

## SECTION 13900 SPRINKLER SYSTEMS

### PART 1 GENERAL

#### **1.1 SECTION INCLUDES**

- A. This Section is the standard for equipment/materials, design, fabrication and approval of automatic sprinkler systems for renovations at the BJ's Wholesale Club, Inc.

#### **1.2 GENERAL REQUIREMENTS**

- A. All work and materials specified in this Section shall be in accordance with Section "MECHANICAL GENERAL PROVISIONS" and the requirements of Divisions 0 and 1.
- B. All bidding contractors are required to visit and fully inspect the building. The scope of work required and the fact that the club will remain in operation shall be fully understood by all bidding sprinkler contractors

#### **1.3 SCOPE OF WORK**

- A. The Sprinkler Contractor shall provide a hydraulically designed sprinkler system to meet the criteria in this specification. The hydraulic design criteria and system components shall be as specified in this Section 13900. All work shall be in accordance with the requirements of the local Fire and Building Departments, the building code of the state in which the project is located, the Owner's (BJ's Wholesale Club) insurance underwriter as well as applicable NFPA Pamphlets.
- B. Work in this Section includes, but is not limited to, providing all material, equipment, products and labor to completely furnish and/or install the following:
  - 1. Demolition where required
  - 2. New or renovated sprinkler systems where indicated in these bid specifications
  - 3. Identification tags at new valves and drains
  - 4. System design placards at each system riser where appropriate
  - 5. Sprinkler working drawings and hydraulic calculations completed and sealed by a registered New York professional engineer licensed in the state in which the project is located
  - 6. All staging required for work under this Section

7. Any and all items necessary to hang, support, anchor, brace, etc. equipment furnished under this contract including the furnishing and installation of additional steel beams, angles, channels, etc. as required
  8. One year warranty
  9. Submittals, Owner's manuals, as-built drawings and instruction to Owner's personnel
  10. Cooler/freezer protection systems where shown
  11. In-rack sprinkler system for motor oil storage rack
  12. In-rack sprinkler system for the tire storage rack
  13. Seismic bracing on all new work as required by the Building Code
- C. The Sprinkler Contractor is also responsible for all submittals, permits, fees and tests required by municipal departments, governing agencies and the Owner's insurance underwriter. All costs of approvals shall be paid by the Contractor.

#### **1.4 SYSTEM DESIGN (GENERAL)**

- A. The bid and design shall be based on water system supply information given in this specification - Section 13900, sub-section 1.10.
- B. The hydraulic demand of the sprinkler system and hose streams shall allow a 10 psi buffer between the required water pressure at the maximum gpm demand point and the available water pressure at the demand point.

#### **1.5 EXISTING ROOF SYSTEM DESIGN**

- A. The roof zone designs (three) are currently based on NFPA-231c for rack storage and meet a density of **.28 gpm per square foot** over the most remote **3,000 square feet** area with an inside hose allowance of 100 gpm and an outside hose allowance of 400 gpm. No modification will be made to these roof level systems except as noted in this specification. Copies of the original sprinkler system design plans can be provided to the successful sprinkler contractor.

#### **1.6 MINIMUM SYSTEM RENOVATION REQUIREMENTS**

- A. Remove sprinklers and drops in existing bakery. Reconfigure piping and drops with new recessed pendent sprinklers in proposed pharmacy
- B. Install line of recessed pendent sprinklers below proposed soffit over meat display chests located in front of the existing meat cooler, meat prep. rooms and section along exterior wall.

- C. Install recessed pendent sprinklers in the new bakery and all adjacent ceiling soffits. Install dry pendent sprinkler protection in the new bakery freezer.
- D. Install in-rack sprinkler protection in the bulk motor oil rack per the requirements of Section 1.7 of this specification.
- E. Install in-rack sprinkler protection in the new/relocated tire storage racks containing light truck tires per the requirements of Section 1.8 of this specification.
- F. Reconfigure the existing sprinkler protection in the meat preparation room to conform to the new wall locations of the proposed rotisserie chicken area. Note that the sprinklers installed over and in front of the chicken oven must be high temperature rated.

