

Seaside Rehabilitation and Healthcare Center
Portland, Maine

SECTION 02810 IRRIGATION SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Controller
- B. Main Pipe
- C. Lateral Pipe
- D. Sleeves
- E. Isolation Valve
- F. Manual Drain Valve
- G. Quick Coupler Valve
- H. Pop-Up and Rotary Spray Heads
- I. Control Valves
- J. Wiring
- K. Backflow Prevention Valve
- L. Rain Shut-off Switch
- M. Grounding
- N. Trust Blocks
- O. Peastone
- P. Water Meter
- Q. Unit Price List (Refer to Irrigation Bid Proposal Section)

1.2 RELATED SECTIONS

- A. Landscaping Section 02900
- B. Contract Drawings and General and Supplementary Conditions in the Contract Documents.

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1.3 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** Provide irrigation systems as a complete unit produced by a single acceptable manufacturer, including heads, valves, controls and accessories.
- B. The sprinkler contractor shall have had considerable experience and demonstrated ability in the installation of sprinkler irrigation systems of this type. All work shall be installed by skilled persons, proficient in the trades required, in a neat, orderly and responsible manner with recognized standards of workmanship.
- C. This system utilizes reclaimed water and is to be noted on all valve boxes and areas required as per local and state health codes.

1.4 SUBMITTALS

- A. **Product Data:** Submit manufacturer's technical data and installation instructions for underground sprinkler system.
- B. **Shop Drawings:** Submit shop drawings for underground irrigation system including plan layout and details illustrating location and type of heads, valves, piping circuits, controls and accessories. Submit shop drawings for pump (if required).
- C. **Drawings:** Provide the Owner with an "as-built" drawing showing the location, type and size of all pipe; all electrical controls; connections and splices; all valve and drain locations by lettered dimensions, and show any installation changes which occurred from original design. Provide the Owner with a complete set of instructions for operating system, including winterizing and charging system.

1.5 GUARANTEE

- A. The Contractor shall provide to the Owner an irrigation system that is free from defects in material and workmanship for a period to be not less than one (1) year from the final date of acceptance.
- B. If, during such guarantee period, any such product fails due to improper installation or defective material, the Contractor shall repair the defective component free of charge. Defective material will be exchanged or credited per respective manufacturer's guarantee. The Contractor shall replace the disturbed area in kind at no cost to the Owner.
- C. Respond to failure within 24 hours. In the event the Contractor does not respond within this time frame, the Owner will back charge the Contractor the same schedule of service fees as provided to him for such repairs.
- D. In climates where winterization is required, the Contractor shall perform such winterization and Spring start-up during the guarantee period. This service shall be performed within 48 hours of being notified by the Owner.

1.6 PROJECT CONDITIONS

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- A. Assume responsibility for the preservation and protection of all trees, plants, monuments, structures, etc., from damage due to this work. In the event damage does occur, repair damage to inanimate items to the satisfaction of the Owner's Representative. Injury to living plants will be repaired by the Contractor or such persons as it may imply to accomplish this work. No additional expense to the Owner shall be charged for this work.
- B. Take whatever precautions are necessary to protect underground lines and utilities from damages and in the event of damage, repair or replace these lines to the satisfaction of the Owner of these lines. The utilities shall be repaired or replaced at the Contractor's expense.
- C. Where trenches and lines cross existing roadways, paths, curbing, etc., keep damage to a minimum and restore to original condition.
- D. If, in the opinion of the Owner or his Representative, a malfunction or other failure renders the irrigation system, or portion of the system, inoperable and this results in damage to the project during the construction period, the cost of the corrective work necessary to an acceptable condition shall be borne by the Contractor.
- E. The Contractor shall at all times keep the premises on which the work is being done, and adjoining premises, clean of rubbish caused by his work. Upon completion of the job, the Contractor shall clean up all debris caused by his work and leave the job in a neat and clean condition. All debris removed from the job shall be taken away by the Contractor.
- F. The Contractor shall confine his apparatus, storage of materials and construction operations to such limits as may be directed by the Owner's Representative, and shall not unreasonably encumber the premises with his materials. The Contractor is responsible for the security of material and equipment and is responsible for all theft, vandalism, arson or other loss of any improvement until final acceptance of the project by the Owner.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Hunter Irrigation Products, or Owner approved equal.
 - 1. All components of the irrigation system shall be designed to handle 1.5 times the working pressure of the system.

