

DIVISION 2

SECTION 02810 – IRRIGATION

PART 1 – GENERAL

1.01 Work Included

Furnish labor, materials, supplies, equipment, tools, transportation, and perform operations in connection with and reasonably incidental to complete installation of the irrigation system, and guarantee/warranty as shown on the drawings and as specified herein.

1.02 Related Work

Refer to System Plans and Installation Detail drawings.

1.03 Submittals

- A. Materials List: Submit materials list for all components to be used in the irrigation system.
- B. Weekly redline drawings of changes made in irrigation system installation from those on construction plans and drawings.

1.04 Handling and Storage

- A. Protect materials used for construction from damage, deterioration, sun exposure, or loss while in storage and during construction.

1.05 Reviews

- A. Reviews of the irrigation installation will be ongoing during the contract. Reviews shall be made of irrigation mainline, lateral, head, valve and other equipment locations prior to installation.
- B. Review of head coverage as zones are completed will be ongoing. Any changes of head locations or nozzles shall be completed immediately.
- C. Other reviews shall take place as outlined under Execution.
- D. Submit redline installation drawings with changes made in installation from those on plans every week to City representative and/or General Contractor.

1.06 Environmental Conditions

- A. Irrigation installation shall be only when weather and soil conditions permit and in accordance with locally accepted practices, and as reviewed by the owner's representative.

1.07 Guarantee/Warranty and Replacement

The purpose of this guarantee/warranty is to insure that the Owner receives materials of prime quality, installed and maintained in a thorough and careful manner.

- A. Guarantee/warranty materials and workmanship against defects due to any cause for a period of two years from the date of substantial completion of all work.
- B. This guarantee/warranty will not be enforced should defects be due to improper maintenance procedures carried out by Owner involving watering, mower damage, improper operation of system, fire, flood or damage, or other similar circumstances beyond the control of the Contractor.

- C. Replace components when they are no longer in satisfactory condition as determined by the Owner's representative for the duration of the guarantee/warranty period. Make replacements within seven days of notification from the Owner's representative.
- D. Replacements shall be of the same kind and size as originally specified and shall be installed as described in the contract documents. Repairs and replacements shall be made at no expense to the Owner.
- E. Guarantee/warranty shall apply to originally specified and installed materials, and any replacements made during the guarantee/warranty period.

PART 2 – MATERIALS

2.01 Quality

- A. All materials used for construction shall be new and without flaws or defects of any type, and shall be the best of their class and kind.

2.02 Mainline

- A. Mainline shall be PVC Class 200, NSF approved pipe. 3" and larger pipe shall be ringtite pipe. 2 ½" and smaller pipe shall be glued joint.

2.03 Laterals

- A. 2" or larger: Class 200 PVC, NSF approved.
- B. 1 ½" or 1": Class 200 PVC, NSF approved.
- C. No laterals smaller than 1" are permitted. Trickle tubing shall be weather and UV resistant material.
- D. ¾" & ½" Polyethylene Drip Pipe: NSF approved, SDR pressure rated pipe, only as approved for drip applications.

2.04 Pipe Fittings

- A. Funny Pipe (pop-up spray turf heads only): to be compatible to the elbows needed for head installation, maximum length is 3 feet.
- B. Lateral fittings: Schedule 40, Type 1, PVC solvent weld with ASTM Standards D2466 and D1784.
- C. Wrought copper or cast bronze fittings, soldered or threaded per installation details for all copper pipes.
- D. Mainline fittings: Ductile Iron for 3" and larger, PVC Schedule 80 for 2 1/2" and smaller.

2.05 Sleeves

- A. Ductile Iron Pipe or CL 200 PVC under all paved surfaces.
- B. Sizes to be a minimum of two sizes larger than the pipe being sleeved. Minimum 2" diameter or larger for irrigation lines.
- C. Wires to be in separate sleeve from pipe, 2" min. size pipe for control wire sleeves.
- D. Sleeves shall have marker tape on upper side and both ends for future locates. Install per drawing details.

