

SECTION 21 10 00 - WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. **Existing system to remain.** Modify only as required due to demolition and new work.
 - 1. This section is for a completely new fire suppression system. Use for new work or as a guide to modify the existing system.
- B. Section Includes:
 - 1. Wet-Pipe Sprinkler System(s): Automatic sprinklers attached to piping containing water that is connected to water supply. 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.
 - 2. Dry-Pipe Sprinkler System(s): Do not use unless approved by Kroger Manager of Architecture and Engineering Services or specifically allowed by this specification section. Submit all requests in writing, through the RFI process, with sufficient documentation provided including allowable deviations.

1.2 DEFINITIONS

- A. Owner's Fire Suppression Consultant:
 - 1. Telgian Corporation, kroger@telgian.com.

1.3 REFERENCES

- A. American Society of Civil Engineers (ASCE)
 - 1. ASCE 7-10, 2010 Edition – Minimum Design Loads for Buildings and Other Structures
- B. American National Standards Institute (ANSI)
 - 1. ANSI/AWWA C-151/A21.51, 2009 Edition – Ductile-Iron Pipe, Centrifugally Cast
 - 2. ANSI/AWWA C-110/A21.10, 2008 Edition – Ductile-Iron and Gray-Iron Fittings
 - 3. ANSI/AWWA C-111/A21.51, 2006 Edition – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- C. FM Global (FM):
 - 1. Approval Guide, Latest Edition
 - 2. FM Data Sheet 2-8N, installation of Sprinkler Systems
 - 3. FM Data Sheet 2-2, installation of Suppression Mode Sprinklers
 - 4. FM Data Sheet 8-9, General Storage

D. National Fire Protection Association (NFPA):

1. NFPA 13, 2010 Edition – Installation of Sprinkler Systems
2. NFPA 20, Installation of Fire Pumps
3. NFPA 24, 2010 Edition – Standard for the Installation of Private Fire Service and their Appurtenances.
4. NFPA 25, 2010 Edition – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
5. NFPA 291, 2010 Edition – Recommended Practice for Fire Flow Testing and Marking of Hydrants.

E. Underwriters Laboratory (UL):

1. UL Fire Protection Directory – Latest Edition.

1.4 SUBMITTALS

1. Submittal Procedures: Provide Submittals complete, accurate, and in full compliance with Division 00 Section "General Requirements" and the following for proper and timely approval:
 - a. Furnish Drawings accurately to scale on sheets of uniform size and include all necessary data, as required by NFPA 13, 2010 section 22.1.3.
 - b. Provide Submittals to authorities having jurisdiction (AHJ) per their requirements. Obtain reviews and approvals as required by AHJ's.
 - c. Within 15 calendar days of award of prime contract, submit to Telgian, via Owner's Project Management Website (PMW), as specified herein. Allow 15 day turn-around on submittals sent to Telgian from the day of receipt.
 - d. Submit electronic sets of detailed shop drawings, seismic calculations, hydraulic calculations, and material data sheets for the complete sprinkler system to Owner's Insurance Underwriter's Engineers, for approval. Provide all data required by NFPA and the authorities having jurisdiction in electronic form via Owner's PMW.
 - e. Respond in writing to submittal package review comments within 15 days of receipt. Include with re-submittals an item by item response letter from the Contractor. Additionally changes or additions to the drawings must be clearly indicated by a change/revision delta and clouded.
 - f. Approval of submittals by authorities having jurisdiction and Telgian is required prior to beginning fabrication and installation.
 - g. Final system acceptance shall be based upon final inspection and tests and approval by Telgian and the authority having jurisdiction.
 - h. Maintain two copies of approved documents on job site.

B. Product Data: For sprinkler components proposed (including but not limited to: new equipment, piping, hangers, valves, etc).

C. Shop Drawings: Include the following::

1. Narrative description of the building and fire sprinkler systems, located on the first sheet of the shop drawings, including at a minimum the following information:

