PART 1 – GENERAL

1.01 PROJECT SUMMARY

A. Work in this Section includes, but is not necessarily limited to providing all engineering and associated costs, calculations, labor, materials, supervision, testing, permits and approvals required to design, install and obtain final acceptance of the automatic fire protection sprinkler system complete in all respects.

B. The fire protection system shall provide full and complete coverage of all areas, and shall be compatible with the contract document layouts and avoid interference with work of all other trades in the building. Contractor shall provide offsets as needed to avoid other trades, including but not limited to mechanical ductwork, hydronic piping, structural elements and lighting. Contractor shall provide any additional heads, piping and appurtenances required in order to satisfy complete coverage of the building in accordance with NFPA.

C. Provide fire protection system complete with all component equipment and material items. Install and test in full conformity with the requirements of all applicable codes, National Fire Protection Association (NFPA) 13 Edition.

1.02 RELATED SECTIONS – NOT USED

1.03 DEFINITIONS

A. Working Plans: Documents, including shop drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. Sprinkler systems shall not be calculated to less than 5 psi or 10% below the actual water supply available, which ever is greater. Sprinkler plans and calculations must take into account and show elevation loss from the flow test location to the flowing sprinklers. Flow test information must be recent to within one (1) year previous to submittal of sprinkler drawings.

B. NFPA standards require that the spray deflector of the sprinkler heads be installed eighteen (18") inches minimum above the top of the merchandise stored in piles, racks, shelves or displays.

C. Sprinkler deflectors shall be positioned to avoid obstruction to both activation and discharge. Obstructions are (but are not limited to) lights, diffusers, duct-work, structural members (false or real), displayed signage or any object capable of impeding the proper activation and discharge of the fire sprinklers. Installation shall comply to the referenced NFPA 13 document (Chapter 4) and the manufacturers listing. The sprinkler contractor shall be responsible for final coordination.

D. All obstructions exceeding four (4') feet wide or which cannot be spaced around (to comply with 1.4.F) shall have sprinklers installed beneath the obstruction. If sprinklers are installed at or below 7’.6” they shall be equipped with a listed head guard.

E. All sprinkler heads in finished ceilings shall be symmetrically spaced to provide proper coverage, and to avoid interference with lights, diffusers, grilles, or other ceiling mounted equipment. The head layout shall conform to the typical pattern.

F. All overhead piping located in areas containing ceilings shall run concealed above the ceiling, without exception.

G. Consult the bid specification drawings for acceptable locations for all piping to be run exposed (areas without ceilings).
H. Inspector’s tests to be provided with half-inch orifice, discharging at three (3”) inches above a hard paved surface. Provide pressure relief valves at inspectors test locations on all "grid" type systems. All inspector’s test shall not be located behind racking or other obstructions, and shall be located within eighteen (18”) inches of an exterior door opening.

I. Provide flushing and drainage as per required in NFPA 13.

J. Provide fire department connection. The exact placement and model of the fire department connection shall be verified with the local jurisdiction. Refer to the provided fire sprinkler drawings for location and arrangement.

K. System control valves accessed from the interior of the riser area and shall be tampered butterfly valves.

L. Provide sprinkler protection at electrical rooms per the requirements of the local jurisdiction.

M. The calculations shall include all sprinklers within the most hydraulically demanding area along each branch line within the distance determined using a 1.2 multiplier (times the square roof of the area).

N. The contractor shall provide a valve connection discharging onto a paved (outside) surface, to allow full system demand to flow forward of the backflow preventor for testing. The test connection shall be capable of full system flow and shall not require system drainage or alteration. Note, the two (2”) inch main drain and FDC are not acceptable.

1.05 SUBMITTALS

A. The contractor shall submit complete shop (working) plans in all aspects in accordance with NFPA 13 (Chapter 6). Include complete calculations and all material data and engineering sheets including but not limited to:

1. Underground materials (pipe, fittings, valve, rod, etc.).
2. Pipe and fitting.
3. Hangers and supports.
4. Seismic restraints.
5. Valve(s) – any type.
6. Alarm devices including electric.
7. Fire department connections.
8. Hose valves (if applicable).
10. Gauges.
12. Pumps and skids.

B. Fire Sprinkler shop drawings (2 sets of working plans, product data and hydraulic calculations) are to be submitted for review after the Engineer of record is satisfied that the shop drawings satisfy the requirements of the NFPA 13 and the project documents. The Engineer of record shall cite such approval on the shop drawings.

C. Coordinate the sprinkler system to avoid interference with work of all other trades in the building. Examine the contract documents and make any modifications needed for a complete shop drawing.

D. Submit shop drawings. Permit ample time for review and potential correction prior to start of work. No fabrication is permitted until approval is obtained.

E. Submit revised drawings and calculations for review and approval as required to accommodate changes to the architectural plan and other contract documents during construction.

