

## SECTION 32 84 00 - PLANTING IRRIGATION

### PART 1 - GENERAL

#### 1.1 SYSTEM PERFORMANCE REQUIREMENTS

##### A. General Information

###### 1. Design Requirements

- a. Provide systems clocks in various locations to control watering schedules. Coordinate locations with the University.
- b. Provide automatic rain shutoff devices at all new irrigation.
- c. Separately meter all sprinkler irrigation systems from the building. Provide pulse output to Building Automation System at all meters.
- d. Verify locations of underground utilities including the existing irrigation system components.
- e. Puddle backfilling of new trenches in landscaped areas. Provide adequate compacted backfill under pavement.
- f. Pulse Transmitters:
  - 1) Provide RTR pulse transmitters with all Badger irrigation water meters.
  - 2) Provide TRICON/E3 pulse transmitter with all Neptune irrigation water meters.
  - 3) Provide Sensus pulse transmitter with all Sensus irrigation water meters.

###### 2. Performance Requirements

- a. Any kinked or damaged pipe is not acceptable.
- b. Turn over existing irrigation controllers, sprinklers and valves to the University unless otherwise instructed.

##### B. Remote Solenoid Control Valves:

###### 1. Design Requirements

- a. Provide a minimum of 4 inches between bottom of box lid and highest part of valve and between bottom of box and piping. Provide a minimum of 4 to 6 bricks to support the bottom side of box. Hand tamp ground underneath valve boxes.
- b. Provide all RCVs of the same brand.
- c. On City of Aurora water system, Use Irritrol Ultra Flow plastic.
- d. Remove and replace existing galvanized fittings with PVC whenever possible.
- e. Flush each RCV zone with sprinkler heads removed.

##### C. Sprinkler Heads:

###### 1. Design Requirements

- a. Include models with 12 different size nozzles per head, gear driven and sealed in oil, strip proof gears, vandalism resistant, dirty water screen, small surface area and fully interchangeable.
- b. Located heads a minimum of 1 inch from walk and 3 inches from building or vertical surface. Place top of heads exactly at finished grade. Where heads are next to walks or curbs, place top of head flush with top of sidewalk or curb.
- c. Firmly tamp under and around heads so as to be exactly straight up and down.
- d. Provide 8 to 12 inches of swing pipe; Do not to exceed 24 inches.
- e. See Diagram in Part 4 – Illustrations.

##### D. Electrical Control System:

###### 1. Design Requirements:

- a. Coordinate control system electrical power supply with the electrical engineer.
- b. Provide lawn sprinkler cabinet in the grounds closet (if provided), the mechanical room, or other services area space. Provide electrical service (110V) at this location with conduit large enough to contain the valve control wires to the outside.