- a. Total square footage of the building.
 - b. Confirmation that the building is provided with sprinkler coverage throughout facility.
 - c. Number of sprinkler system risers.
 - d. Size (pipe diameter) of each sprinkler riser.
 - e. Size (pipe diameter) of underground lead in supplying the risers.
 - f. Types of system(s); grid, tree, loop, etc.
 - g. Size and type of mains and branch lines for each system (i.e. "System one consists of 6 inch sch. 10 supply main, 4 inch sch. 10 front main, 3 inch sch. 10 rear main and 2 inch sch. 40 branch lines").
 - h. Scope of work for the Project.
2. Site plan with flow and test hydrants identified. Include the underground piping from the base of riser to the water test hydrants and the elevation of the test hydrant relative to the base of riser.
 3. Hydraulic placard data for new and existing systems.
 4. Ceiling elevations and elevation/section views of areas being affected by the Project. Provide additional elevation views where needed to show bulkheads and soffits for clarity.
 5. Full height cross section of areas of the building affected by the Project.
 6. Identification of room uses. Include any exterior pre-fabricated mechanical equipment room and trash compactors and drive through pharmacy canopies.
 7. Installation detail of the dry sprinklers and temperature of enclosures to verify the selected length of the dry heads.
 8. Make, model and location of any backflow prevention device that services the fire sprinkler systems. Devices must comply with the requirements of this specification.
 9. Identification of the ASCE 7-10 seismic design category (obtained from Drawings).
 10. When required by ASCE 7-10, seismic bracing is to be in accordance with the specifications, ASCE 7-10 and NFPA 13
 - a. Provide seismic separation assemblies per NFPA 13, and indicate the method used and its location.
 - b. Flex fittings are to be located where required.
 - c. Show the location of seismic components including (but not limited to) bracing (longitudinal, lateral, 4-way, etc.), and restraints.
 - d. Show branch line vertical piping restraints.
 - e. Indicate by note gap requirements between the fire service lead-in stub up and concrete floor and where piping penetrates walls.
 - f. Include seismic calculations.
 11. Location of valves, including pressure relief valves.
 12. Note indicating control valves shall be accessible and provided with a tamper switch, and locked open.
 13. Interior and exterior wall penetration detail, including methods of sealing penetration (for fire proofing, weather proofing, etc.) and escutcheons.
- D. Engineering Calculations: Provide hydraulic calculations for all new and existing systems.
- E. Project Closeout Submittals:

1. Maintenance Data: Provide one set of components of system, servicing requirements, inspection data, and owner's manuals.
2. Training Requirements: Provide operational training to Owner. Include system control operation, fire pump (if provided) manual and abort functions, trouble procedures, auxiliary functions and emergency procedures. Provide one set of operations and maintenance literature and instructions provided by the manufacturer for installed equipment and devices along with a current copy of NFPA 25.
3. Contractors Material Test Certificates: Provide one set of completed Underground, Aboveground, and Fire Pump (if provided) Contractor's Material Test Certificates.
4. As-Built Shop Drawings: Provide two sets of as-built shop drawings indicating installed location of components, including (but not limited to) all piping, sprinklers, hangers, valving, inspector's test stations, auxiliary drains, and hose stations. As-built drawings must include all corrections noted during the site observation process and reflect all revisions, addenda, and construction change directives implemented on the project. Approved as-built drawings are required for Project Closeout.
5. Contractor's Record Letter of Conformance for Fire Suppression: Upon satisfactory Fire Protection Site Observation (FP Observation), complete the Record Letter of Conformance (form provided at the end of this specification), obtaining all signatures (subcontractor and Contractor) and submit original for payment per Contract Documents.
6. At Project completion, present as-built drawings to the Store Manager enclosed in a plastic pipe tube (fixed cap at one end and a threaded-cap on the other end) for storage permanently mounted in the riser room.
7. System Zone Drawing: Indicate sprinkler zone coverage. Title drawing "Fire Protection Sprinkler System Zoning." Indicate the location of risers, control valves, inspector's test drains, and valves. Submit to Telgian, via PMW, for approval. Upon approval, install in a wood frame with plexiglas cover on wall adjacent to Risers.
8. Installers Warranty Information and Certificate.
9. In addition to the copies of Documents delivered to the Store Manager, distribute two additional copies of documents as indicated below:
 - a. Deliver copies of the as-built shop drawings and Contractor's Record Letter of Conformance for Fire Suppression and Contractor's Material Test Certificates (Underground, Overhead, and Fire Pump) in electronic form (*.pdf or *.plt) to Telgian via PMW.

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed.

1. Provide a sprinkler cabinet(s) containing spare sprinklers, wrenches and equipment in accordance with NFPA. The stock of spare sprinklers shall include all types and ratings installed but not less than a total of six. Permanently mount cabinet in the sprinkler riser room.

1.6 DESIGN REQUIREMENTS - GENERAL

- A. Provide a complete fire sprinkler system throughout the building covering all remodeled areas as required herein and by local jurisdictions, including but not limited to internal and external canopies, attic spaces, loading docks, walk-in refrigerated boxes, trash compactor chute,

concealed spaces having combustible construction, prefabricated mechanical center (refrigeration equipment) and vendor kiosks (i.e. Starbucks Coffee, Papa Murphy's Pizza) and The Little Clinic when indicated on the Drawings. Field verify that all of these areas are protected by fire sprinklers, and if not, provide protection complete in all respects and in complete operating condition including underground connection to water main with all necessary controlling equipment.

