

## **DIVISION 2 - SITEWORK**

### **02810 – Irrigation**

#### **Introduction**

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#### **Part 1 - General**

- Damage to existing systems or utilities shall be repaired and made good by the contractor.
- Existing irrigation systems serving plants that remain on site and beyond shall stay fully functional and be protected from damage during construction.
- Any irrigation equipment removed shall be salvaged to the University.
- Materials and installation shall be guaranteed for 2 years.
- Landscaped areas used as Contractor's storage yard and areas impacted by construction shall be restored to pre-existing condition at completion of project.

#### **Part 2 - Products**

- The following irrigation equipment is preferred by the University:
  - Controller – Calsense 3000 controller
    1. Conventionally wired with 14ga wire
    2. Ethernet communication capable
    3. Contains the correct amount of zone modules for the project  
For Example: 8 zone controller, wall mounted with an ethernet connection, ultrasonic flow sensor and master valve
    4. Model number for 8 zone controller CS3-8-WM
    5. Ethernet card: CS3-EN
    6. Flow sensor: ultrasonic flow sensor FM 2U
    7. Master Valve: Rain Brid 200PESBR – 2" PEB Valve that is reclaimed water capable
  - Backflow Preventer - Watts, reduced pressure type (for domestic water supply connections).
  - Master Valve – All systems shall have a master valve wired to the controller after the point of connection (POC)
  - Flow Meter – All systems shall have a "Calsense" flow meter installed downstream of the master valve. Flow meter shall be wired to the controller and compatible with central control system.
  - Filter - Agrifim
  - Remote Control Valve (RCV) – Rainbird PSEB-R for potable water systems. Rainbird PSEB-R with non-potable handle for reclaim water systems.
  - Ball Valves - Brass body ball valves
  - Quick Coupling Valves (QCV) – Rainbird 44 DRC for potable water systems. Rainbird 44 DLRC for reclaimed water systems. Also furnish 2 valve keys fitted with 3/4" swivel hose ells.
  - Pressure Reducer - Senninger
  - Valve Boxes – Carson with locking lid. Sizes for 1" RCV – 12" Standard; 1 1/2" and 2" RCV – 18" Jumbo. For sizes QCV's - 9" dia. X 10" deep. On reclaim water systems all boxes shall be purple in color. On potable systems boxes shall be green in turf areas and brown/tan in planting areas.
  - Turf Rotors – Hunter I-20 Ultra, I-25 Ultra, I-40 Adjustable, and I-40-ON. Rotors shall have purple tops when

- used in reclaimed water systems.
- Rotator Sprays - Hunter Pro-Spray 04-40-CV for potable water, Pro Spray 04-40-CVR for reclaimed water. Hunter MP Rotator Nozzles, 1500, 2000, 3000.
- Pop Up Sprays – Rainbird SAM-PRS RD-04 w/check valve, 30 PSI for reclaimed water.
- Bubbler Heads – Rainbird Bubbler 1404 – 1 GPH and 1408 – 2 GPH
- Netafim drip indicator flag, part number 10-F-01
- Drip Emitters – Rainbird Xeri-Bug emitters. XB-10 and XB-20 only.
- Multi-port Emitters –Rainbird Xeri-Bird XBD-80. Multi-port emitters shall also be enclosed in an “Econo” emitter box, purple in color on reclaimed systems.
- Polyethylene Pipe - Distribution tubing size; .220". Drip system lateral size; .710"
  
- Polyethylene Fittings –AG Products compression type #710cc. Male barbed-typed fittings are not permitted.
- Polyethylene Dripline – Netafim Techline dripline tubing and Netafim fittings.
- End Caps - AG Products #710ccctc
- Polyvinylchloride (PVC) Pipe - Schedule 40 for pressurized lines, Schedule 40 for non-pressurized lines, Class 315 for non-pressurized, 1/2" dia. drip lines. Schedule 40 for all sleeves (I.D. of sleeves shall be a minimum of 1" larger than the O.D. of the pipe or wire bundle it will carry. Purple pipe shall be used on all main lines in reclaimed water systems. Purple primer is to be used on every PVC joint (including ½" pipe).
- PVC Fittings – Spears Schedule 80 on all mainlines and Schedule 40 on all lateral lines.
- Threaded PVC Nipples - Schedule 80
- Control and Common Wire - type THWN Neoprene insulated, single conductor; minimum wire sizes shall be as follows: common wire - 12 gauge, control wire - 14 gauge (12 gauge for runs over 1000').
- Splicing Materials: Spears ds-400 prefilled connectors and Spears ds-300 sealer: line splices are allowed only on runs of more than 500'.
- Teflon Tape - for threaded connections.
- Unions – Two schedule 80 unions slip x slip shall be installed on all valve assemblies including master valve.

