Company.
    - m. Watts Water Technologies, Inc.
    - n. Pre-approved equal.

## 2.6 SPECIALTY VALVES

- A. General Requirements:
  1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
  2. Minimum Pressure Rating: 175 psig.
  3. Body Material: Cast or ductile iron.
  4. Size: Same as connected piping.
  5. End Connections: Flanged or grooved.
- B. Alarm Valves:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Globe Fire Sprinkler Corporation.
    - b. Reliable Automatic Sprinkler Co., Inc.
    - c. Tyco Fire & Building Products LP.
    - d. Victaulic Company.
    - e. Viking Corporation.
    - f. Pre-approved equal.
  2. Standard: UL 193.
  3. Design: For horizontal or vertical installation.
  4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
  5. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
  6. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
- C. Automatic (Ball Drip) Drain Valves:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AFAC Inc.

- b. Reliable Automatic Sprinkler Co., Inc.
- c. Tyco Fire & Building Products LP.
- d. Pre-approved equal.
- 2. Standard: UL 1726.
- 3. Pressure Rating: 175 psig minimum.
- 4. Type: Automatic draining, ball check.
- 5. Size: NPS 3/4.
- 6. End Connections: Threaded.

## 2.7 SPRINKLER SPECIALTY PIPE FITTINGS

### A. Branch Outlet Fittings:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Anvil International, Inc.
  - b. National Fittings, Inc.
  - c. Tyco Fire & Building Products LP.
  - d. Victaulic Company.
  - e. Pre-approved equal.
- 2. Standard: UL 213.
- 3. Pressure Rating: 175 psig minimum.
- 4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
- 5. Type: Mechanical-T and -cross fittings.
- 6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
- 7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
- 8. Branch Outlets: Grooved, plain-end pipe, or threaded.

### B. Flow Detection and Test Assemblies:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Reliable Automatic Sprinkler Co., Inc.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Pre-approved equal.
- 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 3. Pressure Rating: 175 psig minimum.
- 4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
- 5. Size: Same as connected piping.
- 6. Inlet and Outlet: Threaded.

### C. Branch Line Testers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Elkhart Brass Mfg. Company, Inc.
  - b. Fire-End & Croker Corporation.
  - c. Potter Roemer.
  - d. Pre-approved equal.
- 2. Standard: UL 199.
- 3. Pressure Rating: 175 psig minimum.
- 4. Body Material: Brass.
- 5. Size: Same as connected piping.
- 6. Inlet: Threaded.
- 7. Drain Outlet: Threaded and capped.
- 8. Branch Outlet: Threaded, for sprinkler.

### D. Sprinkler Inspector's Test Fittings:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AGF Manufacturing Inc.
  - b. Triple R Specialty.
  - c. Tyco Fire & Building Products LP.
  - d. Victaulic Company.
  - e. Viking Corporation.
  - f. Pre-approved equal.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. CECA, LLC.
  - b. Corcoran Piping System Co.
  - c. Merit Manufacturing; a division of Anvil International, Inc.
  - d. Pre-approved equal.
2. Standard: UL 1474.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible, Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Fivalco Inc.
  - b. FlexHead Industries, Inc.
  - c. Gateway Tubing, Inc.
  - d. Pre-approved equal.
2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 175 psig minimum.
5. Size: Same as connected piping, for sprinkler.

## 2.8 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc.
3. Tyco Fire & Building Products LP.
4. Venus Fire Protection Ltd.
5. Victaulic Company.
6. Viking Corporation.
7. Pre-approved equal.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Residential Sprinklers: 175 psig maximum.
3. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
4. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Nonresidential Applications: UL 199.
3. Residential Applications: UL 1626.
4. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:

1. Chrome plated.
2. Bronze.
3. Painted.

E. Special Coatings:

1. Wax.

2. Lead.
3. Corrosion-resistant paint.

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, two piece, with 1-inch vertical adjustment.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

G. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Reliable Automatic Sprinkler Co., Inc.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Viking Corporation.
  - e. Pre-approved equal.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

## 2.9 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Motor-Operated Alarm:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Globe Fire Sprinkler Corporation.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Viking Corporation.
  - e. Pre-approved equal.
2. Standard: UL 753.
3. Type: Mechanically operated, with Pelton wheel.
4. Alarm Gong: Cast aluminum with red-enamel factory finish.
5. Size: 10-inch diameter.
6. Components: Shaft length, bearings, and sleeve to suit wall construction.
7. Inlet: NPS 3/4.
8. Outlet: NPS 1 drain connection.

C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ADT Security Services, Inc.
  - b. McDonnell & Miller; ITT Industries.
  - c. Potter Electric Signal Company.
  - d. System Sensor; a Honeywell company.
  - e. Viking Corporation.
  - f. Watts Industries (Canada) Inc.
  - g. Pre-approved equal.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig.
7. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Fire-Lite Alarms, Inc.; a Honeywell company.
  - b. Kennedy Valve; a division of McWane, Inc.
  - c. Potter Electric Signal Company.
  - d. System Sensor; a Honeywell company.
  - e. Pre-approved equal.
2. Standard: UL 346.

