SECTION 32 84 24

IRRIGATION SPRINKLER SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless specifically noted, the current edition of the reference shall be used.

AMERICAN PETROLEUM INSTITUTE (API)

API Standard 598	Valve Inspecting and Testing

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1010	Performance Requirements for Water Hammer Arresters
ASSE 1020	Performance Requirements for Pressure Vacuum Breaker Assembly
ASSE Series 5000	Cross-Connection Control Professional Qualification Standard

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C500	Metal-Seated Gate Valves for Water Supply Service
AWWA C511	Standard for Reduced-Pressure Principle Backflow Prevention Assembly
AWWA C651	Standard for Disinfecting Water Mains
AWWA C901	Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13mm) Through 3 In. (76 mm), for Water Service
AWWA M14	Manual for Recommended Practice for Backflow Prevention and Cross-Connection Control; 3rd Edition

ASME INTERNATIONAL (ASME)

ASME B1.2	Gauges and Gauging for Unified Inch Screw Threads
ASME B16.15	Cast Bronze Alloy Threaded Fittings Classes 125 and 250
ASME B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.3	Malleable Iron Threaded Fittings, Classes 150 and 300
ASME B40.100	Pressure Gauges and Gauge Attachments

ASTM INTERNATIONAL (ASTM)

ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM B32	Standard Specification for Solder Metal
ASTM B43	Standard Specification for Seamless Red Brass Pipe, Standard Sizes
ASTM B88	Standard Specification for Seamless Copper Water Tube
ASTM D1785	Standard Specification for Polyvinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D2241	Standard Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2287	Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM D2464	Standard Specification for Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D2466	Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2564	Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems
ASTM D2774	Underground Installation of Thermoplastic Pressure Piping
ASTM D2855	Standard Practice for Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings
ASTM D3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM F441/F441M	Standard Specification for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	List of Approved Backflow Prevention Assemblies

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	Bronze Gate, Globe, Angle and Check Valves
MSS SP-85	Gray Iron Globe & Angle Valves Flanged and Threaded Ends

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	National Electrical Code

NSF INTERNATIONAL (NSF)

NSF/ANSI 14	Plastics Piping System Components and Related Materials

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-51145	Flux, Soldering, Non-Electronic, Paste and Liquid

UNDERWRITERS LABORATORIES (UL)

UL 651	Standard for Schedules 40 and 80 Rigid PVC Conduit and Fittings

1.2 SYSTEM DESCRIPTION

This specification covers the complete irrigation system.

1.2.1 Design

1.2.1.1 The complete irrigation system, beginning with the tie in to the water supply, shall be designed by a Landscape Architect, licensed in the State of Oklahoma.

1.2.1.2 All calculations and drawings shall be signed and sealed by the design professional.

1.2.1.3 All calculations and drawings shall be submitted for approval in accordance with section 1.3.

1.3 SUBMITTALS

Government approval of all materials, designs and procedures is required prior to use or installation. The following are to be submitted in accordance with Section 01 33 00; SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

1. Irrigation sprinkler system.

Drawings, including irrigation legend, shall be prepared by a licensed Landscape Architect.

2. As Built Drawings

SD-03 Product Data

1. Piping materials, tubing, and fittings
2. Valves and accessories
3. Sprinkler heads
4. Backflow preventers
5. Automatic controller
6. Solvent cement
7. Control wiring
8. Drip irrigation equipment and accessories
9. Water hammer arresters
10. Water meter
11. Rain shut-off device
12. Freeze shut-off device
13. Soil moisture sensor
14. Tapping tee
15. Valve boxes and lids
16. Drip head accessories

SD-05 Design Data

1. System Design

The design submittal shall include, as a minimum:

a. Irrigation requirements
b. Pressure calculations
c. Piping and component material specifications
d. Piping and component functional specifications
e. Coverage area calculations
f. Thrust block calculations

SD-06 Test Reports

1. Valves, and accessories tests
2. Backflow preventers
3. Pressure test
4. Operation test, including verification of sprinkler head layout
5. Submit record of pressure tests conducted on recording gage.