## **1.7 DESIGN - MOTOR OIL STORAGE RACK**

- A. In-rack sprinklers shall be provided for the double row motor oil storage rack in accordance with the requirements of this Section and NFPA-30. This rack is indicated on fixture plan F-1 as rack 01S. Former motor oil storage rack 01T will be dismantled and the in-rack system currently in these racks will be removed by this contractor.
- B. One level of in-rack sprinklers shall be provided in the motor oil storage rack. Water demand shall be based on the operation of the hydraulically remote six sprinklers operating at a minimum pressure of 50 psi(57 gpm). A 500 gpm hose stream allowance shall be made, but no ceiling system flow will be needed with this rack demand. Heads shall be quick response type, have a temperature rating of 165°F, and a K factor of 8. Sprinklers shall be Viking Model M Quick Response Large Orifice, or approved equal. A solid horizontal barrier shall be installed at the 12'-6" level, consisting of ½" minimum plywood or particle board by the fixture supplier. Pipe and sprinkler head location shall be as shown in plan data attachments.
- C. This rack system shall be supplied by the existing 4" in-rack zone riser.

## **1.8 DESIGN - TIRE STORAGE RACK**

- A. In-rack sprinklers shall be provided in the new single row racks containing tires stored on pallets, on side. Protection for this rack shall be in accordance with the requirements of this Section and NFPA-231D. The location of this rack is indicated on fixture plan F-1 as rack 01X and is approximately 30' long. Racks formerly designated as 01R will be dismantled and the in-rack system currently in these racks will be removed by this contractor.
- B. Two (2) lines of in-rack sprinklers shall be provided attached to, and just behind the rack at the 6'-10" level and at the 12'-0" level. In-rack sprinklers shall be spaced at 8'-0" on-center and designed to discharge at a minimum of 30 gpm. The design shall be based on a total of 14 sprinklers operating (7 on each level)

and this flow shall be balanced with the roof system demand at the point of connection. The roof system shall be calculated to provide a density of 0.28 gpm/sqft over 3000 sqft plus 100 gpm inside, 400 gpm outside hose allowance. Pipe and sprinkler head location shall be as shown on plan data attachments.

- C. In-rack sprinklers shall be rack type equipped with water shields and wire cages. They shall be ½" or 17/32" orifice, standard response type, 165°F. rated.
- D. This rack system shall be supplied by the existing 4" in-rack zone riser.

## **1.9 GENERAL SYSTEM DESIGN**

- A. The design for the pharmacy and bakery shall be .15 gpm per square foot over the most remote 2,000 square feet plus 250 gpm for hose streams. Heads shall have a temperature rating of 165°F with spacing not to exceed 130 square feet per head.
- B. The bakery freezer unit shall be designed to provide a density of 0.20 gpm/sqft over the entire area of one unit plus 250 gpm for hose streams.

## **1.10 WATER SUPPLY**

- A. The bid and design basis of this fire suppression system renovation shall be based on the following supply effective at the discharge of the existing 1500 gpm at 65 psi electric motor driven fire booster pump. Static - 152 psi, Residual - 102 psi, Flow - 1500 gpm.

## **1.11 COLUMN PROTECTION**

- A. Sprinkler protection is currently provided at steel columns located within the storage rack units. This protection shall remain in place and shall not require modification under this contract.

## **1.12 WORKING DRAWINGS**

- A. Before commencing the sprinkler installation, The Contractor shall have prepared coordinated working drawings in conformance with NFPA and the requirements of the Owner's insurance underwriter and Fire Protection Engineer.
- B. All drawings shall be easily readable and of quality suitable for reproduction. The drawings shall be drawn at the scale of 1/8" = 1'-0" and shall include information as outlined in NFPA Pamphlet 13, Section 6-1.1.1. In addition, the

hydraulic design information and water flow test data shall be clearly shown on the drawings including the following:

1. Hydraulic design information:
  - a. Density (gpm per sq.ft.)
  - b. Design remote area (sq. ft.)
  - c. Hose stream demand, inside and outside (gpm)
  - d. Demand at the base of the riser without hose streams (gpm @ psi)
  - e. Demand at the point of connection to the public water main with hose streams (gpm @ psi)
  
2. Water flow test data:
  - a. Site schematic with locations and elevations (in reference to the finished floor elevation of the building to be sprinklered) of the flowing hydrant and the pressure hydrant
  - b. The static and residual pressure readings (psi) taken during the test
  - c. The size (inches) and coefficient of the hydrant discharge outlet used to flow water
  - d. The flow rate during the test (gpm)
  - e. The date and time of the test
  - f. The company conducting the test
  
- C. In preparing these drawings, the Contractor shall give full consideration to the work to be installed by others, including equipment, piping, lighting fixtures, wiring, ventilating ducts and structural features, and shall assume full responsibility for establishing proper clearances between his work and the work of others in this building.
  