3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

## 2.10 PRESSURE GAGES

- 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.
  5. Pre-approved equal.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gage Range: 0 to 250 psig minimum.
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- F. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

## 2.11 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One-Piece, Cast-Brass Escutcheons: Polished chrome-plated finish with set-screws.
- C. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with chrome-plated finish.
- D. One-Piece, Stamped-Steel Escutcheons: Chrome-plated finish with set-screw.
- E. Split-Casting, Cast-Brass Escutcheons: Polished chrome-plated finish with concealed hinge and set-screw.
- F. Split-Plate, Stamped-Steel Escutcheons: Chrome-plated finish with concealed hinge, set-screw.
- G. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- H. Split-Casting Floor Plates: Cast brass with concealed hinge.

## 2.12 SLEEVES

- A. Cast-Iron Wall Pipe Sleeves: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Molded-PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- D. Molded-PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- E. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- F. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard weight, zinc coated, plain ends.
- G. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  1. Underdeck Clamp: Clamping ring with set-screws.

## 2.13 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Advance Products & Systems, Inc.
  - 2. Calpico, Inc.
  - 3. Metraflex, Inc.
  - 4. Pipeline Seal and Insulator, Inc.
  - 5. Pre-approved equal.
- B. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
  - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 2. Pressure Plates: Carbon steel, plastic, or stainless steel.
  - 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or stainless steel of length required to secure pressure plates to sealing elements.

## 2.14 GROUT

- A. Standard: ASTM C 1107, Grade B, posthardening and volume adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink, and recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Division 21 Section "Facility Fire-Suppression Water-Service Piping."
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

### 3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
  - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- E. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.



- H. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- J. Install alarm devices in piping systems.
- K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- M. Fill sprinkler system piping with water.

### 3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
  - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- L. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- M. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

### 3.4 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
  - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
  - 2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

### 3.5 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

### 3.6 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
  - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
  - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
  - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece or split casting, cast brass with polished chrome-plated finish.
  - 4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish.
  - 5. Bare Piping in Equipment Rooms: One piece, cast brass or stamped steel with set-screw.
  - 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

### 3.7 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- E. Install sleeves in new partitions, slabs, and walls as they are built.
- F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants."
- G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants."
- H. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals.

- I. Seal space outside of sleeves in concrete slabs and walls with grout.
- J. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- K. Install sleeve materials according to the following applications:
  - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Galvanized-steel pipe.
  - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Galvanized-steel pipe.
    - a. Extend sleeves 2 inches above finished floor level.
    - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements for flashing in Division 07 Section "Sheet Metal Flashing and Trim."
  - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
    - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
    - b. Galvanized-steel-sheet sleeves for pipes NPS 6 and larger.
    - c. Exception: Sleeves are not required for water-supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
  - 4. Sleeves for Piping Passing through Concrete Roof Slabs: Galvanized-steel pipe.
  - 5. Sleeves for Piping Passing through Exterior Concrete Walls:
    - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
    - b. Cast-iron wall-pipe sleeves for pipes NPS 6 and larger.
    - c. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
  - 6. Sleeves for Piping Passing through Interior Concrete Walls:
    - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
    - b. Galvanized-steel-sheet sleeves for pipes NPS 6 and larger.
- L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestop materials and installations in Division 07 Section "Penetration Firestopping."

### 3.8 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.9 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
  - 4. Energize circuits to electrical equipment and devices.
  - 5. Coordinate with fire-alarm tests. Operate as required.
  - 6. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