2.06 Valves

- A. Remote Control Zone Valves: Electrically operated, appropriate for the water supply, with manual bleed device and flow control stem. Shall have a slow-opening and slow-closing action for

protection against surge pressure. Brand and model to be Rainbird PESB or 300BPE valves with Dial Pressure regulator size as shown on plans.

- B. Isolation Gate Valves: Kennedy 1571X or Matco #100M, able to withstand a continuous operating pressure of 150 psi. Clear waterway equal to full diameter of pipe. Resilient wedge gate valve conforming to AWWA C-509 standards Shall be opened by turning 2" square nut to the left (wheel opening is unacceptable).
- C. Manual Drain Valve: 3/4" ball valve with tee handle. Watts, #B-6000, or approved equal.
- D. Quick Coupling Valves: 1" brass, Rainbird #5RC units with rubber cover. Keys Rainbird 55K 1" brass key.

2.07 Valve Boxes

- A. House valves in valve box with matching locking cover (AMETEK brand only). Only one valve per box. Install in box sizes to allow work on components.
- B. Install 3/4" drip tubing ends with end closure in 10" round valve box with cover at end of each run.

2.08 Control System

- A. Use Irritrol MC-24 Plus-B controller. Mount terminal strips in the pedestal to change from 14 gauge field wire to 18 gauge wire for run into controller.
- B. Surge Protection: 8 foot copper grounding rod, #4 solid copper wire, grounding buss receptacle, ground terminal strip and/or as recommended by manufacturer.
- C. Install Hunter Wireless Rain Klik rain sensor (one per controller) at location near the controller but not where it will receive precipitation from the irrigation system. Owner must approve location.
- D. Provide Eicon remote receiver and field transmitter with frequency as specified by Owner.

2.09 Electric Control Wiring

- A. #14 feed wire and #14 common wire solid copper direct burial UF or PE cable, UL approved, or larger, per system design and manufacturer's recommendations.
- B. Five wires with consistent color scheme throughout:
 - 1. Red = live (one per valve)
 - 2. White = ground
 - 3. Black, blue and green = extra from controllers to furthest extent of mainlines.
- C. Wire connectors and waterproofing sealant to be used to join control wires to remote control valves.
- D. Run wire for remaining zones on controller to the end of the mainline that the controller supports.

2.10 Sprinkler Heads

- A. All heads shall be of the same manufacturer as specified on the plans, and marked with the manufacturer's name and model in such a way that materials can be identified without removal from the system. Owner will specify brand and models to match other equipment in use in public system in the vicinity.
- B. Gear driven Rotor heads: Rainbird.
- C. Pop-Up Spray heads: Rainbird.
- D. Xeri-Pop Heads: Rainbird.

2.11 Backflow Device

- A. Backflow device shall be Febco 2 ½" Reduced Pressure Principle device installed in a Guard Shack enclosure (per manufacturer's recommendations).

PART 3 – EXECUTION

3.01 Pipe trenching

- A. Install pipe in open cut trenches of sufficient width to facilitate thorough tamping/puddling of suitable backfill material under and over pipe.
- B. Trench depths:
 - 1. Mainline - Minimum of 24" deep from top of pipe to finished grade for 6" and under mainline. Minimum of 32" deep from top of pipe to finished grade for 8" and larger.
 - 2. Lateral - Minimum of 16" deep from top of pipe to finished grade. ¾" drip pipe 8" deep from top of pipe except in shrub beds.
 - 3. Sleeves - Install sleeves at a depth, which permits the encased pipe or wiring to remain at the specified burial depth.

3.02 Sleeves

- A. Boring shall not be permitted unless obstruction in pipe path cannot be moved, or pipe cannot be re-routed.
- B. Mainline installed in existing sleeves at greater depth than adjacent pipe, shall have a manual drain valve at each end if the sleeve is longer than 20 feet, or at one end if the sleeve is less than 20 feet.
- C. Install sleeve so ends extend past edge of curb, gutter, sidewalk, bike path or other obstruction, a minimum of 2 feet.
- D. Mark sleeves with an "x" chiseled in walk (or other surface) directly over sleeve location.
- E. Sleeves installed for future use shall be capped at both ends.
- F. Separate sleeve (2" min. size) shall be used for all wiring.
- G. Sleeves shall not have joints. If joints are necessary, only solvent welded joints are allowed.
- H. Compaction of backfill for sleeves shall be 95% of Standard Proctor Density, ASTM D698-78. Use of water puddling around sleeves for compaction will not be allowed.