- D. Shop drawings shall be signed and sealed by a professional engineer licensed in the state in which the project is located.

### **1.13 HYDRAULIC CALCULATIONS**

- A. Hydraulic calculations shall include a summary sheet, detailed working sheets and a graph sheet showing hydraulic demand points and available water supply. The detailed working sheets shall clearly show all pipe sections, tees, elbows, control valves, check valves, etc. and both their equivalent pipe length and friction loss to allow verification of calculations. Velocity pressures shall be determined in the calculations and shall not exceed 32 ft./sec.

- B. The length of the hydraulically designed most remote area shall be determined by the formula  $1.4 \times$  the square root of the remote area. Additional sets of calculations shall be submitted to verify that the remote area selected is most remote from the riser.

#### **1.14 SUBMITTALS**

- A. The Sprinkler Contractor shall submit copies of the required drawings and calculations for review and approval in ample time to meet the construction schedule. Procedures for plan review and approval are as follows:
1. A total of seven (7) copies of each drawing, seven (7) copies of the supporting hydraulic calculations with water flow test information and seven (7) copies of manufacturer's equipment specifications shall be submitted to BJ's Fire Protection Consultant at the following address:  
  
Mr. David Wood, P.E.  
Fire Protection Services  
P.O. Box 605  
14 Mulberry Street  
Fairhaven, MA 02719-0605  
(508) 991-2466  
FAX(508) 999-6832
  2. Upon receipt and review, the Fire Protection Engineer shall submit one (1) stamped copy of each drawing, one (1) stamped copy of the supporting hydraulic calculations with water flow test information and one (1) stamped copy of the manufacturer's equipment specifications to the project architect for his records, one copy of each of the above to the engineering representative of the BJ's Wholesale Club's insurance underwriter and one copy of each of the above to the Architectural Manager at BJ's Wholesale Club. Three (3) stamped copies of each of the above shall be returned to the Contractor. BJ's Fire Protection Engineer shall have 10 working days to review submitted materials before returning them to the Contractor.
  3. The Contractor shall submit the required number of sets (minimum of two {2}) sets of the drawings with supporting hydraulic calculations to the local fire department or the local Authority Having Jurisdiction for their review and approval.

4. *Neither ordering of equipment and materials nor fabrication shall begin until the contractor has obtained all necessary approvals for revisions identified above. If the contractor orders materials or equipment or begins fabrication or installation before securing approval, the contractor shall be responsible for all expenses incurred in conforming with the conditions of the approval.*

5. As the installation progresses, the Contractor shall keep a complete record of all changes. At the end of the installation, the working drawings and hydraulic calculations shall be revised to reflect the as-built condition.

6. Upon completion, the Contractor shall submit two (2) copies of the as-built drawings, two (2) copies of the supporting hydraulic calculations with water flow test information and two (2) copies of the manufacturer's equipment specifications to the BJ's Construction Manager at the following address:

BJ's Wholesale Club  
Construction Manager for "Project"  
Property Development  
P.O. Box 9601  
Natick, MA 01760

The as-built drawings and hydraulic calculations shall bear approval stamp of the local Fire Department. Written approval from the local Fire Department shall suffice if stamped approval is not feasible.

B. Submittals of manufacturer's equipment specifications shall include the following:

1. Piping, valves and fittings
2. Hangers
3. Sprinkler heads

C. The Contractor shall also submit the completed Contractor's Material and Test Certificates and written operating and maintenance instructions to BJ's Construction Manager at the aforementioned address.

## **1.15 OTHER CODE REQUIREMENTS**

- A. The requirements set forth in these specifications shall be considered to be minimum requirements. The contractor shall meet all local, state and national building/fire/plumbing code requirements regardless if specific items are stated in this Section or not. It is the Contractors responsibility to be familiar with all applicable codes and to ensure that the installation meets these codes.