F. Actual loss through any backflow devices must be accounted for in calculations. Sprinkler contractor shall submit, with their calculations and shop drawings a manufacturer's flow chart indicating pressure loss through the device(s) at the required flows.
PART 2 – PRODUCTS

2.01 GENERAL PARAMETERS
A. All materials submitted and installed shall be UL listed, individually or as any assembly to be installed in a fire protection system.
B. All materials shall be acceptable to all national and local applicable codes and standards.

2.02 SPRINKLER HEADS
A. No sprinklers to be installed are permitted to have a rubber O-ring seal. Only metallic "spring seal" or equivalent seals are allowed.
B. All sprinkler types and temperature ratings shall be as indicated on the drawings.

2.03 BRACKETS
A. Brackets for attaching pipe hangers to building structure shall be the size and type for the intended use, and acceptable to the structural engineer in accordance with NFPA 13.

2.04 SWITCHES
A. Provide all tamper and flow switches for indicating control valves and systems and as required by local ordinances.

2.05 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those indicated on drawings.

2.06 PIPE AND FITTINGS
A. Ductile-Iron Pipe: AWWA C151, push-on-joint type, with cement-mortar lining and seal coat according to AWWA C104. Include rubber gasket according to AWWA C111.
B. Ductile-Iron Pipe: AWWA C151, mechanical-joint type; with cement-mortar lining and seal coat according to AWWA C104. Include glad, rubber according to NFPA 1963 and matching local fire department sizes and threads, and bottom outlet with pipe threads. Include brass, lugged caps, gaskets, and brass chains; brass, lugged swivel connection and drop clapper for each hose-connection inlet; eighteen (18") inch (460-mm) high brass sleeve; and round, floor, brass, escutcheon plate with marking "AUTO SPKR."
   2. Finish Including Sleeve: Rough chrome-plated.
C. Steel Pipe: ERW or CW schedule 10 or 40. All fittings shall comply with NFPA 13.

2.07 FIRE DEPARTMENT CONNECTIONS
A. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250 psig (1725-kPa) pressure rating; and designed for horizontal or vertical installation. Include two (2) single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts 7A, 125-V ac and 0.25A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
B. Pressure Switches: UL 753; electrical-supervision type, water-flow switch with retard feature. Include single-pole, double-thrown, normally closed contacts and design that operates on rising pressure and signals water flow.
C. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
D. Indicator-Post Supervisory Switches: UL 753; electrical; single-pole, double throw, with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.

2.08 PRESSURE GAUGES
A. Pressure Gauges: UL 393, 3 ½ to 4 ½ inch (-90 to 115 mm) diameter dial with dial range of 0 to 300 psig (0 to 1725 kPa).

PART 3 – EXECUTION

3.01 INSTALLATION
A. Furnish and install under this Section all hangers and steel fabrications, other than building structure, required for proper support of piping and equipment.

3.02 HANGER ATTACHMENTS
A. Support of pipes with diameter larger than 2 ½ inches may require modification of structural members to support increased loads. Suspend piping and equipment supported by building structure only by those methods, and only at those locations acceptable to the structural engineer.
B. Provide supplementary supporting steel fabrication to bridge between structural steel fabrication to bridge between structural members to receive the hanger. Attach supplementary members to building structure only by those methods, and at those locations acceptable to the structural engineer.

3.03 INSPECTION, TESTING, AND CLEANING
A. Arrange for all inspections, examinations and tests in full conformity with the requirements of all applicable codes, National Fire Protection Association (NFPA) standards and authority having jurisdiction necessary to obtain complete and final acceptance of the fire sprinkler system.
B. Flush underground piping and pressure test at 200 psi for two (2) hours prior to connection to overhead piping. Flushing and testing shall be witnessed by the Fire Department.
C. Leave entire sprinkler system clean in every respect at the conclusion of the work.
D. Testing will occur after installation of all systems has been completed (approximately two (2) to three (3) weeks prior to opening). The contractor shall be required to provide a lift, air, and water pumps for system pressurization, and any necessary hand tools and apparatus for complete testing and draining of the systems. One (1) test of all systems should be completed within one (1) day. If all or any systems fail, the contractor shall be responsible to be present and furnish all items listed above until such time that systems are found to be acceptable or in accordance with NFPA 13, 25, and the bid documents. The contractor is responsible for notifying the Owner when installation is complete and testing may begin. Please allow five (5) to ten (10) working days for scheduling.
E. The contractor shall furnish to the owner a complete set of signed and witnessed test certificates for the following:
   1. Underground flushing.
   2. Underground hydrostatic test.
   3. Interior wet system hydrostatic test(s).
   4. All system trip tests.
F. The Contractor shall train owner on use of all equipment and furnish two (2) copies to be left on site, of NFPA 25 the latest edition, and all apparatus manuals, please allow seven (7) days for scheduling.
3.04 WARRANTY

A. Provide warranty in accordance with the General Conditions for a period of at least one (1) year.

END OF SECTION