- c. When extending existing irrigations systems, the University Project Manager will determine replacement of the control wire from a satellite controller and to a solenoid valve. The University Grounds will determine the exact site locations of the electrical control system. Test for positive radio communication prior to the installation of the satellite controllers.
  - d. Provide lightning protection with a copper-clad grounding rod driven into the soil 8 feet deep. A single rod may be used for grouped control units. Connect controller to grounding rod with AWG No. 10 solid conductor copper wire. Secure wire to grounding rod with brass or bronze clamp. If rod is buried adjacent to the controller enclosure, locate the connection in a separate valve box.
  - e. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with an identification number which consists of the name and station number of the existing controller to which the control wire had been previously connected.
  - f. Bundle control wires where two or more are in the same trench at a minimum of 10 foot intervals.
  - g. Control wiring may be pulled into the soil utilizing a vibratory plow device specifically manufactured for pipe pulling. Minimum burial depth equals 12 inches.
  - h. Provide a 24 inch excess length of wire in an 8 inch diameter loop at each 90 degree change of direction, at both ends of sleeves and at 100 foot intervals along continuous runs of wiring. Do not tie wiring loop. Coil 24 inch length of wire within each remote control valve box.
  - i. Install only one control valve on each control wire.
  - j. Pre-number or label control wires with indelible non-fading ink, made of permanent, non-fading material.
  - k. Provide wire from satellite controller unit to each remote control valve for new construction using AWG No. 14 solid copper, Type UF cable, UL approved for direct underground burial or multi-strand type UF irrigation cable no smaller than 18 gauge.
  - l. All wiring sizing must conform to the manufacturers recommendations on voltage losses of solenoid valves being used and must not exceed these specifications.
  - m. Provides wires with the same color over its entire length. Provide white for common ground wire.
  - n. Crimp solder splices and seal with waterproof sealant. Provide plastic wire connectors consisting of two pieces: one piece which snap locks into the other. Provide a copper crimp sleeve with a connector. All wiring splices that are direct buried must be done with "3M" D by wire splice kits.
  - 2. Performance Requirements
    - a. Electrical Conduit: PVC Schedule 40 conforming to ASTM Standard D1785.
    - b. Fittings: Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784.
- E. Sleeving:
- 1. Design Requirements
    - a. Install separate sleeves beneath paved areas to route each run of irrigation wiring bundle.
    - b. All sleeves under pavement must be bedded in sand with a minimum of 6 inches above and below the sleeve.
    - c. Install only one irrigation pipe per sleeve.
    - d. Install sleeving at a depth which permits the encased wiring to remain at the specified burial depth.
    - e. Extend sleeve ends six inches beyond the edge of the paved surface. During construction, cover sleeve ends and mark with stakes. Mark concrete with a chiseled "X" at sleeve end locations.
    - f. Bore through obstructions which cannot be removed rather than alter the route. Employ equipment and methods designed for horizontal boring.
    - g. Cut and patch roadways which must be crossed. Replacement asphalt and subgrade shall match existing conditions. All sleeves under pavement shall be embedded in sand with a 6 inch cover under and above sleeve.

- h. Provide PVC Class 200 pipe with solvent welded joints for sleeving material beneath pedestrian pavements, drives, and streets.
- i. Provide sleeving diameter a minimum of twice that of the pipe and wiring bundle, whichever is greater. Provide a minimum diameter of 2 inches for sleeves for wiring.

F. Piping:

1. Design Requirements

- a. Locate all pressurized pipe between 14 inches and 18 inches deep.
- b. Locate all non-pressurized poly pipe shall between 8 to 12 inches deep.
- c. Locate pressurized and non-pressurized pipe underneath roads at a minimum of 18 inches deep.
- d. Map and document any changes to new or existing piping indicating size, type and location of pipe.
- e. Provide concrete thrust blocks on all pressurized pipe 2 inches and larger. Base selection on 60 psig static system pressure.
- f. Provide lateral branch lines of poly pipe rated at 100 psig NSF for 3/4 and 1 inch sizes. Provide poly pipe at larger branch lines and main trunk lines. All poly pipe of 1-1/4 inches and larger must be 80 psig NSF grade.
- g. All poly pipe fittings must be plastic barbed, designed specifically for underground irrigation practices. Provide schedule 40 PVC fittings, with solvent weld on all sizes 3 inches and smaller and tight fittings on all sizes 3 inches and larger. Provide appropriate thrust blocking at ring tight.
- h. Double clamp all 1-1/4 inch and larger insert fittings; smaller poly pipe may be single clamped with screw or pinch clamps.

1.2 SUBMITTALS

- A. Record Drawings: Record all alterations with accurate reference dimensions, measured from at least two permanent reference points, for each controller or control unit, each sleeve end, each stub-out for future wiring connections, and other irrigation components enclosed within a valve box.

1.3 WARRANTY

- A. Provide a one year warranty including blow out and turn on. The warranty shall include, but not be limited to, fill and repair depressions and restoration of landscape or structural damaged by the settlement of irrigation trenches or excavations. Repairs shall be made within seven days of notification from the University Project Manager.
- B. Provide a 2 year minimum warranty for all sprinkler heads.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide the following products or comparable products:
  - 1. Electric Valves:
    - a. Preferred: Irritrol Ultraflow 700 Series - .75 - 1 - 1.50 - 2 - in.
    - b. Rain Bird 100-DV/100-DV-F - .75 - 1 - 1.50 - 2 - in.
  - 2. Brass Gate Valves (all with cross handles), Size .50 to 3 inches:
    - a. Matco 515T (Treaded)
    - b. Matco 515C (Solder)
  - 3. Forged Brass Ball Valves, Standard/Full or Full Port Drainable:
    - a. Matco 752T - 752C
    - b. Matco 754T - 754C