3.03 Pipe Installation

- A. Use Teflon tape on all threaded joints; only schedule 80 pipe may be threaded.
- B. Reducing pipe size shall be with reducing insert couplings: at least 6" beyond last tee of the larger pipe.
- C. Snake PVC lateral pipe from side to side within trench.
- D. Backfill shall be free from rubbish, stones larger than 2" diameter, frozen material and vegetative matter. Do not backfill in freezing weather. If backfill material is rocky, the pipe shall be bedded in 2" of fill sand covered by 6" of fill sand.
- E. After puddling or tamping, leave all trenches slightly mounded to allow for settling.
- F. Compact to proper densities depending on whether surface area over the line will be paved or landscaped.

3.04 Thrust Blocks

- A. Shall be installed where PVC mainline (2 ½" or larger) changes direction over 20 degrees.
- B. Use ThrustFORM standard fitting configurations for changes in direction in main line. See installation details for Thrust Form Blocks.
- C. ThrustFORM Systems, P.O. Box 2717, Georgetown, TX, Tel: (866) 306-3676, Fax: (512) 528-1671.
- D. Keep pipe joint clean of concrete. Do not encase.
- E. Place wiring away from thrust block to avoid contact with the concrete. Use clear plastic sheeting to isolate the concrete from other materials.

3.05 Valve Installation

- A. Install at least 12" from and align with adjacent walls or paved edges.
- B. Automatic Remote Valves: Install in such a way that valves is accessible for repairs. Make electrical connection to allow pigtail so solenoid can be removed from valve with 24" (min.) slack to allow ends to be pulled 12" above ground.
 - 1. Flush completely before installing valve. Thoroughly flush piping system under full head of water for three minutes through furthest valve, before installing heads.
 - 2. Valve assembly to include ball valve and union for ease of maintenance and repair.
 - 3. Install in valve box per details.
- C. Quick Coupler Valve: Install in 10" round locking valve box. Flush completely before installing valve. Thoroughly flush piping system under full head of water for three minutes through furthest valve.
- D. Isolation Gate Valves: Install in valve box as per detail.
- E. Valve Boxes:
 - 1. Brand all valve boxes with the following codes: "SV" and the controller valve number per as built plans for all remote control valves; "DV" for all drain valves; "GV" for all isolation valves; "DRGV" for all drip system isolation valves; "QC" for all quick coupling valves; "WA" for all winterization assemblies; "FM" for all flow meter assemblies; and "MV" for all master valve assemblies. Use a branding iron stamp with 3" high letters.
 - 2. Valve box shall NOT rest on mainline. Use brick or other non-compressible material per detail. Top of valve box to be flush with finish grade. Use add-ons to depth of valve gravel.
 - 3. Install valves in box with adequate space to access valves with ease. Valves shall not be too deep to be inaccessible for repairs. 3" depth of ¾" washed gravel to be placed in the bottom of each valve box with enough space to fully turn valve for removal (see detail).

3.06 Head Installation

- A. Set heads plumb and level with finish grade. In sloped area, heads to be tilted as necessary to provide full radius spray pattern.
- B. Flush lateral lines before installing heads. Thoroughly flush piping system under full head of water for three minutes through furthest head, before installing heads. Cap risers if delay of head installation occurs.
- C. Survey and stake head locations along the edge of the baseball infield to establish a smooth arc. The arc of the infield shall be established as a line between turf and infield mix. See Section - Turf Seed Construction.