### Part 3 - Execution

- Formal Inspections with University present:
  - Layout (prior to trenching) of all piping, heads and other equipment.
  - Mainline trenches, mainline, water source point-of-connection and control wire valves, quick couplers, controllers, other equipment and electrical power connection.
  - Lateral piping and distribution tubing, spray heads, bubbler heads and drip emitters.
  - Final inspection upon completion of all work.
  
- Formal testing with University present:
  - Main line: tested for not less than four continuous hours at a static line pressure of not less than 100 PSI, with all isolation valves open, and all pipe uncovered.
  - Flush after installation of laterals and risers and test for watertightness and proper operation of lateral piping, filters, control valves, pressure regulators, end or run flush outlets and other equipment with all pipe uncovered.
  - Flush after installation and test for watertightness and proper operation of drip emitters and distribution tubing, spray heads, bubblers heads.
  - Final operational testing to demonstrate full coverage and proper function of automatic controls.
  
- Pipe and wiring shall be carried in separate Schedule 40 PVC sleeves under sidewalks and pavement with min. burial depths as follows:
  - Pipe and wires under pavement - 24"
  - Pressurized lines - 18"
  - Non-pressurized lines - 12"
  - Non-pressurized drip laterals - 8"
  - Wire - 12"

- Sleeves shall extend 12" beyond edge of sidewalk and/or pavement.
  
- Minimum clearances between irrigation lines adjacent to or crossing other irrigation lines or those of other trades shall be as follows:
  - 1" diameter and smaller: 6" horizontally, 3" vertically
  - Larger than 1" dia.: 12" horizontally, 6" vertically

- Excavations shall allow for 2" (min) of sand bedding or earth fill when rock or unsuitable bearing material is encountered. Provide and compact backfill as follows:
  - Sand bedding or approved earth fill to a point 6" above the top of pipe (for pipe under paving provide 4" minimum sand bedding on all sides).
  - Approved fill free of lumps 1" in dia. and larger to 6" from the top of the trench.
  - Approved topsoil, as specified elsewhere to the top of the trench.
- Snake pipe in trench to allow 1 additional foot per 100" of pipe.
- Holes bored beneath pavement shall maintain an alignment tolerance of no more than 1" in 10', both vertically and horizontally.
- Pipe shall be cut only with an approved pipe cutter. Cuts with a hacksaw or knife are not permitted
- Polyethylene pipe shall be inserted into fittings 1/2" min. Minimum radius of Poly. pipe bends shall be 18".
- Backflow preventers shall be insulated with aluminum tape.
- Install filter immediately downstream of backflow preventer and upstream of control valves.
- Provide thrust blocks for pipe 1-1/2" in dia. and larger.
- All main lines shall have a continuous trace wire laid with the pipe.
- Provide QCV's at 150' (max) spacing along the mainline or around the perimeter of the project, as necessary; install QCV's in valve boxes and on swing joint assemblies perpendicular to adjacent finished grade unless otherwise noted – Schedule 80 1" TxT 90° + 1" Schedule 80 nipple.
- Install RCV's perpendicular to adjacent finished grade unless otherwise noted; provide a minimum of 30" slack in control wires at control valves to allow servicing. Allow 2" clearance between control valves and gravel sump beneath.
- Install end caps in "econo" type valve boxes.
- Install RCV assemblies (RCV, Filter, pressure reducer, QCV, sensor) in valve boxes.
- Tie control and common wires in bundles at 10' intervals.
- Wire splices shall be made in valve boxes.
- Group valve boxes, install no closer than 6" to adjacent walls and not further than 12" from walks, curbs, etc. Install all valve boxes flush with finish grade. Support valve boxes on bricks (min. four) below grade. Provide landscape fabric in the bottom of the box.
- Equipment within valve boxes shall be 4" below lid and quick couplers no more than 3".
- Install spray heads on triple swing joints 6" from adjacent walks, curbs, mowing strips, etc. and with the top of the head flush with adjacent grade.
- Install dripline with fittings from the same manufacturer.
- Install bubbler heads on double swing joints and with the distance from the bottom of the head to adjacent finished grade set at 2".

- Distribution tubing leading from the drip emitter to the surface shall not exceed 5 feet in length, shall extend 2" above adjacent finish grade and shall be secured in the soil with an anchor created by wrapping the tubing twice around a 3" length of 1/2" PVC pipe and buried 8" below grade.
- Netafirm drip indicator flag is placed at the end of line for each drip zone; i.e., if there are 20 zones there will be 20 indicator flags.
- Mark the zone number on the flag using a weatherproof black paint pen. Match field zone numbers to as-built irrigation plans.
- Affix a non-fading, weather resistant copy of Irrigation Diagram and controller name label to inside of controller cabinet door. The Irrigation Diagram shall show all valves operated by the controller, valve sizes and type of planting irrigated.
- For future expansion add a minimum of 2 extra control wires to the furthest valve manifold in each direction.

**End of Section 02810**