

**SECTION 4200
UNDERGROUND SPRINKLER SYSTEM**

GENERAL

1.01 Scope. Work to be performed under this section shall include all labor, materials, and equipment required to complete underground sprinkler system.

1.02 Related Work Specified Elsewhere.

Section 2730 - Revegetation - Seeding, Sodding & Hydroseeding

Section 2740 - Trees, Plants and Ground Cover

1.03 Quality Assurance. Installer shall have satisfactorily installed acceptable underground sprinkler systems on at least three other comparable projects.

1.04 Submittals.

A. Shop Drawings

B. Design: Any deviations in layout (equipment usage or trenching) from the proposed sprinkler design must be approved by the Engineer prior to construction. Submit three (3) copies of any design deviation for approval by Engineer before commencing any Work. Design shall be based on head, valve, and piping locations provided as shown. Sleeving to accommodate sprinkler pipe shall be installed prior to paving operation as set forth herein and as indicated on the Drawings. Zones and stationing shall conform to those indicated on the Drawings. Contractor shall determine water pressure at supply line for system pressure availability. Minimum water coverage for planted area shall be 85%.

C. Operation and Maintenance Date: Submit written operating instruction including winterization procedures. Submit a controller programming schedule indicating length of time each zone is to be operated. Coordinate controller/ watering operations with Owner's maintenance personnel.

D. Maintenance Materials: In addition to installed systems, provide Owner with:

- i) Two sprinkler heads of each size and type.
- ii) Two valve keys for operating manual valves (two drain valve keys two gate valve keys).
- iii. Two keys for each type of valve cover.
- iv. Two wrenches for removing and installing each type of head.

1.05 Delivery, Storage and Handling. Prevent damage to system components during loading, transporting and unloading. Deliver all components in original containers and store in a clean, dry location.

1.06 Warranty. Warrant irrigation system for a period of one (1) year after completion and acceptance of all work against material defects and craftsmanship. The warranty shall be for 100% of the installed price. This warranty does not cover any defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond the irrigation system installer's control.

1.07 Record Drawings. A contract set of drawings for all phases of the work shall be maintained at the site, with all changes or deviations from the original drawings marked thereon in contrasting color. This shall be a separate set of drawings, not used for construction purposes, which will be kept up to date as the job progresses and be made available to the Engineer for inspection at all times. the sprinkler contractor shall revise his drawings to indicate all changes made during installation. Upon completion of the work, three sets of revised prints shall be delivered to the Owner.

2.00 MATERIALS

2.01 Pipe and Pipe Fittings.

- A. Pressure Pipe: PVC Class 200 for all pressure pipe.
- B. Conduit Pipe (downstream from circuit valves): Conform to Commercial Standard 80 NSF Polyethylene Pipe.
- C. Pipe Fittings: For PVC plastic pipe, ASTM D2466 socket fittings with ASTM A 2564 solvent cement.
- D. Sleeving: Class 160 PVC with primed and solvent (gray blue) welded joints.

2.02 Valves and Valve Boxes.

- A. Valves: Electric automatic valves.
- B. Strainers: Y strainers on each valve.
- C. Backflow Preventor: Provide anti-siphon device to meet local code.
- D. Valve Box: Plastic
- E. Valve Cover and Frame: Plastic with provision for locking.

2.03 Sprinkler Heads. Manufacturer's standard unit designed to provide uniform coverage over entire area of spray shown on drawings at available water pressure, as follows:

- A. Pop-up Spray (PUSp): Fixed pattern with screw-type flow adjustment.
- B. Flush Surface (FLSrf): Fixed pattern with screw-type flow adjustment.
- C. Shrubbery (Shub): Fixed pattern with screw-type flow adjustment.

2.04 Drainage Backfill. Cleaned gravel or crushed stone, graded from 3" maximum to 3/4" minimum.

- A. General: Furnish a low voltage system manufactured expressly for control of automatic circuit valves of landscape irrigation systems. Provide unit capacity to suit number of circuits as indicated. Wall-mount station controller.