2.2 MATERIALS

- A. Controller: Shall be a (Hunter ICC Metal with Pedestal, or approved equal) microprocessor based/micro-electronic solid-state type, capable of fully automatic or manual operation of the system. It shall be compatible with central control and housed in

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a weatherproof, lockable, seamless steel cabinet suitable for wall mounting or for free-standing pedestal mounting.

The controller shall operate on a minimum of 117 VAC power input and be capable of operating up to two 7 VA 24 VAC electric remote control valves per station. The controller shall have a reset circuit breaker to protect it from field wire short circuits entering the controller.

The controller shall have the number of stations shown on plans to accommodate as the current design requires plus additional stations for potential expansion. Each station shall have the capability of being programmed to operate for 0 to 99 minutes in one minute increments, or 0 to 9.9 hours in 0.1 hour increments. The controller shall have 4 independent programs with 6 automatic starts available per day for each. Each station on the controller shall be assignable to either or both programs.

The controller shall have variable day cycle programming for flexibility in programming operating days. The repeating day cycle can be set to any number of days from 1 to 14. During operation, the controller shall provide a monitoring readout indicating station in operation and time remaining. The controller shall have a 12-hour AM/PM clock. The controller shall have a water budget feature that shall allow the station run times for the entire controller to be adjusted down to 10% or up to 200% of the originally programmed time. The water budgeting adjustments shall be in 10% increments.

The controller shall be capable of being operated manually at any time. A manual "single station" operation for programmed time or new time setting shall be possible without affecting the original program.

The controller shall have a factory preset back-up program for standby operation in the event of a program loss, and a recharging battery back-up circuit to maintain program during a power loss.

The controller shall have a feature that allows for the elimination of the default (back-up) program where specified.

- B. Main Pipe: Rigid Plastic Pipe: Polyvinyl Chloride (PVC) conforming to Product Standard PS222-70 or ASTM D2241-74 for PVC 1120 (Type I), SDR-21 (Class 200) and National Sanitation Foundation (NSF) approved. Fittings: Socket-type, PVC Schedule 40, conforming to ASTM D2466-74 and D1784. Solvent used for joining pipe fittings: ASTM D2564-73A. Do not thread rigid plastic pipe unless otherwise noted.
1. Rigid and flexible plastic pipe: National Sanitation Foundation approved.
- C. Lateral Pipe: Polyvinyl chloride (PVC) conforming to Product Standard PS-22-70 or ASTM D2241-74 for PVC 1120 (type I) SDR-21 (Class 200), and National Sanitation Foundation approved. Fittings: Socket-type PVC Schedule 40, conforming to ASTM D2466-74 and D-1784. Solvent used for joining pipe and fittings: ASTM D2564- 73A. Place 14 gauge tracing wire with all pipes that do not have electric wire in the same trench.