- c. Matco 8701 - 8711
- 4. Automatic Drain Valves:
  - a. King Drains
  - b. Imperial
  - c. Rain Bird
- 5. Valves Cover Boxes:
  - a. Carson Boxes: any model size as needed
  - b. Ametex Boxes: any model size as needed
- 6. Controllers:
  - a. Rain Bird
- 7. Pop-up Spray Sprinkler:
  - a. Rain Bird 1800 Series Size 1802 to 1812 Regular, S.A.M. or Pressure Regulating
  - b. Hunter S-type 4 inch
  - c. Spray Nozzles, as needed (plastic/brass)
- 8. Rotor Pop-up Sprinkler Mini-Paw, Maxi-Paw:
  - a. Hunter I-20
  - b. Hunter I-25
- 9. Flex Swing Pipe:
  - a. Hardie (Super Blue)
  - b. Rain Bird (20/SP-100)
- 10. Clamps for Poly Pipe:
  - a. Crimp Clamp (size .50 to 1 inch)
  - b. Murray Worm Gear Clamp (size .50 to 3 inch) 100% stainless steel
- 11. Wire Connectors:
  - a. 3M DBY/DBR Direct Bury Connector
  - b. Rain Bird ST-03 Gray/PT-S5 Snap-Tite
  - c. Fixed Spring Wire Connectors
- 12. Quick Coupling Valves:
  - a. 3 NP/ 33 DNP/ 5NP/ 44NP (non-portable)
  - b. 3RD/ 33DRC/ 5RC/ 44RC Quick Coupling Valves
- 13. Drip Irrigation:
  - a. Rain Bird Underground Pressure Regulator HMB-20 and 25
  - b. Rain Bird Y-filters RBY-075-RBY-100
  - c. Hardies Y-filters
- 14. Drip Tubing:
  - a. Blue Stripe
  - b. Lasco
  - c. Pepco
- 15. Drip Emitters:
  - a. Rain Bird
  - b. Salco
  - a. Agrifim
- 16. Irrigation Water Meters:
  - a. Badger (Preferred)
    - 1) Recordall Disc Series up to 2"
    - 2) Turbo Series over 2"
  - b. Neptune
    - 1) T-10 up to 2"
    - 2) HP Turbine over 2"
  - c. Sensus
    - 1) SR II up to 2"
    - 2) Turbo over 2"

## 2.2 MATERIALS

### A. Copper Tube:

1. Type K
  2. Type L
  3. Type M
  4. Copper fitting (all)
- B. Ultra-Clear Flexible Pipe:
1. .50 to 2 inch (125 psi) NSF
  2. .50 to 2 inch (100 psi) NSF
  3. .50 to 2 inch (80 psi) NSF
- C. PVC Pipe:
1. 1 to 6 inch (class 200)
  2. 1 to 6 inch (class 160)
- D. Insert Fittings (PVC and Nylon):
1. PVC (Schedule 80)
  2. PVC (Schedule 40)
- E. Weld-on Plastic Pipe Cement (PVC only):
1. #725 cement P70 primer
  2. #711 cement P70 primer
  3. #727 cement P70 primer
- F. Teflon Seal Thread Tape and Paste:
1. STT - 12 x 600 1/2 x 600' Tape
  2. STT - 34 x 520 3/4 x 600' Tape
  3. STT - 1 x 520 1 x 500' Tape
- G. Wire Solder:
1. Silver and Safe Flow Silver
  2. Silver Bearing Solder: 96% tin, 4% silver
  3. 95/5; 95% tin, 5% antimony
- H. Sprinkler Control Wire "UL" Listed:
1. #18-4 to #18-12 PJ Thermo Multi-conductor Spool
  2. 14-UF Single Conductor Reels
  3. 12-UF Single Conductor Reels
- I. Tools and Spare Parts: Refer to Section 01 78 46 – Extra Stock Materials.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. System Damage:
1. Immediately repair any main line damage.
  2. Contact the University Project Manager in the event of damage to poly lines or sprinklers to repair damage promptly and in the proper sequence. Stop work and notify the University Project Manager if asbestos irrigation pipe is damaged.
    - a. Immediately upon cutting through the irrigation line, cut and tape both ends such that dirt and debris cannot get into the lines.
    - b. Backfill and tamp, or puddle up to the level of irrigation line that is to be repaired and notify the University Project Manager. After repair has been completed, backfill to grade but do not tamp directly on top of irrigation line.