### 3.11 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

### 3.12 PIPING SCHEDULE

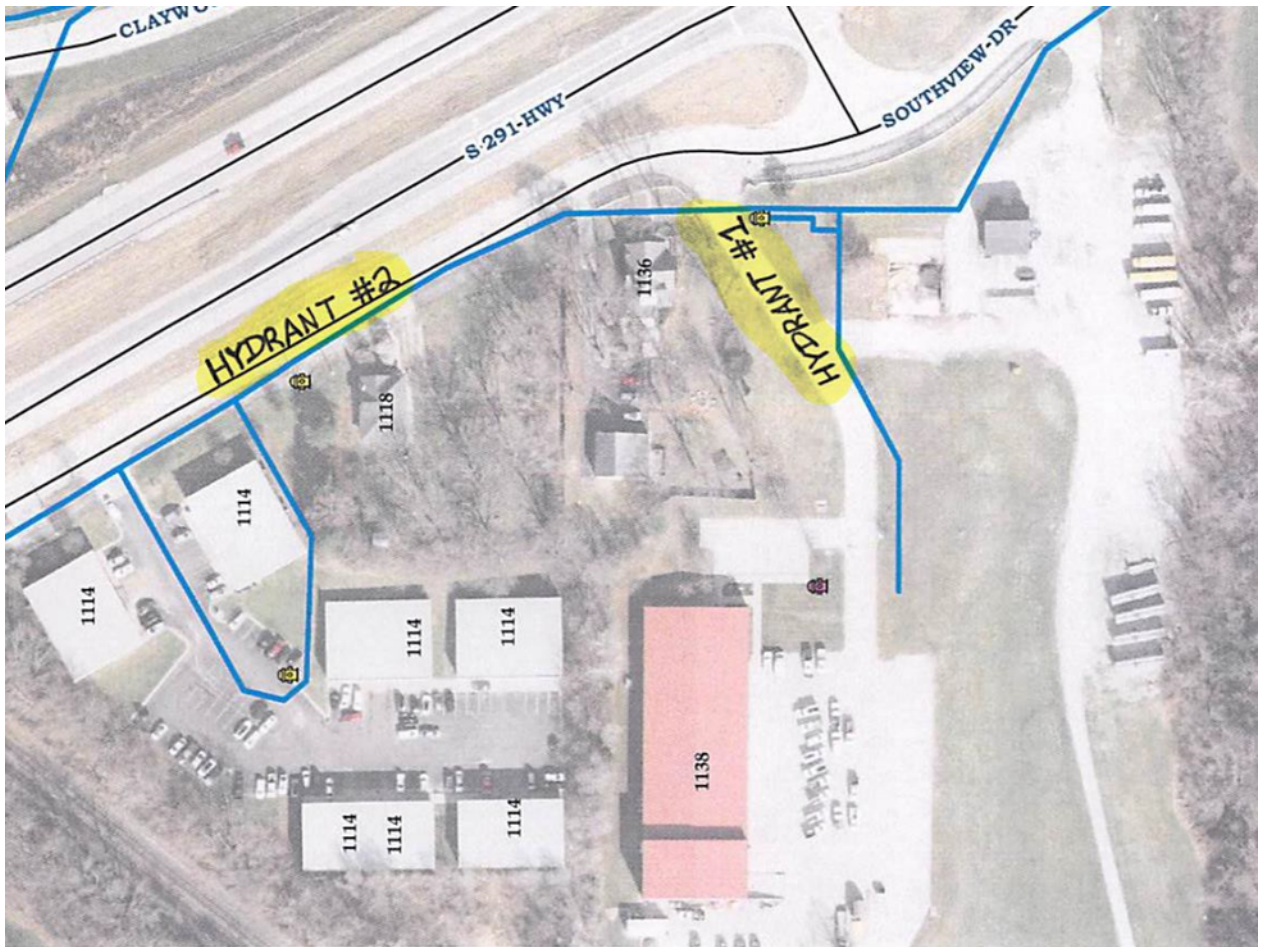
- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded or grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Wet-pipe sprinkler system, NPS 2 and smaller, shall be one of the following:
  - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
  - 2. Standard-weight galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
  - 3. Standard-weight, black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
  - 4. Standard-weight, galvanized-steel pipe with plain ends; galvanized, plain-end-pipe fittings; and twist-locked joints.
  - 5. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  - 6. Standard-weight, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  - 7. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
  - 8. Schedule 10 black-steel pipe with grooved fittings.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 6, shall be one of the following:
  - 1. Standard-weight or Schedule 30, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  - 2. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  - 3. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
  - 4. Thinwall black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
  - 5. Thinwall black-steel pipe with plain ends; welding fittings; and welded joints.

### 3.13 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
  - 1. All Gypboard Ceilings and/or Soffits: Concealed head sprinklers
  - 2. Locate sprinkler heads in center in ACT tiles.
  - 3. Rooms without Ceilings: Upright sprinklers.
  - 4. Rooms with Suspended Ceilings: Pendent sprinklers.
  - 5. Wall Mounting: Sidewall sprinklers.
  - 6. Spaces Subject to Freezing: Pendent, dry sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
  - 1. Concealed Sprinklers: Rough brass, with white color plate.
  - 2. Recessed Sprinklers: Bright chrome, with chrome escutcheon.
  - 3. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

### 3.14 SITE FLOW TEST DATA

- A. Two tests were performed for 1138 Southview Drive on August 25th 2023. The first test was through the 2.5" nozzle. We used hydrant #1 as our flow hydrant and Hydrant #2 as our test hydrant. Below are the results we came up with.
1. Pitot Pressure – 33 PSI.
  2. Residual Flow – 964 GPM.
  3. Static Pressure – 122 PSI.
  4. Residual Pressure – 110 PSI.
  5. Fire Flow @ 20 PSI – 3061 GPM.
- B. The second test performed was through the 4" nozzle. We used hydrant #2 as the flow hydrant and hydrant #1 as the test hydrant. Below are the results we came up with.
1. Pitot Pressure – 23 PSI.
  2. Residual Flow – 2060 GPM.
  3. Static Pressure – 128 PSI.
  4. Residual Pressure – 115 PSI.
  5. Fire Flow @ 20 PSI – 6462 GPM.



END OF SECTION 211313