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1. Nipples for heads and Swing-Joint Nipples: PVC Schedule 80 threaded pipe conforming to Product Standard PS21-70 or ASTM 1758-68. Fittings: threaded PVC Schedule 40 conforming to ASTM D2466-39 and D1784. Use Teflon tape on all threaded joints.
 2. Flexible Plastic Pipe: Conform to the United States Department of Commerce Commercial Standard CS-256-63, FE 2306-80# polyethylene pipe. Fittings: Plastic insert fittings designed for use with flexible polyethylene pipe, secured with stainless steel worn gear clamps.
 3. Copper Pipe: Type K Copper, ASTM B-88. Fittings for copper pipe: wrought copper or cast bronze, 150 psi. Joints: solder joints with 95-5 tin antimony.
 4. Corporation Stops and Curb Stops/Boxes: As manufactured by the Ford Meter Box Company, Inc. or approved equal.
- D. Sleeves: All sleeves will be constructed of Schedule 40 PVC conforming to ASTM D2466-74 and D-1784. Provide sleeves with tight fitting end caps with opening to accommodate system piping and wire.
- E. Isolation Valve: PVC Schedule 80, Plastic Slip X Slip, threaded valve or approved equal.
- F. Manual Drain Valve: Brass and stainless steel construction utilizing a star or wheel handle mounted on the top of the unit. Operation of the valve shall be from the ground surface either by hand or key. Installation shall be such that the pressurized pipe drains shall be accessible via an adjustable plastic service box with lid. A set of three (3) keys shall be provided for the Owner's use in operating the valves.
- G. Quick Coupler Valve: Type shown on the Irrigation Plan or approved equal. A set of three (3) keys shall be provided for the Owner's use, of either single or double lug type.
- H. Pop-Up and Rotary Spray Heads: Type shown on the Irrigation Plan or approved equal.
- I. Control Valves: Valves with cross-handle type flow control, of brass construction, normally closed, 24-volt AC electrically operated with slow - opening/slow - closing device.
1. Electric Remote Control Valves: Heavy duty brass or plastic and stainless steel construction with pressure regulating module and nylon scrubber to break down grit, preventing build-up and clogging. Use Hunter valves, ICV-301G-DC-AS-R, or approved equal, 3" valve to operate within 60 gpm.
 2. Valve Boxes: Deep molded 14" x 19" x 12" or 10" round valve box with locking matching cover marked "irrigation control valve". All valve boxes to be labeled "recycled water" and color "purple" as per local and state codes.
- J. Wiring:
1. 24 volt control wires from the controllers to the remote valves shall be #14 PE or UF-UL approved 600 volt direct burial wire. All 24 volt common wires shall be #12 PE or UF-UL approved 600 volt direct burial wire.

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2. All splices shall be done with 3M "Scotchlok" epoxy splice kits.
 3. Wire shall be furnished in 2500' reels and all splices shall be made only at the valve location and at the controller location.
 4. Where wire is to be buried under sidewalks or pavement it shall be placed in conduit (PVC Schedule 40) with a 2 foot minimum cover.
- K. Backflow Prevention Valve (By Building Contractor): Watts 909M1QT-S Double Check Valve or approved equal with purple reclaimed water color as per codes.
- L. Rain Shutoff Switch: Rain Monitor, Rain Check, as manufactured by Hunter or approved equal.
- M. Grounding:
1. An 8' copper clad rod, 5/8" in diameter driven at the controller location and #8 bare copper wire set 250' into an irrigated area. These devices must have a resistance of 5 Ohms or less to the ground into which it is driven.
 2. The local irrigation materials representative or manufacturer's service representative must test, inspect and approve all grounding prior to operating the system.
- N. Thrust Blocks: Concrete with a minimum compressive strength of 2500 psi in 28 days. The size of thrust block shall be based on 150 percent of the working pressure of the system.
- O. Peastone: Commercially available peastone to the satisfaction of the Owner's Representative.
- P. Water Meter (By Building Contractor): Shall be from an acceptable manufacturer and 2" size or as designated by the supplier of water.
- Q. Unit Price List (Refer to Irrigation Bid Proposal Section)

PART 3 EXECUTION

3.1 SYSTEM

- A. Point of Connection (POC): As shown on drawings. Contractor to verify with Owner.
- B. Design Procedure: The system requires the minimum pressure, as shown on the plans. The Contractor shall be responsible for determining available pressure and flow at this point in order to determine the necessity of a pump. These calculations and any pump selection shall be submitted to the Owner's Representative for review prior to system installation.

