



## 02825

### **Irrigation Systems**

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### **A. Summary**

This section contains the design criteria for exterior irrigation systems.

### **B. System Design and Performance Requirements**

1. For all projects, provide an automatic, electrically-and centrally-controlled irrigation system for all new planting areas, unless otherwise directed by Yale University.
2. The system should be designed to provide complete coverage and prevent over-spray on paving and adjacent structures.
3. The contractor must employ an experienced irrigation system designer to design the irrigation lines and sprinkler heads. The designer must determine the existing water pressure and flow available at each project location.
4. Drip type watering hoses are encouraged in planting beds.
5. Pop-up type sprinkler heads are required.
6. Base sprinkler selection and spacing on a wind velocity of 5 mph.
7. Provide a soil moisture sensor for all systems.
8. Before starting construction, submit a design drawing to Yale University for review and approval.



### C. Submittals

Submit the following design and construction documents to Yale University.

#### 1. Design Documents

- a. Provide record drawings showing the location and type of all lines, heads, and valves. Use the site landscape drawing background as a base drawing to complete the record drawings. In addition, provide a reduced plan set to be left at the irrigation controller.
- b. Before starting construction, the contractor must submit a list of irrigation systems designed by their irrigation system designer over the last five years.

#### 2. Construction Documents

- a. Before starting construction, submit:
  - A list of materials
  - Manufacturer specifications and installation procedures
  - Flow and test reports
- b. Provide the following operation and maintenance documentation:
  - A watering log (left at the irrigation controller)
  - A list of the closed suppliers for all heads, valves, and the irrigation system controller
  - Two copies of an operational manual (submit upon project completion)

### D. Product Standards

Provide Yale University with a product guarantee for the valves, heads, and drip lines used on the project.



### E. Materials

1. All exterior irrigation pipe and fittings must be Class 200-DR 21 polyvinyl chloride (PVC) water pipe, extruded from virgin parent material, that conform to ASTM 2241 standards.
2. All sprinkler heads must be:
  - Industrial-grade
  - Full or adjustable, part-circle rotary pop-up, with a single or double nozzle
  - Driven by a hydraulic turbine-type motor or oscillating impact-type drive
  - Hydraulic valve-in-head model, normally closed
3. Automatic remote control valves must be electric solenoid-type, with globe screwed patterns, using 24 VAC, 60 Hz power with a running current of 2 W. The valve solenoids must be completely epoxy-encapsulated for positive waterproofing and must include a stainless steel shunt band. The valves must open and close slowly (in not less than 5 seconds) by means of a potential fluid resistor to avoid damage or surge pressures. All wiring in PVC conduits.
4. The automatic controller must be capable of 14-day programmability, with infinite timing from 0 to 60 seconds on each station, and no time lag between stations. The controller must be UL-listed, with a plug-in transformer using 115 VAC to 24 V circuit breaker protection. The cabinet must be lockable and waterproof.

### F. Special Requirements

1. Booster pumps may be required when the existing water pressure and flow will not operate the irrigation system properly.
2. All irrigation systems must have a water meter from the City of New Haven installed on the water service line inside the building. The purchase of the meter must be part of the contractor's bid.
3. Provide an air connection (for blowing out the system) and a backflow preventer on all irrigation systems.

### G. Preparation

1. If existing water to a building will be shut down to provide water for the irrigation system, the contractor, in conjunction with Yale University, must prepare a shutdown procedure document before starting construction that outlines scheduling and notification requirements.



### H. Installation Guidelines

1. Where possible, provide a uniform pipe bedding of suitable on-site material. If suitable material is not available, backfill the trench with sand. Using a material similar to the bedding, backfill the entire trench width evenly in 6" lifts to 6" above the top of the pipe. Compact the lifts to at least a 95% Standard Proctor density, meeting ASTM D1556 standards at optimum moisture (or as recommended by the soils engineer). Backfill the remaining trench in lifts not to exceed 12" up to the sub-grade height for the surface condition encountered. Compact the lifts to a 95% Standard Proctor density, meeting ASTM D1556 standards at optimum moisture (or as recommended by the soils engineer). Backfilling and compacting above the sub-grade must be determined by the soils engineer or by the recommended paving design for the project.
2. Bury pressure irrigation lines at a minimum depth of 18". Bury non-pressure lines at a minimum depth of 12".

### I. Quality Control

Work on exterior irrigation systems must conform to the following quality control standards.

#### 1. Testing Laboratory

Yale University will retain the services of a qualified, independent testing laboratory to perform soil compaction tests, as directed, during construction.

#### 2. Testing Methodology and Extent

Conduct a coverage test when the sprinkler system is completed.

### J. Cleaning and Adjusting

With the participation of Yale University personnel, the system must be operated before acceptance by Yale University.

### K. Startup and Training

1. The contractor must operate the irrigation system with Yale University staff present to observe its operation.
2. The contractor must adjust the system over a preventative maintenance period of 90 days and guarantee the system for one year upon acceptance of the system by Yale University.