- D. Pop-Up Heads along walks and bikeways: Install heads in 6" layer of sand under the base of the head.
- E. Nozzles: Supply appropriate nozzle for best performance.
- F. Adjustment: Adjust nozzles and radius of throw to minimize overspray onto hard surfaces.

3.07 Backflow Device

- A. Install and test backflow preventer in compliance with the Colorado Primary Drinking Water Regulations.

3.08 Controller Installation

- A. To be installed in a building or an above ground location suitable to prevent vandalism and provide protection from adverse weather conditions, and per Owner direction. All exposed wiring to and from the controller shall be encased in galvanized metal conduit. Exterior controllers to be installed per manufacturer recommendations.
- B. Install Controller(s) at eye level.
- C. Install Controller per Owner direction and in accordance with manufacturers' specifications. Install surge protection, grounding rods and other accessory components as specified.
- D. Attach wire markers to the ends of control wires inside the controller unit. Label wires with the identification number of the remote control valve activated by the wire.

3.09 Wiring

- A. Comply with local electrical codes.
- B. Power source brought to controller to a ground fault receptacle installed within controller casing.
- C. String control wires as close as possible to mainline, consistently along and slightly below one side of the pipe.
- D. Leave minimum loop of 24" at each valve and controller and at each splice, at the ends of each sleeve, at 100-foot intervals along continuous runs of wiring, and change of direction of 90 degrees or more. Band wires together at 10' intervals with pipe wrapping tape.
- E. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install three extra wires, as specified, to the furthest valve on the system and/or each branch of the system.
- F. Run 14 gauge wire to terminal strips in the controller pedestal and 18 gauge from terminal strips to controller.

3.10 Point of Connection

- A. Make connection at a point (minimum of five feet) from the outside meter pit wall. Run 3" metal pipe into the backflow device and out to the winterization assembly. Begin running PVC pipe for mainline (3") five feet after the WA.

3.11 Testing

- A. All tests to be run in the presence of Owners' representative. Schedule all tests a minimum of 48 hours in advance of tests. Repeat any failed tests until full acceptance is obtained.
- B. Pressure Test: Leave mainline uncovered at joints and fittings. Place a pressure gauge (capable of reading pressures up to 120 psi minimum) on a Quick Coupling valve attached to the system. Fill mainlines with water and bring to full pressure. If new system is an add-on to existing system, isolate the new system from the old system after filling. Record pressure readings at 15-minute

intervals for 4 hours. Pressure shall not drop more than 3 of initial reading. If pressure drops more than 3%, a thorough walk through of the mainline shall be made to discover leakage and corrected. Repeat test until maximum desired pressure drop is achieved.

- C. Operational Test (prior to seeding operations): Activate each remote control valve from the central control system in the presence of Owners' representative. Replace, adjust or move heads and nozzles as needed to obtain acceptable performance of system. Replace defective valves, wiring or other appurtenances to correct operational deficiencies.

3.12 Completion Services

When project construction is complete, request from Owners' representative a punch list inspection for Construction Acceptance:

- A. Demonstrate system to Owner personnel.
- B. Provide Owner personnel with ordering information including model numbers, size and style for all components.
- C. Provide two sets of as built drawings as listed below, showing system as installed with each sheet clearly marked "AS-BUILT DRAWINGS", the name of the project and all information clearly provided. As-builts shall reflect changes indicated on weekly red line submittals.
 - 1. One set of reproducible Mylar, no larger than 24" x 36".
 - 2. One set of all sheets reduced to 11" x 17", with each station color coded, and each sheet plastic laminated.
 - 3. Provide as-built drawing on computer disk in a *.DWG format.
- D. Clean Up: Remove all excess materials, tools, rubbish and debris from site.
- E. Contractor shall request Final Acceptance inspection from Owner.
- F. Provide Owner personnel operating keys, servicing tools, test equipment, warranties/ guarantees, maintenance manuals, and contractor's affidavit of release of liens. Keys, tools and other operating equipment need to be turned over to Owner. Submittal of all these items must be accompanied by a transmittal letter and delivered to the Owner offices (delivery at the project site is acceptable with signed receipt).

END OF SECTION