## **1.16 REFERENCED STANDARDS**

- A. The latest editions of the following National Fire Protection Association (NFPA) Standards are hereby incorporated into these specifications. Where there are discrepancies between NFPA and this specification, the more stringent requirements shall take precedence.

NFPA 13 - Standard for the Installation of Sprinkler Systems.

NFPA 231C - Standard for the Protection of Rack Storage of Materials

NFPA-30 - Flammable and Combustible Liquids Code.

NFPA-231D - Standard for Storage of Rubber Tires

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. All products shall be U.L. Listed, Factory Mutual approved and meet the requirements of NFPA standards and the local regulatory agencies.
- B. All products shall be designed specifically for sprinkler/fire protection installation.

### **2.2 PIPE AND FITTINGS (INSIDE BUILDING)**

- A. Piping shall meet requirements of NFPA Pamphlet 13, Section 2-3.1 through 2-3.5, ASTM A135 and all local Authorities Having Jurisdiction. Pipe shall be black steel. Pipe 1" to 2½" inclusive may be black steel schedule 10 or 40 (except as noted below). All pipe 2 1/2" and larger shall be minimum wall thickness equal to schedule 10. Pipe of wall thickness less than schedule 10 shall not be used. ***Fitting systems designed for use with pipe of wall thickness***



***less than schedule 10, shall not be used. All in-rack piping 1" to 2" inclusive shall be schedule 40 pipe.***

- B. Fittings shall be cast iron and designed for a working pressure of 175 PSI and sprinkler service. Malleable fittings, unless of a type specifically approved for sprinklers, shall not be used. Fittings may be threaded, grooved, welded and/or plain end. One piece fittings of approved design shall be used wherever a change in the size of pipe is made. Bushings shall not be used for reducing the size of the openings of fittings. Couplings shall be used only when the length of run exceeds that of a standard full length of pipe.
- C. Fittings shall be manufactured specifically for fire protection service and be by Victaulic, Gustin Bacon, Grinnell, Ward or approved equal. All fittings and couplings shall be by the same manufacturer where applicable.
- D. Capped flushing connections shall be provided at the ends of all cross mains.

### **2.3 SPRINKLER HEADS**

- A. Sprinkler heads shall be in compliance with the hydraulic design criteria as specified in Part 1 of this Section.
- B. Pendant sprinkler heads for areas with hung ceilings shall be chrome plated with chrome plated escutcheons.
- C. Heads installed in freezers and coolers shall be dry pendant. The length shall be sufficient to position the seat for the head at least 12" above the top of the units. ***Dry pendent sprinklers shall be surface or extended mount style, chrome plated, standard response, 1/2" orifice, 286° F. rated.*** The distance from and the position relative to refrigeration evaporator discharge points is critical and in each case shall be coordinated in the field with the Refrigeration Contractor ***PRIOR TO FABRICATION AND INSTALLATION.*** ***In no case shall the sprinklers be mounted directly in the path of air discharge from the refrigeration units.***
- D. Heads installed near unit heaters, process equipment or in areas where ambient temperature might exceed 120°F. shall be high temperature and intermediate temperature in accordance with the requirements of NFPA Pamphlet
- E. In addition to the installed heads, provide spare sprinkler heads as required by NFPA 13. Provide approved steel cabinet(s) containing additional heads as

well as one sprinkler wrench for each type and size of head. The cabinet shall be mounted on the wall adjacent to the alarm valve.

- F. Additional sprinklers shall be provided on drops beneath HVAC ducts or any other large roof level obstruction over 48" wide. This will include closely grouped ducts which when combined measure 48" or wider. These pipe drops and sprinklers shall be supported from the building structure and not from the ducts or the work of other trades. Sprinklers below obstructions shall have equal orifice size to the roof system, shall be protected with a wire cage, and shall be 165°F rated.