- B. Fire sprinklers and piping shall not be routed underneath skylights.
- C. The sprinkler system shall be hydraulically designed and installed in accordance with the referenced editions of NFPA standards and all State and Local Ordinances. The minimum requirements for all components, materials, and methods shall be in accordance with NFPA and as listed by Underwriter's Laboratories, Inc. or FM Global, and the requirements of the Owner, prior to the start of work.
 - 1. Pipe schedule systems are not allowed, except as allowed by NFPA 13.
- D. Include design, hydraulic calculations, piping layout drawings, details and other drawings necessary for fabrication and installation of the fire protection system, and required changes or revisions thereof necessary to obtain approval from Telgian and authority having jurisdiction.
- E. No extra charges will be allowed for changes to drawings, piping, etc., required to conform to NFPA Standards, the Owner requirements, authority having jurisdiction requirements, Telgian requirements or with conflict with other trades.
- F. Any deviations from the specifications need to be approved by the Owner (Kroger Manager of Architecture and Engineering Services). Documentation of the allowable deviations will need to be provided in the submittals.
- G. Hydraulic Calculations
 - 1. Provide hydraulic calculations performed in accordance with NFPA for each system affected by the remodel. All areas affected by the remodel must be hydraulically calculated to prove that they comply with construction document requirements.
 - 2. Perform hydraulic calculations beyond the sprinkler system riser to the water flow test calculated effective point.
 - 3. Provide water flow test information with static, residual and pitot pressure readings in accordance with NFPA 291 recommended procedures. Provide the location and elevation of the static and residual hydrants. Provide the time and date of test. Compile flow test results on the preliminary and final drawings submitted to the Owner's underwriter for approval. If required, calculate available water flow and residual pressure at base of riser.
 - 4. Conduct flow tests within six months prior to design submittal.
 - 5. The minimum available flow and pressure at the base of the riser for sprinkler system design shall be provided so that a fire pump is not required. The typical volume and pressure required at the base of the fire sprinkler riser to accomplish this is 600 gpm at 35-psi residual pressure. Values shall be verified based on fire sprinkler water demand for the specific site.
 - 6. Include check valve, and back flow prevention devices (as required by state or local authorities) in calculation for wet sprinkler system. An allowance for friction head losses through these devices must be made in hydraulic calculations.

7. Select the hydraulically most demanding area in accordance with NFPA. For grid style pipe arrangement, provide information to demonstrate the peaking of the demand when compared to areas immediately adjacent along the same branch lines.
 8. The Contractor shall verify with the water purveyor that the water system can provide required fire sprinkler water demand (600 gpm minimum) with a minimum duration of 60 minutes.
 9. Provide a 10 percent safety factor including hose streams in all calculations. Safety factor is calculated based on reducing the supply curve (static and residual pressures) by 10 percent of the static pressure.
- H. Provide either a backflow prevention valve in water supply line or check valve in system riser. Backflow prevention design must meet the requirements of the local authorities having jurisdiction, water purveyor, and Contract Documents. Verify backflow prevention valve meets current jurisdictional requirements. If no backflow prevention valve is required, verify each riser is provided with a swing check valve. Retrofit if necessary.
- I. Provide each sprinkler system with fire department connection with check valve and ball drip. The fire department connection shall be easily accessible and clearly labeled.
- J. The fire department connection location shall be approved by the authority having jurisdiction. Hose threads shall be the same as those of the public fire department.

1.7 DESIGN REQUIREMENTS, BUILDING

- A. Complete design including seismic bracing shall comply with NFPA 13 and State and Local building codes.
- B. Conceal all piping including piping for auxiliary drains above ceilings and in walls of finished areas or where subject to view by customers. Piping may be exposed in dock and backroom storage areas.
- C. Base sprinkler system design density on Ordinary Hazard Group II occupancy for all areas (i.e. retail sales, back stock, exterior canopies, kiosks, attics, combustible concealed spaces, etc.), unless noted otherwise in contract documents. Minimum design density for standard sprinklers shall be 0.20 gpm per square foot over the hydraulically most remote 1500 square feet. If extended coverage heads are used, the minimum design density shall be 0.20 gpm per square foot over the hydraulically most remote 2000 square feet. In either case, provide a hose stream allowance of 250 gpm.
- D. Where merchandise storage and display exceeds a height of 12 feet, the sprinkler system design density shall be at least 0.39 gpm per square foot over the most remote 2000 square feet based on storage of Class IV commodity to a height up to 15 feet.
- E. Where merchandise storage and display exceed a height of 12 feet, the maximum area of coverage per individual sprinkler shall not exceed 100 square feet and the sprinkler shall have a minimum K factor of 11.2.
- F. Individual sprinkler system shall not exceed 52,000 square feet.