SD-07 Certificates

1. Backflow preventers:

ASSE Series 5000, Submit a certificate of Full Approval or a current Certificate of Approval from FCCCHR List for size, and make of backflow preventer being provided for this project. A Certificate of Provisional Approval will not be acceptable.

SD-08 Manufacturer's Instructions

1. Automatic controller
2. Sprinkler heads
3. Piping materials
4. Tubing and fittings.

5. Backflow preventers
6. Valves
7. Solvent cement
8. Control wiring
9. Drip irrigation and accessories
10. Water hammer arresters
11. Water meter
12. Rain shut-off device
13. Freeze shut-off device
14. Soil moisture sensor
15. Mounting details for automatic controllers.

SD-10 Operation and Maintenance Data

1. Piping materials and fittings
2. Sprinkler heads and accessories
3. Backflow preventers
4. Valves
5. Automatic controller
6. Drip irrigation and accessories
7. Water hammer arresters
8. Water meter
9. Rain shut-off device
10. Freeze shut-off device
11. Soil moisture sensor

SD-11 Closeout Submittals

1. Controller Charts

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

1.4.1.1 Deliver materials in original rolls, packages, cartons, and containers with the name of manufacturer, brand, and model clear and legible.

1.4.1.2 Inspect materials delivered to the site for damage.

1.4.2 Storage

1.4.2.1 Store the materials on site in enclosures or under protective covering.

1.4.2.2 Store plastic piping and rubber gaskets under cover out of direct sunlight.

1.4.2.3 Do not store materials directly on ground.

1.4.2.4 Keep inside of pipes and fittings free from dirt and debris.

1.4.3 Handling

2.4.3.1 Handle and carry pipe, fittings, valves, and accessories in such a manner as to ensure delivery to trench in sound undamaged condition.

2.4.3.2 Do not drag pipe.

1.5 QUALITY ASSURANCE

1.5.1 Required Test

1.5.1.1 Test the completed system for:

1. Leaks

    a. Repair all leaks prior to performing additional tests.

2. System operating pressure

3. Spray head operation

4. Spray head coverage

5. Backflow preventer operation

6. Controller operation

7. All valves and accessories

1.5.1.2 Submit tests reports signed by an authorized official of the contractor.

PART 2 PRODUCTS AND MATERIALS

2.1 All products and materials shall be as specified by the design professional.

PART 3 EXECUTION

3.1 INSTALLATION

Install the sprinkler system after site grading has been completed in accordance with the approved plans and specifications.

3.1.1 Trenching

3.1.1.1 The depth of trench shall be as specified on the plans.

3.1.1.2 The width of trench shall be 4 inches or 1 1/2 times diameter of pipe, whichever is wider.

3.1.1.3 Hand trench around roots to pipe grade when roots of 2 inches diameter or greater are encountered.

3.1.1.4 Backfill and hand tamp over excavation.

3.1.1.5 When rock is encountered, excavate 4 inches deeper and backfill with sand to pipe grade.

3.1.1.6 Keep trenches free of obstructions and debris that would damage pipe.

3.1.1.7 Do not mix subsoil with topsoil.

3.1.1.8 Bore under existing concrete walks, drives and other obstacles at a depth conforming to bottom of adjacent trenches.

a. Install pipe sleeve, two pipe diameters larger than the sprinkler pipe, to fill the bore.

3.1.1.9 Prior to backfilling the trench, the Contracting Officer shall verify and approve the location of all irrigation heads.

3.1.1.10 Backfill the trench to three inches below grade with common fill and compact to the same density as the surrounding soil.

3.1.1.11 Fill the top three inches of the trench with topsoil and compact to the same density as the surrounding soil.

3.1.1.12 Replace the turf or plants in kind or as specified by the plans.

3.1.2 Clearances

3.1.2.1 The minimum horizontal clearances between lines shall be four inches for pipe diameters of two inches or less and 12 inches for pipe diameters larger than two inches.