## **2.4 HANGERS**

- A. Shall be cadmium plated adjustable sprinkler band type, sized and spaced per NFPA Pamphlet 13.
- B. Sprinkler pipe shall be supported from the *top chord of steel bar joists/joist girders and the top lip of steel purlins*. Hangers may be supported from holes in the vertical web of steel purlins if the structural design engineer will allow this. Hangers may also be supported from the lower lip of steel purlins if special deep purlin c-clamps are used and approved. Pipe may be supported from the top or bottom flange of wide flange steel beams.
- C. This contractor shall provide all additional steel, trapeze hangers and hardware required to properly support sprinkler system piping. Additional steel shall be designed per NFPA Pamphlet 13, Section 2-6.1.5.
- D. All sprinkler pipe and hardware shall be attached to building structural members and shall not be attached to work of other trades with the exception of in-rack piping which shall be installed per plan data sheets.

## **2.5 EARTHQUAKE BRACING**

- A. Earthquake seismic bracing shall be provided as required by the State Building Code.
- B. Earthquake bracing equipment shall be UL Listed and shall meet all requirements of NFPA 13, Section 4-14.4.3 and any additional equipment requirements of state/local codes.

## **PART 3 EXECUTION**

BJ's Wholesale Club  
Portland, Maine  
Deli  
Dal Pos Architects, LLC, December 2003

SPRINKLER SYSTEMS  
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### **3.1 GENERAL**

- A. All installation work shall be in accordance with applicable NFPA Standards, local codes and ordinances, as well as industry standards of good practice.

### **3.2 INSTALLATION OF PIPING**

- A. General

All installation work shall be performed strictly in accordance with NFPA Pamphlet 13 and Factory Mutual Data Sheet 2-8 and all other applicable state and local codes.

- B. Building Piping:

1. All sprinkler branch lines and mains shall be supported from the building structural system using approved hangers, inserts and other devices. Hangers shall be placed between 12 inches and 18 inches from each head and shall conform to NFPA Pamphlet 13. Piping shall be secured in correct alignment and pitch, and in a manner to prevent sagging and vibration. All pipes shall be anchored for expansion.
2. Sprinkler risers shall be supported from suitable brackets fastened to the building structure in accordance with NFPA Pamphlet 13. The Sprinkler Contractor shall provide all miscellaneous steel to span between the bar joists and columns as required for pipe support.
3. Roof level branch line piping shall be installed high in steel bar joists. All sprinkler system and in-rack system mains shall be installed tight to primary steel.

### **3.3 INSTALLATION OF SPRINKLER HEADS**

- A. Maintain a uniform rectangular pattern of sprinkler heads wherever possible. Exposed piping shall be fit with upright style heads. Piping concealed above hung ceilings shall be fit with pendant style sprinkler heads trimmed with escutcheon plates. When possible, pendant heads in finished areas shall be located such that they line up with the lighting fixtures as well as with each other.
- B. The minimum clearance between surface mounted light fixtures and sprinkler heads shall be 6 inches for fixtures up to 6 inches in depth and 12 inches for

greater depths. For suspended light fixtures, the minimum clearance shall be 12 inches.

- C. Provide sprinkler guards as required to protect the system from mechanical damage. As a minimum, sprinkler guards shall be installed on heads in the tire storage rack, the motor oil storage rack, and the small appliance/business center racks.
- E. The location of piping/sprinklers in racks shall be per the attached plan data sheets.

### **3.4 INSTALLATION OF EQUIPMENT**

- A. The Contractor shall obtain detailed information from the material and equipment manufacturers as to the proper method of installation and shall execute accordingly.
- B. Locate and install equipment such that it meets the requirements of NFPA, the regulatory agency and the local Fire Department. Identification tags shall be provided as required.
- C. All equipment requiring operation, maintenance or inspection shall be so mounted/located to allow ready access. Equipment shall not be located behind other permanent fixtures, at a vertical height above the floor not readily accessible, and/or mounted in such a way as to make normal access difficult. The owner/tenant shall require all equipment located in violation to this section to be relocated at no additional cost to the owner/tenant.

### **3.5 SYSTEM CONNECTIONS**

- A. **Flushing Connections:** Provisions shall be made to facilitate the flushing of the system. A flushing connection shall be provided at the end of each cross main terminating in 2 inch and larger pipe. Each flushing connection shall have a 2 inch capped nipple not less than 4 inches long.
- B. **Drain Connections:** Provisions shall be made to drain all pockets or low points occurring in the piping systems. The two inch system drain pipe shall be arranged to discharge to the exterior of the building unless prohibited by regulatory authorities. The discharge point shall be low on exterior wall and away from normal pedestrian travel paths.