- G. Provide each riser with two pressure indicating gauges, one on the system side and one on the supply side of each system. Provide each riser with an inside control valve and main drain. Route piping from the main drain connection to direct water discharge outside the building.
- H. If overhead doors open in horizontal position, provide sprinklers below door when the door is in a horizontal position. Install a k-factor sprinkler head consistent with roof level sprinklers. Sprinklers shall be listed and approved for this hazard area.
- I. Provide sprinklers in soffit areas only where required. When sprinklers are required in soffits, positioned a maximum of 1-foot from the front (Sales Area) edge of soffit.
- J. Where quick response sprinklers are installed, all sprinklers within a compartment (Refer to NFPA 13 definition of a compartment) shall be quick-response.
- K. Anti-freeze systems shall not be used.
- L. Interior areas subject to freezing temperatures shall be protected by dry pendent sprinklers.
 - 1. Interior dry pipe systems shall not be used except in areas that are subject to freezing, such as concealed combustible spaces.
 - 2. Dry pipe systems shall not be used for coolers, retarders, and freezers. Protect coolers, retarders and freezers with dry-pendent sprinklers supplied from wet pipe systems. Where structure of building does not provide sufficient installation space for dry pendent sprinklers, use dry-sidewall sprinklers to protect the cooler, retarder or freezer. Any other alternate must be approved by Owner (Kroger Manager of Architecture and Engineering Services). All requests shall be in writing with sufficient documentation provided. Requests should be through the RFI process. Written documentation of the allowable deviations will need to be provided in submittal information.
- M. Where exterior areas are subject to freezing temperatures and require fire sprinkler protection, they shall be protected by dry sidewall sprinklers.
 - 1. Where exterior areas are protected by fire sprinklers, utilize dry sidewall brass heads below exterior ceilings, with matching polished brass escutcheon plates. Dry sidewall brass sprinklers shall be used to protect as much of the exterior canopy as possible, complying with all requirements of NFPA 13. Dry-pipe system shall only be used to protect the area of canopy beyond reach of dry sidewall heads. Supply dry sidewall sprinklers from wet type system with piping concealed in stud walls inside the building. If necessary, "build out" stud walls to conceal dry sidewall sprinklers on the interior of the store. For areas beyond the reach of dry sidewall sprinklers, provide protection by means of dry pipe system.
 - 2. Provide protection under exterior canopies including, but not limited to sidewalk, entrance and pick-up canopies.
 - 3. For drive thru pharmacy or bank canopies, provide fire sprinkler protection only where required by code or authorities having jurisdiction.
 - 4. Base under canopy sprinkler system design density on Ordinary Hazard Group II occupancy.
 - 5. Provide condensate drain and air compressor in easily accessible location approved by Owner.
 - 6. The valves, compressor, trim and the water supply pipe shall be protected against freezing. Valve rooms shall be lighted and heated. Heat tape shall not be used.

Coordinate location, support, access, and electrical needs with all parties. If any equipment (i.e. valves, air compressors, etc.) are located above a ceiling, or elevated more than 7 feet above finish floor, an access ladder shall be provided and permanently mounted to facilitate inspection and testing. Location of all equipment and access (i.e. ladders, platforms, etc.) shall be approved by Owner.

7. For Remodel, Expansion, and Takeover projects where it is not possible to utilize dry sidewall sprinklers supplied from an interior wet pipe system to protect exterior areas, a dry pipe system shall be utilized. Piping should be concealed above the ceiling.
 - a. If it is not possible to conceal piping, piping may be installed exposed in the "corner" adjacent to the exterior wall and sidewall sprinklers utilized, minimizing the operational and aesthetic impact of the installation.
 - b. As a last resort, if it is not possible to conceal piping, or utilize sidewall sprinklers with piping exposed in the "corner" adjacent to the exterior wall, then exposed piping with upright or pendent sprinklers may be considered. Contractor proceeds at risk with this option. If there is any other way to accomplish protection, and it is identified by any party prior to the expiration of the warranty period, the Contractor will be required to modify the installation at their cost. All costs of permits, inspections, plan reviews, design, installation, labor and supplies necessary to make the corrections will be the responsibility of the Contractor.

1.8 QUALITY ASSURANCE

- A. Fire suppression system installer and their employees shall maintain all jurisdictional (local, state and federal) licenses, registrations, and certifications for the design, fabrication and installation of systems required by Contract Documents.
- B. Qualifications (Installer): Company specializing in performing work of this Section with minimum three years experience and a minimum of a NICET Certified Engineering Technician (Level III) Fire Sprinkler Designer on staff responsible for project.
- C. Qualifications (Welder): Company specializing in performing work of this Section with minimum three years experience and a minimum of a NICET Certified Engineering Technician (Level III) Fire Sprinkler Designer on staff responsible for project.
- D. Provide certificate of compliance from Authorities Having Jurisdiction indicating approval of field acceptance tests.

1.9 WARRANTY

- A. Workmanship and Material Warranty: Standard form in which fire suppression system installer agrees to repair or replace components of fire suppression system that fail for any cause, other than misuse within specified warranty period.
 1. Installation shall be warranted to be in accordance with plans and specifications, as approved by the Owner's insurance broker.
 2. Warranty Period: One year from date outlined in General Conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials, devices and equipment shall be new and listed by U.L. and/or approved by Factory Mutual (FM) for use in fire protection systems.

2.2 FIRE PROTECTION – BELOW GROUND – PIPE, FITTINGS AND CONNECTIONS

A. Exterior:

1. Piping and fitting to be bituminous seal coated.
2. Ductile Iron Pipe: ANSI A21.51; AWWA C151; Class 50.
3. Ductile Iron Mechanical Joint Fittings: ANSI 21.10; AWWA C110.
4. Mechanical Joints: Rubber gaskets ANSI 21.51; AWWA C111.