3.1.2.2 The minimum vertical clearances between lines shall be one inch.

3.1.3 Slope

3.1.3.1 The minimum slope shall be between 1/16 inch and 3/16 inch per foot (1/2% to 1½%) in the direction of drain valves.

3.1.4 Thrust Blocks

3.1.4.1 Install thrust blocks at locations specified on the plans.

3.1.4.2 Place concrete so that sides subject to thrust or load are against undisturbed earth, and valves and fittings are serviceable after concrete has set.

3.1.5 Sterilization

3.1.5.1 Sterilize sprinkler systems fed from a potable water system upstream of backflow preventer in accordance with AWWA C651.

3.1.5.2 New water lines shall meet all local, state and federal health test requirements before being placed into service.

3.1.6 Dielectric Protection

3.1.6.1 Where pipes of dissimilar metals are joined, make the connection with a dielectric fitting.

3.1.7 Accessories

3.1.7.1 Connection to Existing Water Supply Systems

a. Make the connection to the existing water supply system in accordance with the approved plans.

b. Provide all materials required to make the connection to the existing water supply systems and perform excavating, backfilling, and other incidental labor as required.

c. Notify the Contracting Officer, in writing, at least 15 days prior to the date the connections are required.

d. Coordinate all water outages through Base CE.

3.1.7.2 Water Meter

a. Install the water meter upstream of the backflow preventer per the manufacturer's recommendations and the local utility department’s instructions.

3.1.7.3 Air/Vacuum Relief Valve

a. Locate the air/vacuum relief valve at the highest point in the piping system.

3.1.8 Electrical

3.1.8.1 Install all electric components and wiring in accordance with the approved plans.

3.1.8.2 Provide grey electrical conduit where wires run under paved or non-paved pedestrian paths and vehicular roads.

3.1.8.3 All wires, circuits and components shall be clearly marked or tagged.

3.1.9 Flushing

3.1.9.1 After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads and valves, flush piping system under a full head of water.

3.1.9.2 Flush the piping system for three minutes or one minute for every 100 feet of pipe, whichever is longer.

3.1.10 Adjustment

3.10.1.1 After grading, plant installation and rolling of planted areas, adjust sprinkler heads flush with finished grade.

3.10.1.2 Make adjustments by providing new nipples of proper length or by use of heads having an approved device, integral with head, which will permit adjustment in height of head without changing piping.

3.2 FIELD QUALITY CONTROL

3.2.1 The Contractor shall provide all labor, equipment and incidentals required to perform field inspections and tests as specified.

3.2.2 The Contracting Officer or the CO Representative will witness field inspections and field tests specified in this section.

3.2.3 Testing

3.2.3.1 Prior to Backfilling

a. Pressure Test

1. Maintain a hydrostatic pressure of 150 psi without pumping for a period of one hour with an allowable pressure drop of 5 psi.

b. Leaks

1. Visually inspect the entire system for leaks while it is pressurized.

2. Make necessary corrections to stop leakage.

c. Retest the system and make corrections until the system can hold pressure for the duration specified above.

d. Operation Test

1. After conclusion of the pressure test, install the irrigation heads and the remainder of the system components and test the entire system for operation under normal operating pressure.

2. Make necessary corrections or adjustments to raise or lower the pressure for each part of the system where tests results do not match pressure requirements.

3. Backfill the trenches in accordance with section 3.1.1.

4. Operation test is acceptable if the entire system operates through at least three complete, consecutive cycles.

3.2.4 As Built Drawings

3.2.4.1 Submit as built drawings in accordance with section 1.3.

3.2.4.2 As built drawings shall include chart for each controller indicating the area controlled by the controller.

3.2.4.3 Controller chart reductions shall also be provided

a. The reduction shall be clearly legible and shall fit, without folding, into the controller housing.

b. The reduction shall be encased in clear plastic.

c. The plastic shall be of a thickness and quality to provide a long term watertight seal and clearness.

- End of Section -