- B. Transformer: To convert building service voltage to control voltage of 24 volts.
- C. Circuit Control: Each circuit variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each circuit.
- D. Timing Device: Adjustable, 24 hour and 7 to 14 day, clocks to operate any time of day and skip any day in a 7 day or 14 day period. Allow for manual or semi-automatic operation without disturbing present automatic operation.
- E. Wire: Size must meet local codes and be in accordance with manufacturer's recommendations.

3.00 METHODS AND PROCEDURES

3.01 Inspection. Installer must examine the areas and conditions under which landscape irrigation system is to be installed and notify the General Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 Trenching and Backfill.

- A. Excavation: All pipe lines shall be installed in open cut trenches (machine trenched where accessible, otherwise manually excavated). The width of the trench in the pipe will be placed shall be sufficient to allow thorough tamping of suitable backfill material under and over the pipe. Boring will be permitted only where the pipe must pass under an existing obstruction which cannot be removed. In backfilling the bore, the final density of the backfill must match that of the surrounding soil. All other under pavement pipe laying shall be installed in sleeving material prior to placement of flatwork or other obstructions. Any trench deeper than 6' shall be adequately shored and/or braced for safety considerations. Trenches shall be dug to depths outlined under pipe and wire depth and shall be compacted by tamping to a minimum density of 95% Standard Proctor. No after-settling shall occur when finish grade has been re-established. (Verify established finished grades in planter areas before proceeding with the pipe installation).

The Contractor shall be responsible for investigating the type of soil and conditions in which these lines are to be installed and shall allow for same in his proposal. No extra will be allowed due to difficulty in trenching.

- B. Backfilling: Puddling or jetting compaction will not be allowed. Hand or machine tamp trenches are required for compaction.

Excavated trenching material will generally be considered satisfactory for backfill purposes. All backfill material shall be free from rubbish, vegetative matter, frozen materials, or stones larger than 2" in maximum dimension. Any material not suitable for backfill shall be hauled away.

Backfill shall not be done in freezing weather except with written approval from the Engineer.

C. Pipe and Wiring Depth:

1. Mainline Pressure Piping: 36" from top of pipe.
2. Lateral Lines: 15" from top of pipe.
3. Control Wiring: 36" from finish grade along mainline pipe.

3.03 Installation.

- A. General: Unless otherwise indicated, comply with requirements of the Uniform Plumbing Code.
- B. Backflow Preventor: Provide unions on upstream or downstream sides. Install minimum 6" above highest ground level sprinkler head.
- C. Circuit Valves: Install in valve box, arranged for easy adjustment and removal. Provide union on downstream side.

Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

- D. Piping: Lay pipe on solid subbase, uniformly sloped without humps or depressions.

For circuit piping, slope to drain valve at least 1/2" in 10' of run.

Install PVC pipe in dry weather when temperature is above 40°F in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperatures above 40 degrees F before testing, unless otherwise recommended by manufacturer.

- E. Drain Pockets: Excavate to size indicated. Backfill with acceptable drain material to 12" below grade. Cover drain material with a sheet of 30 lb. asphalt saturated felt and backfill remainder with excavated material.

- F. Sprinkler Heads: Flush circuit lines with full head of water and install heads after hydrostatic test is completed.

Install lawn heads at manufacturer's recommended heights.

Install shrubbery heads at heights indicated.

Locate part-circle heads to maintain a minimum distance of 4" from walls and 2" from other boundaries, unless otherwise indicated.

- G. Sleeves Under Pavement: Install 3" PVC for sleeving under all paved areas in which the irrigation system crosses.

4.00 QUALITY CONTROL

- A. General: Notify Owner in writing when testing will be conducted. Conduct test in the presence of Owner.

B. Hydrostatic Test: Test water piping and valves, before backfilling trenches, to a hydrostatic pressure of not less than 100 psi for 3 hours, unless otherwise indicated. Piping may be tested in sections to expedite the work. Remove and repair piping, connections, valves which do not pass the hydrostatic testing.

C. Operational Testing: Perform operational testing after hydrostatic testing.

Demonstrate to the Owner that the system meets coverage requirements and that automatic controls function properly.

Coverage requirements are based on operations of one circuit at a time.

End of Section