2.3 FIRE PROTECTION – ABOVE GROUND – PIPE, FITTINGS AND CONNECTIONS

A. Wet Pipe Systems:

1. Pipe: Schedule 40 black steel pipe or Schedule 10 (lightwall or thinwall FM approved)
2. Fittings and Connections: Butt welded or seamless, jointed with cast iron or malleable iron, flanged fittings, standard weight malleable iron fittings or by means of grooved type couplings and matching fittings, and have a minimum working pressure of 175 psig.
 - a. Threaded fittings allowable on use with Schedule 40 steel pipe only, do not use on Schedule 10 or lightwall pipe.
3. Mechanical tees and strap-o-let type bolt-on and gasketed fitted fittings, shall not be used.

B. Dry Pipe Systems

1. Pipe: Schedule 40 black steel pipe or Schedule 10 pipe, galvanized, zinc coated internally and externally.
2. Fittings and Connections: Same as wet pipe systems except galvanized. Black steel fittings will only be allowed in interior of building if the space is conditioned.
 - a. Threaded fittings allowable on use with Schedule 40 steel pipe only, do not use on Schedule 10 pipe.
3. Mechanical tees and strap-o-let type bolt-on and gasketed fitted fittings, shall not be used.
4. Dry-pipe system must be specifically allowed by this specification section or approved by Owner (Kroger Manager of Architecture and Engineering Services).

2.4 SPRINKLERS

- A. Provide white polyester coated sprinklers with matching semi-recessed escutcheons. Sprinklers shall be rated at 155 degrees F quick response throughout finished areas receiving a lay-in or

gypsum ceiling except when near heat source, then high temperature rated sprinklers shall be provided.

- B. Sprinkler escutcheon plates and recessed fittings shall be part of a listed and approved sprinkler assembly.
- C. Flexible Piping Systems: At Contractor's option, UL listed and FM approved flexible piping connections to sprinklers may be used for both suspended and sheetrock ceilings when suitable for their intended use.
 - 1. Description: Fully welded (non-mechanical fittings), braided, leak-tested sprinkler drop with a minimum internal corrugated hose diameter of 1 inch, lengths of 2 ft to 6 ft., and a one-piece multi-port ceiling bracket with removable attachment hub and self-securing integrated snap-on clip-ends for attachment to ceiling grid without the need for a screw fastener.
 - 2. Acceptable Products:
 - a. FlexHead Industries, Inc; FlexHead Series 2000; (800) 829-6975.
 - b. Victaulic Company; VicFlex; (610) 559-3300.

2.5 VALVES

- A. Control Valves: Provide each individual water control valve for each system, either an interior valve or an exterior wall mounted valve. OS&Y and Butterfly valves are acceptable.
 - 1. Gate Valves shall be O.S. &Y type, iron body, bronze mounted, double disc parallel seat type, UL/FM psi non-shock.
- B. Check Valves: Provide flanged, iron body, bronze mounted swing check valve, with rubber faced disc, and 175 psi cold water working pressure.
 - 1. Acceptable Manufacturers:
 - a. Mueller Industries, Inc.
 - b. Clow Valve Company
 - c. Keystone Valves, a division of Tyco/Flow Control
- C. Angle and Globe Valves: Shall be bronze, threaded valves.
- D. Backflow Prevention Device: Provide backflow prevention device for the water supply system as required by the authority having jurisdiction and water providers.
 - 1. Acceptable Manufacturers:
 - a. FEBCO, a subsidiary of Watts Water Technologies, Inc.
 - b. Ames fire and Waterworks, a subsidiary of Watts Water Technologies, Inc.
 - c. Watts Water Technologies, Inc.
- E. Valves on Underground Piping: Conform to the American Water Works Association requirements for working pressure of 175 psi. Provide underground valves with approved locking type post indicators

2.6 VALVE PITS

- A. When required, construct valve pits in accordance with the local governing authority.
- B. Provide galvanized, traffic type, gratings and covers when located in drive aisles or parking lots.

2.7 MAINTENANCE AIR COMPRESSORS

- A. Subject to compliance with requirements, provide tank mounted UL Listed or FM approved air compressor system.
 - 1. Provide electric, air-cooled, oil-less compressor.
 - 2. Power: 240 volt, three phase, 60 Hz. Hard wire per NEC and manufacturer's requirements.

2.8 ALARM SYSTEM

- A. Acceptable Manufacturers:
 - 1. Potter Electric Signal Company.
 - 2. Grinnell Fire Protection; a Tyco International Company.
- B. Sprinkler alarm system shall consist of the following Basis-of-Design equipment:
 - 1. Water Flow Indicator: Grinnell Fire Protection, a Tyco International Company; Autocall Type WF-5.
 - 2. Vane Type Waterflow Alarm Switch with Retard: Potter Electric Signal Company; VSR series
 - 3. High/Low Pressure Switches (if required): Potter Electric Signal Company; PS40A
 - 4. Outside Screw and Yoke Valve Supervisory Switch: Potter Electric Signal Company; OSYSU series
 - 5. Control Valve Supervisory Switch: Potter Electric Signal Company; PCVS series
- C. Water Flow Indicator (Type WF-5 or VSR): Contains two sets of normally open 120 volt contacts. One set of contacts shall activate fire alarm system. The other set of contacts shall activate a 120 volt outside horn-strobe or bell.
- D. Provide sprinkler alarm system wiring in accordance with the electrical section of the specifications.
- E. Owner's Central Station Alarm Monitoring: Include the following conditions to be alarmed and monitored:
 - 1. Supervisory air pressure on dry-pipe systems.
 - 2. Sprinkler system water flow.
 - 3. Valve Supervision for all system valves including but not limited to supply mains, pits, branch and OS & Y valves.
- F. Alarm System Equipment: Refer to Division 28 Section "Fire Alarm/Security System" for the following:

1. Products: Contact Bosch Pre-Sales at 800-289-0096 for assistance with locating qualified installation resources.
 - a. Bosch Security Systems, Inc.; D9412GV2 or D7412GV2
 - b. Bosch Security Systems, Inc.; D7024 or FPD7024
2. Alarm Horn

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify the adequacy of water pressure is sufficient to supply fire sprinkler systems. Include in Bid all costs necessary for a complete system including service entrance, fire pump, water supply upgrade, or interior system modification (new mains, revised branch lines, new sprinklers, etc.). No additional payments will be made to achieve compliance with Code or authorities having jurisdiction.
- B. Fabricate and install system and equipment in accordance with NFPA 13 and manufacturer's instructions.
- C. Welding of pipe shall be in accordance with NFPA 13.

3.2 INSTALLATION, GENERAL

- A. Coordinate system components (i.e. piping, sprinklers, valves, supports, bracing, electrical equipment, etc.) with all trades. No additional payments will be made to correct conflicts arising from lack of coordination.
- B. Piping extending from the main building into the prefabricated mechanical center shall be installed and insulated as indicated in Division 23 Section "HVAC Insulation" and in accordance with Drawings.
- C. Owner does not require fire sprinkler protection inside or below Pharmacy drive through canopies if they are constructed of non-combustible or limited combustible construction, as defined by NFPA 13. Verify construction and materials, as well as jurisdictional requirements. Meet the more restrictive of the jurisdictional and Owner requirements.
- D. Install electrical equipment in conformance with the latest edition of the National Electric Code (NEC) and authorities having jurisdiction.

3.3 PIPING AND SYSTEM COMPONENT INSTALLATION, SUPPORT AND BRACING

- A. Locate the main riser for system as shown on Drawings.
- B. Pipe hanger and support devices shall be per NFPA 13. Support vertical piping at each floor.

- C. Support piping larger than 4 inch by a minimum of two joists, with pipe support centered between joists and hanger spacing of 6-foot maximum. Attach hangers to the top cord of joists/joist girder within 6-inches of panel points.
- D. Install horizontal runs for mains and branches as close as practical to the bottom cord of roof joists taking into account allowance for system piping drainage.
- E. Do not install pipes less than 7.5-feet above finished floor.
- F. Where pipe is exposed to elements and subject to moisture exposure, paint exposed pipe threads to prevent corrosion. Remove cutting oil and grease prior to painting. Reference Division 09 Section "Painting" for guidance on paint type and application.
- G. Design and install seismic-restraint for sprinkler systems per the adopted Building Code and NFPA 13.
- H. Arrange system for flushing as required by NFPA standards.
- I. Install auxiliary drains where needed to remove water from low points in piping. Show water discharge point on the Submittal Drawings and take into account pedestrian sidewalks and walk ways, traffic flow. Confirm proper water discharge and drainage so that no immediate or long term damage will be caused when operating these drains.
- J. Keep interior of pipe free from dirt and other foreign material as installation progresses. Plug open ends when work is stopped. Join lengths with couplings in accordance with pipe manufacturer's instructions.
- K. Provide underground piping, system components and pipe restraints per NFPA 24. Support barrel of pipe for entire length on compacted bedding. Excavate for couplings, fittings and valves.
- L. For underground pipe, provide concrete thrust blocks as required by NFPA 24. Place concrete between undisturbed soil and fittings. Do not cover coupling flanges or other joints with concrete. Do not use retaining type clamps.

3.4 SPRINKLERS

- A. Sprinklers installed above high temperature areas (such as ovens) shall be rated at 286-degrees F.
- B. Provide brass sprinkler heads in the following locations:
 - 1. At the roof deck level in backroom areas
 - 2. Below stairways unless enclosed by walls and inaccessible.
 - 3. Unfinished areas.
 - 4. Above suspended ceiling when required.
 - 5. Above prep room ceilings that abut the backroom and behind full height wall in back room areas without ceilings. These heads shall not be subjected to obstructions of water flow discharge due to roof supporting structure.