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- C. Location of Heads: Design location is approximate. Make minor adjustments as necessary to avoid plantings and other obstructions.

3.2 LAYOUT

- A. Perform necessary staking for construction.

3.3 INSTALLATION

A. Excavation:

1. Pipe and Wiring Depth: Pressure Mainline - 24 inches from top of pipe.
2. Lateral Lines: 12 to 18 inches from top of pipe.
3. Control Wiring - 18 inches from finish to grade. If located under pavement, minimum cover shall be 24 inches for all piping and wiring. Assume responsibility for protecting all lines and wire until pavement is complete

B. Backfill: Shall be placed and compacted as specified.

1. After the system is operating, and required tests and inspections have been completed, backfill excavations and trenches with clean soil.
2. Backfill for all trenches, regardless of type of pipe covered, shall be compacted to minimum ninety (90) percent density.

C. Quick Couplers: Install on swing joint risers of Schedule 80 PVC. Angle nipples no more than 45 degrees and no less than 10 degrees. Top shall be flush with finish grade.

D. Sprinklers:

1. Sprinklers with an inlet size of 3/4 inch and 1/2 inch shall be installed using 3/8 inch swing pipe as shown in details or as approved by Owner's Representative.
2. Before sprinkler heads are set, flush the lines thoroughly in order to make sure there is no foreign matter in the lines.
2. All sprinkler equipment shall be connected to the lateral or main line piping by using the type of connection shown in the details.
3. After turf is established and the ground has settled, the Contractor shall, within 10 days of notification, lower heads to finish grade. Where heads are installed along walks, roads, etc., they shall be permanently positioned. Elevation of sprinkler heads and quick coupler valves is critical and the Contractor shall exercise care and set them exactly at or 1/2 inch below grade.

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- E. Valves: Shall be connected directly to the mainline in a plumb position with sufficient clearance for service and operation. The valves shall be adjusted for proper operation for the specified performance.
- F. Manual Drain Valves: Place at locations shown on the plan and as shown in details.
- G. Control Valves: Each remote control valve shall be installed in a locking plastic valve box. The valve box shall be positioned over the valve so that all parts of the valve can be reached for service, and it shall be set at grade so as to be easily located. Valve boxes shall be installed above a pea gravel pit provided for drainage and shall be reasonably free from dirt and debris.
- H. Controller: Install automatic irrigation controller where shown on the drawings or as directed in accordance with the manufacturer's/owner's recommendations. All wiring inside building shall be installed in rigid conduit, according to all applicable electrical codes. Contractor shall verify with owner the location of controller.
- I. Wiring: Control wire shall be specifically designed for direct burial use and sizes shall be in accordance with the minimums recommended by the controller manufacturer. A minimum loop of 24" shall be left at each valve, at each splice, at each change in direction, at every 500 feet of straight run, and at each controller for contraction and/or servicing. Wire shall be placed consistently along one side of the pipe in the trench. Splices and connections shall be watertight and leakproof. Wire shall be within a protective sleeve for pavement crossings or where other conditions make it necessary. Multiple wires in the trenches shall be banded together at 20 foot intervals for protection.
- J. Pipe and Fittings:
1. Suitable tools for the safe and convenient handling of the pipe shall be used. The interior of all pipe, fittings, sprinklers and valves shall be cleaned before being assembled into piping system and shall be kept clean up to the time of completion and acceptance of the project. All open ends of pipe and fittings must be suitably blocked or covered during lunch hour and at night to prevent entry of ground vermin, leaves, etc.
 2. Appropriate pipe fittings must be inserted in the line where the angle exceeds 15 degrees off center. All male threads on screwed pipe and fittings shall be coated with an approved pipe thread compound before being made up. Pipe compound shall not be applied to female threads on fittings or valves.
 3. Each pipe shall be supported uniformly throughout its length and shall not rest on any boulder, rock or other unyielding structure unless otherwise specifically designated on the drawings.
 4. Unless otherwise specified or indicated on the drawings, all sharp changes shall be made with one 90 degree elbow.
 5. All mainline elbows, tees and fittings shall be suitably thrust blocked with concrete or established with EBAA joint restraints to prevent the breaking or blow off of the joint.