### **3.6 RESPONSIBILITY**

- A. The Sprinkler Contractor shall be held responsible during the installation and testing periods of the sprinkler system for any damage to the work of others, to the building, its contents, etc., caused by leaks in any sprinkler equipment, by unplugged or disconnected sprinkler pipes, fittings, etc., or by overflow. He shall pay for necessary replacements or repairs to items damaged by such leakage.

### **3.7 TESTING**

- A. All piping in this installation shall be thoroughly cleaned and tested during the progress of the work, at the completion of the work, or at other times as may be required. All pipe shall be hydrostatically tested per NFPA Pamphlet 13, Section 8-2.2. The Sprinkler Contractor shall complete a standard Contractor's Material & Test Certificate for all above ground piping and forward same to the building owner at completion of all testing. No piping shall be concealed before being tested. All joints shall be inspected for leaks during the test, and any leaks which develop shall be repaired and the complete test repeated. Leaks shall be repaired by disassembly, correction and reassembly only. Caulking of joints will not be permitted and leaking joints must be remade. Stuffing boxes on all valves shall be repacked with new packing and made tight. Systems shall be tested and repaired until all requirements are met. Testing shall be done at the expense of the Sprinkler Contractor, with all required equipment furnished by him.
- B. At the completion of the installation, the entire system shall be tested to meet the approval of the local Fire Department or Authority Having Jurisdiction. This test shall be conducted in the presence of an authorized representative of BJ's Wholesale Club. Give a minimum of two days prior notice to the Owner/Tenant and all authorized agents.

### **3.8 MAINTENANCE MANUALS**

- A. Two complete sets of equipment maintenance manuals shall be assembled in 3-ring binders and placed in the sprinkler room. Binders shall include all manufacturers cuts and maintenance information on equipment used in this fire protection installation.
- B. Equipment shall include: valves, check valves, flow switches, tamper switches, hose equipment and all other relevant fire protection equipment which could require future maintenance.

- C. Projected schedule of equipment inspections required under Section 3.08 of this specification.

### **3.9 CUTTING AND PATCHING**

- A. The contractor is responsible for all cutting and patching work required for this installation.
- B. Locations shall be marked carefully and holes shall be no larger than necessary for the pipe involved. Hole size shall be strictly limited to a size which can be covered by a standard sized escutcheon. Misaligned and oversized holes will be patched by the contractor at no additional cost to the owner.
- C. Cutting/drilling of exterior wall shall require the reinsulation and packing of the opening to meet original R-value and prevent air infiltration.

### **3.10 EARTHQUAKE BRACING**

- A. All sprinkler system piping shall be braced to withstand earthquake (seismic) movement per the requirements of NFPA-13, 1996 edition, Section 4-14.4.3.
- B. Flexible couplings of an approved type shall be installed per the requirements of NFPA-13, Section 4-14.4.3.2.
- C. Clearances around all system piping between building components and other trades shall be strictly maintained per Section 4-14.4.3.4.
- D. Pipe sway bracing per Section 4-14.4.3.5 shall be installed to resist lateral and longitudinal seismic loads and to prevent unrestrained vertical movement. This shall include 4-way bracing of all building risers to the building structure.

### **3.11 DISPOSAL OF DEMOLITION MATERIAL**

- A. The sprinkler contractor shall include in the bid price the proper disposal of all pipe, fittings, sprinklers, equipment and misc. steel that are included in the demolition process.
- B. All demolition materials shall be removed from the site on a daily basis or the contractor shall provide an adequately sized demolition material truck container. This container shall be located where directed by the general contractor.

- C. The entire site shall be kept clean and free of dangerous conditions at all times. It is the sprinkler contractor's sole responsibility to properly dispose of demolition materials generated as part of his/her contract.

### **3.12 WARRANTY**

- A. The contractor shall warranty all materials and workmanship for a period of one (1) year. The contractor shall repair/replace all defective equipment/workmanship and make all needed adjustments during this period in a timely manner and at no cost to the owner.
- B. The warranty period shall begin on the day of the final system acceptance by the building owner and the Authority Having Jurisdiction.

END OF SECTION