6. At the roof deck level in the space above coolers and freezers unless the cooler or freezer is surrounded by a solid wall that extends the full height to the underside of the roof truss.
 7. At the roof deck level in the space above suspended ceilings for the food preparation areas in the backroom portion of the store.
- C. Provide sprinklers in electrical rooms.
- D. Install recessed white heads and concealed piping in all areas with ceiling or soffit height less than 7 feet. See Drawings for additional information.
- E. Protect sprinklers installed below 10 feet above finished floor, such as in backrooms and under stairwells, or in any other accessible area where they might receive mechanical damage with head guards.
- F. Install sprinklers to protect concealed areas containing combustible construction, such as covered canopy, store facade and roof deck supports.
- G. Install sprinklers above and below stairways if open or accessible. The area beneath a stairway is considered accessible unless it is completely enclosed noncombustible construction with drywall and no access doors are provided.
- H. Provide brass sprinkler heads above and below ductwork or other obstructions which is over 4 feet wide.
- I. Install high temperature rated sprinklers in the backroom, storage areas, back corridors and areas above and in the coolers/freezers.
- J. Provide a dry sidewall, 286-degree F, 1/2-inch sprinkler in the chute leading to the trash compactor in a location/manner to avoid physical damage to the sprinkler.
- K. Do not use interior dry pipe systems except in areas that are subject to freezing, such as concealed combustible spaces.
- L. Where Dry-Pipe systems have been specifically allowed by this specification section or approved by the Owner (Kroger Manager of Architecture and Engineering Services), the installation shall comply with all requirements of the Contract Documents, Owner and authorities having jurisdiction. Provide condensate drain and air compressor in easily accessible location approved by Owner. Pipe drains to a location approved by Owner.
1. Protect dry-pipe system and water supply pipe against freezing. Provide light and heat in valve rooms. Do not use heat tape.
 2. Dry-pipe system design operating area shall be increased 30 percent in accordance with NFPA-13.
 3. Dry-pipe systems shall not exceed a 750 gallon capacity.
 4. Do not use grid style pipe arrangement for dry-pipe systems.
- M. Align and install sprinklers in straight lines in both directions in coordination with lighting and air conditioning ceiling fixtures, and with the grid ceiling where they occur, subject to approval of the Owner before installation.

3.5 VALVES, DRAINS AND INSPECTORS TEST CONNECTIONS

- A. Valve Supervision: Install tamper switches and lock valves open with unbreakable locks and sturdy chain.
- B. Coordinate with the electrical trades for installation of electric sprinkler operated flow and alarm bell, if required. Verify during bid period which system is required so there will be no additional cost to the Owner.
- C. Provide necessary system interfaces and related fire sprinkler system devices for alarm notification for sprinkler system water flow or discharge to the Fire Alarm Panel equipped with Central Station Monitoring by KCAC.
- D. Provide shut off valve with tamper switch and water flow indicator for branch line to refrigeration equipment center when refrigeration equipment center is indicated on plans.
- E. Provide a sprinkler system test connection for each system. Locate the test connection at the sprinkler riser, easily accessible and arranged to discharge outside the building.
- F. Arrange main drains, inspectors test connections, backflow preventer assemblies, to discharge outside the building. Show the water discharge point on the submittal drawings and take into account pedestrian sidewalks and walk ways, traffic flow. Confirm proper water discharge and drainage so that no immediate or long term damage will be caused when operating these drains.

3.6 SIGNS AND IDENTIFICATION

- A. Attach a placard (hydraulic sign) to each sprinkler system riser to indicate the design basis and water demand. Recreate and install if missing from existing systems. Provide labor, equipment, design and engineering necessary to create or recreate these placards. No additional payments will be made to achieve compliance with this requirement.
- B. Provide red enamel steel identification signs on all alarm, control, dry, drain and test valves, etc., to identify their purpose and function as required by NFPA or authority having jurisdiction. Provide lettering size and style selected by the Owner and from NFPA suggested styles.
- C. Post a suitable sign adjacent to supply valves giving adequate instructions in the operation.
- D. System Zone Drawing: Indicate sprinkler zone coverage. Title drawing "Fire Protection Sprinkler System Zoning". Indicate the location of shut-off inspector's test drains and valves. Provide in a wood frame with plexiglas cover and mount on wall adjacent to Risers.

3.7 CUTTING AND PATCHING:

- A. Except as otherwise specified, perform cutting and patching provide openings with lintel and supports as required for installation of fire suppression system including paving, floors and walls. Patch with the same materials, workmanship and finish matching surrounding construction. Trim rings are to be provided (coordinate finish of trim rings with Owner).
- B. Seal pipe penetrations through fire rated walls or floors to achieve fire resistance equivalent to fire separation required. Provide wall plates at all penetrations.