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- K. Thrust Blocks: Thrust blocks shall be installed at all tees, bends or end of all mainline pipes. Blocks placed between solid ground and the fittings to be anchored. The area of backing shall be sufficient to permit no movement whatever of the pipe when placed under test pressures for final acceptance.
- L. Surge Protection:
1. Electrical systems - Surge protection shall be installed on the 115 VAC power wires and on the communication wires. Surge protection shall also be provided on all 24 VAC secondary circuits.
 2. Grounding shall be checked by the local manufacturer's representative prior to operating any part of the system.
- M. Electrical Service:
1. Electrical service of proper voltage and phase and necessary metering will be furnished to a central panel for the automatic central controller and field controllers by the Owner. Wiring to connect the controllers including but not limited to installing a panel board, installing the necessary primary disconnect, fuse boxes and controls, switches and attaching wire to same shall be the responsibility of the Contractor.
 2. All electrical equipment and wiring shall comply with local and state codes and shall be installed by those skilled and licensed in the trade. Unless governing codes specify otherwise, 24 VAC control wire may be installed by the Contractor.
 3. Wiring Methods:
 - a) Rigid steel (RGS) with cast fittings:
 - aa) Damp Locations
 - ab) Exterior locations
 - ac) Below grade
 - ad) Under concrete slab
 - ae) In concrete slab
 - af) Hazardous locations
 - b) EMT with sheet metal boxes and fittings except as noted.
 - ba) All general interior work

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- bb) Dry locations
- bc) In stud wall
- bd) Above drop ceilings

- N. Irrigation Water Meter: Installation to conform to the latest specifications of the supplier of water. Contractor shall verify with owner location for the meter.
- O. Backflow Preventer: Contractor to install as per local and state codes. Contractor shall verify location for backflow preventer.

3.4 TESTING

- A. System: Test system for pressure and leakage at 1.5 the working pressure in accordance with AWWA C 600. Allow concrete thrust blocks to properly cure prior to testing.
- B. Circuits: All electrical circuits shall be tested in accordance with the control system manufacturer's recommendations prior to automatic sequencing.

3.5 CLEAN-UP

- A. General Site: Perform clean-up operations continuously throughout the duration of the work. Contractor to deposit excavated materials at least 2 feet away from any trench side and promptly haul away excess material, leaving the backfilled trench in a neat and workmanlike appearance to the satisfaction of the Owner's Representative.

3.6 BALANCING AND ADJUSTMENT

- A. System Efficiency: The Contractor shall assume responsibility for the balancing and adjustments of the various components of the system so the overall operation of the system is the most efficient. Including but not limited to synchronization of the controllers, adjustments to valves, part circle sprinkler heads and individual station adjustments on the controller.

Outside Resources: The Contractor has the right to call in the Owner or the manufacturer's representative to aid in balancing and adjusting the system.

- B. Coordination: The site landscape contractor and the site irrigation contractor shall coordinate the water demands and timings for each irrigation zone.

3.7 OWNER'S RESPONSIBILITY FOR MAINTENANCE

- A. It will be the responsibility of the Owner to maintain the system in working order during the guarantee period, performing necessary minor repairs, keeping the grass from obstructing the sprinkler heads, protecting against vandalism, and preventing damage during landscape maintenance operations.

3.8 SERVICE BY CONTRACTOR

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- A. Service the system at the Owner's request during guarantee period. Any work performed which is not covered by the guarantee, will be paid for by the Owner. If requested by the Owner, furnish the Owner with a schedule of service fees.

END OF SECTION