B. Warning Tape:

1. Bury warning tape six inches deep on top of control wiring. Provide inert plastic film tape highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Provide tape that is three inches wide, colored yellow and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."

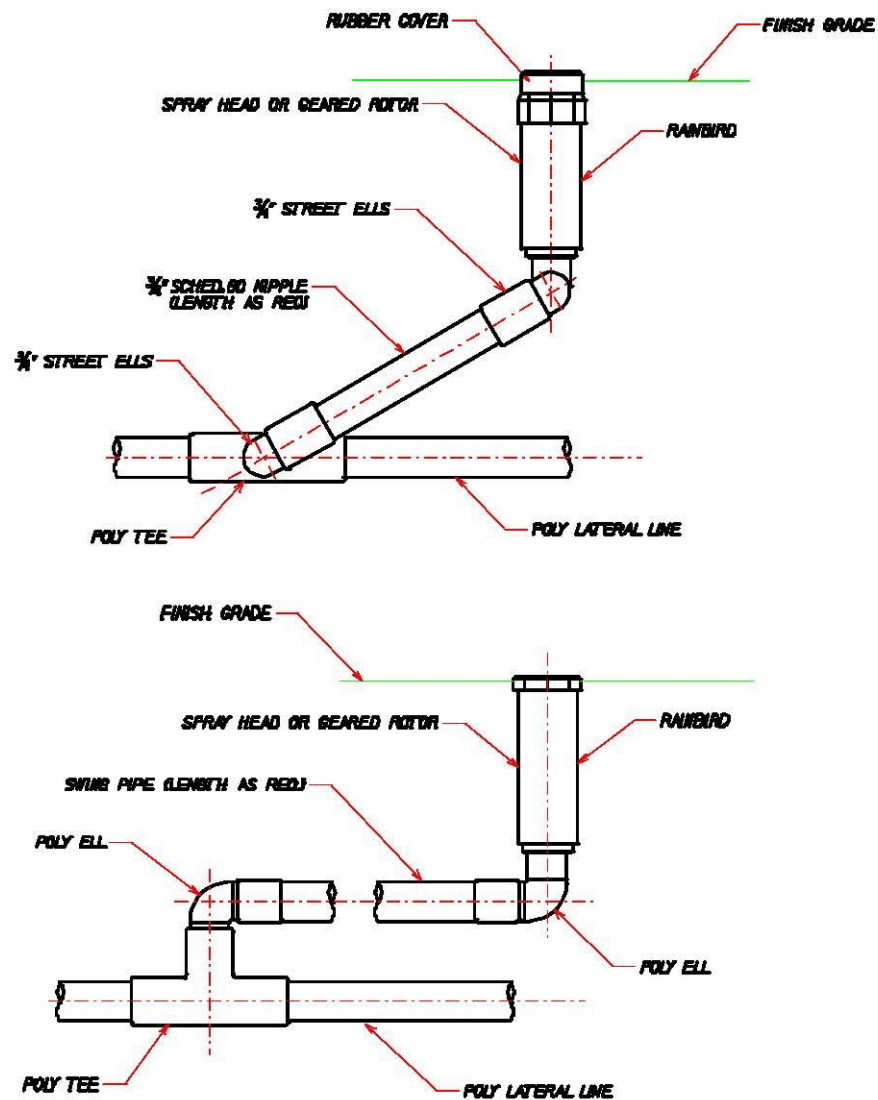
3.2 TESTING, CLEANING, AND CERTIFICATION

A. Electrical:

1. Test for leaks to ground per manufacturer's recommendations. Test wires, underground splices or appurtenances and replace defective items. Repeat tests after replacement and approval by Grounds through the University Project Manager.

PART 4 - ILLUSTRATIONS

4.1 SPRINKLER HEAD PIPING DETAILS



1 SPRINKLER HEAD PIPING DETAILS  
SCALE: NONE

END OF SECTION 32 84 00