3.8 TESTING AND COMMISSIONING:

- A. General: Schedule, coordinate, and conduct tests required by Authorities Having Jurisdiction and Telgian. Modify, replace or retest as required by Authorities Having Jurisdiction and / or Telgian.
- B. Flush, test, and inspect sprinkler system according to NFPA 13 "Systems Acceptance" Chapter. Test the systems, including the underground water mains, and the aboveground piping and components to assure that equipment and components function as intended. Pressure test the systems in accordance with NFPA 13 and NFPA 24. Have available copies of as-built drawings. Perform tests in such a manner as to prevent water damage or staining of building and property.
 - 1. Under Ground Fire Protection Piping:
 - a. Test per NFPA 24.
 - b. Flush underground mains and lead-in connections thoroughly to remove foreign material before connection is made to above ground system piping. Minimum flow rate shall not be less than the maximum water flow demand rate of the system and not less than necessary to provide a velocity of 10 feet per second. Continue flushing for sufficient time to ensure thorough cleaning. Provide proper disposal of water from flushing operation.
 - c. Perform Hydrostatic tests per NFPA 24.
 - 2. Above Ground Fire Protection Piping:
 - a. Test per NFPA 13.
 - b. Inspect welds and verify welder's qualifications per Authorities Having Jurisdiction.
 - c. Perform Hydrostatic tests per NFPA 13.
 - d. Furnish water for tests. Repair any leaks or cracks developing as a result of these tests to the satisfaction of the Telgian.
 - e. In addition to the hydrostatic test, conduct an air pressure leakage test at 40 psi for 24 hours on dry-pipe systems.
 - 3. Backflow Prevention Assembly Forward Flow Test.
 - 4. Operation of control valves and flowing of inspector's test connections to verify operation of alarm devices including alarm switches. After operation of control valves has been completed, assure that control valves are in the open position.
 - 5. Main Drain flow test.
- C. Fire Sprinkler System Construction Follow Up: Telgian will conduct a Fire Sprinkler Site Observation (FP Observation). The purpose of the FP Observation is to determine if the fire sprinkler systems are in general conformance with Contract Documents and shop drawings. Coordinate with Telgian for the time and date of the FP Observation. Begin scheduling for the FP Observation with Telgian one month prior to possession with FP Observation being conducted one to two weeks prior to possession. FP Observation shall occur prior to possession. A representative sample checklist is available upon request. Utilize Site Folio and the kroger@telgian.com via email address to contact Telgian to schedule the visit.
 - 1. FP Observation: Telgian will meet the Contractor, and Sprinkler Contractor representatives at the scheduled time. A representative of the Contractor and fire

suppression system installer shall be present during the FP Observation. At scheduled time, Contractor/Sprinkler Contractor shall be ready to initiate FP Observation as outlined herein. Prior to initiating, the following information shall be reviewed and copies provided to Telgian:

- a. Completed Contractor's Material and Test Certificate for Underground Piping. Provide the completed Contractor's Material And Test Certificate For Underground Piping provided at the end of this Section. All portions of the certificate shall be completed. If Completed form is not available certifying underground has been properly flushed, hydro tested, and leak tested, Acceptance tests cannot be performed, requiring all parties to reschedule test. Rescheduling may take up to four weeks, and may result in Contractor being back charged for Telgian's additional time and expenses. It is critical that completed Contractor's Material and Test Certificate for Underground Piping certifying proper flushing, hydro testing, and leak testing has been accomplished.
 - b. Contractor's Material and Test Certificate for Aboveground Piping (By System). As a minimum, the form shall contain information indicated in sample form shown in NFPA 13.
 - c. Sprinkler Zone Map.
 - d. Approved Shop Drawings.
 - e. Fire Pump Factory Test Curve (if applicable).
2. After these documents have been reviewed, the FP Observation of the installed systems will be conducted. Telgian will conduct and document a site observation of the fire sprinkler systems (and fire pump as applicable). At the conclusion of this Observation, an exit interview will be conducted with the Contractor to review and identify issues that need correction prior to acceptance of the system.
 3. Deficiencies noted as a result of the Owner's insurance inspection must be promptly corrected in accordance with the warranty.
- D. If any portion of the FP Observation is required to be repeated or rescheduled due to non-compliance with contract documents or code, unpreparedness of site or equipment for testing on scheduled date, and/or unsatisfactory results obtained, and a revisit is required, contractor is advised that rescheduling may take up to four weeks and may result in Contractor being back charged for Telgian's additional time and expenses as well as owner supplied equipment representatives time and expenses required to be present for testing (i.e., fire pump).

3.9 COMPLETION:

- A. Remove all debris, materials and equipment from the premises upon completion of work. Piping to be cleaned, ready for painting. Repair any areas damaged or stained as a result of the testing.
- B. System shall be fully operational two weeks prior to fixture date as established by the Owner's Representative.
- C. Notify Telgian via PMW and using the kroger@telgian.com via email upon completion of installation and opening date.

CONTRACTOR'S RECORD LETTER OF CONFORMANCE
SECTION 21 10 00
FIRE SUPPRESSION

Project Location: _____ Date: _____

(City & State)

Project Number: _____ Store Number: _____

Statement of Conformance:

This Record Letter of Conformance is provided as a Record Document. The undersigned hereby declares that the fire sprinkler system(s) including fire pump(s) and water storage tanks (hereafter referred to as the "Systems") is installed and is in general conformance with the Contract Documents and shop drawings and submitted product data. The "Systems" have been provided and placed in operational condition in accordance with the manufacturer's published instructions and the Contract Documents. To be accepted, all signatures must be original ink signatures (copies are not allowed).

FIRE SPRINKLER SUBCONTRACTOR:

(Subcontractor Signature)

(Subcontractor name and address) Phone Number: () _____

CONTRACTOR:

(Contractor Signature)

(Contractor name and address) Phone Number: () _____

END OF SECTION 21 10 00