

SECTION 32 84 00
PLANTING IRRIGATION

PART 1 - GENERAL

1.1 DESCRIPTION

The repair of an automatically-controlled irrigation system, complete, including piping, drip emitters, valves, controls, control wiring, fittings, and necessary accessories.

1.2 RELATED WORK

- A. Concrete: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Maintenance of Existing Utilities: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 11, EARTH MOVING.
- D. Division 26, ELECTRICAL.
- E. Section 32 90 00, PLANTING

1.3 QUALITY ASSURANCE

- A. Criteria:
 - 1. Manufacturer regularly and presently manufactures the item submitted as one of their principal products.
 - 2. Installer, or supplier of a service, has technical qualifications, experience, and trained personnel and facilities to perform the specified work.
- B. Products Criteria:
 - 1. Multiple Units: When two or more units of the same type or class of materials or equipment are required, these units are products of one manufacturer.
 - 2. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
 - a. All components of an assembled unit need not be products of the same manufacturer but component parts which are alike are the product of a single manufacturer.
 - b. Components are compatible with each other and with the total assembly for the intended service.
 - 3. Nameplates: Nameplate bearing manufacturer's name or identification trademark securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

C. System Requirements:

1. Layout work as closely as possible to drawings. Drawings are diagrammatic to the extent that swing joints, offsets and all fittings are not shown. Lines are to be common trenched wherever possible.
2. Locations of remote control valves is schematic. Remote control valves shall be grouped wherever possible and aligned at a set dimension back of curb along roads.
3. Irrigation lines and control wire shall run through designated utility lanes or beside roadways where possible.
4. Connect new system to existing mains.

D. Maintenance and Operating Instructions: Provide manuals as specified in Section 01 00 00, GENERAL REQUIREMENTS.

E. Follow manufacturer's instructions for installation.

F. As-Built Record Drawings: Maintain a complete set of as-built drawings which shall be corrected daily to show changes in locations of all pipe, valves, pumps and related irrigation equipment. Valves shall be shown with dimensions to reference points.

G. Controller Chart:

1. Coordinate with the resident engineer thru schedule and programming of the existing controller.

1.4 SUBMITTALS

A. Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers' Literature and Data:

1. Piping.
2. Jointing materials.
3. Valves.
4. Strainers.
5. Drip Emitters
6. Quick couplers.
7. Valve boxes.

C. Reproducible "as-built" drawings.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

- D1785-06.....Poly (Vinyl Chloride) (PVC) Plastic Pipe,
Schedule 40, 80, and 120
- D2241-05.....Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe
(SDR Series)
- D2464-06.....Threaded Poly (Vinyl Chloride) (PVC) Plastic
Pipe Fittings, Schedule 80
- D2466-06.....Poly (Vinyl Chloride) (PVC) Plastic Pipe
Fittings, Schedule 40
- D2564-04.....Solvent Cements for Poly (Vinyl Chloride) (PVC)
Plastic Piping Systems
- D2855-96(R2002).....Making Solvent Cemented Joints with Poly (Vinyl
Chloride) (PVC) Pipe and Fittings
- F477-08.....Elastomeric Seals (Gaskets) for Joining Plastic
Pipe

C. Manufacturers Standardization Society (MSS):

- SP-70-06.....Gray Iron Gate Valves, Flanged and Thread Ends

PART 2 - PRODUCTS

2.1 PIPING

- A. Irrigation Laterals: Polyvinyl Chloride, ASTM D2241, PVC 1120, SDR 21,
solvent welded.
- B. Threaded Pipe: Polyvinyl Chloride, ASTM D1785, PVC 1120, Schedule 80,
for threaded connections, risers and swing joints.
- C. Fittings:
 - 1. Irrigation Laterals: PVC, schedule 40, solvent welded socket type,
ASTM D2466.
 - 2. Threaded Pipe: PVC, schedule 80, ASTM D2464.
 - 3. Swing Joints: Threaded fittings with elastomeric seals that allow 360
degree rotation, and designed for minimum 1375 kPa (200 psig) working
pressure, may be used in lieu of standard threaded fittings.
- D. Jointing Materials:
 - 1. Irrigation Laterals: Solvent cement, ASTM D2564.

2.2 VALVES (EXCEPT REMOTE CONTROL VALVES)

- A. Underground Shut-Off Valves: Provide One of the Following:
 - 1. Gate valves 50 mm (2 inches) and larger: Iron body, bronze mounted,
double disc with parallel or inclined seats, non-rising stem turning
clockwise to close, 1025 kPa (150 psi) minimum working pressure. AWWA
C504.

2. Ball valves (for isolation valves 1-1/2" and smaller): Full-port ball valves with bronze body, PTFE seats, and 90 degree on/off handle. Ball valves to have NPT female end connections.
 3. Ends of valves shall accommodate the type of pipe installed.
- B. Pressure Reducing Valve: Cast steel body with renewable seats, with stainless steel trim. Flow passages and all parts designed to withstand high velocity applications, flange connected.

2.3 VALVE BOX

- A. Remote Control Valves: In planter areas, valve boxes shall be HDPE structural foam Type A, Class III, tan in color. Box shall be minimum 475 mm (19 inches) long by 350 mm (14 inches) deep with key-lockable hinged cast iron cover.
1. After installation, label boxes with two 80 mm (3 inch) size stencils designated controller and circuit numbers with permanent white epoxy paint. Numbers shall be placed at center of valve cover and shall face nearest main road or service road.
- B. Drip zone Lateral Flush Cap Assembly: Round reinforced plastic valve box and lid constructed from HDPE. Opening at top of access box to be 14.5 cm (5-3/4") diameter, minimum. Height of access box to be 23cm (9-1/16"), minimum. Lid to have lift-hole for opening.
- C. Emitter Access Boxes: Round plastic boxes with lid constructed of UV resistant thermoplastic material, tan in color. Top diameter to be 13 cm (5") minimum. Height of box to be 26 cm (10-1/4"), minimum.

2.4 STRAINERS

Basket or "Y" type with brass strainer basket. Body smaller than 70 mm (2-1/2 inch) shall be brass or bronze; 70 mm (2-1/2 inch) and larger shall be cast iron or semi-steel. Strainer cover to be furnished with blow-off connection and shut-off valve to accommodate 20 mm (3/4 inch) diameter hose connection.

2.5 REMOTE CONTROL VALVES:

- A. Remote control valve installed underground and operated by a 24-volt AC electric solenoid and shall hatch the existing valves in the system.
- B. Valves shall be diaphragm type designed to operate in water containing sand and debris and shall have a self cleaning type contamination filter to filter all water leading to the solenoid actuator and the diaphragm chamber. Valve shall incorporate a non-adjustable type opening and closing speed control for protection against surge pressures, or valves shall operate by means of a slow acting direct drive thermal hydraulic motor without ports, screens or diaphragms.
- C. Valves shall be completely serviceable from the top without removing valve body from the system.

2.6 HEADS

- A. Shall be of make, type and performance as the existing system components. The entire internal assembly including filter screen, to be capable of removal from the top without removing the sprinkler case from the riser.
- B. Drip Emitters: Drip emitters shall be of the pressure compensating, permanently assembled type with 1.25cm ($\frac{1}{2}$ ") FPT inlet. Emitters shall be capable of providing 1gpm at inlet pressures between 15 and 50 psi.
- C. Emitter distribution tubing shall be constructed of UV resistant vinyl material with a .22" O.D. and a .16" I.D. Tubing shall be as manufactured by the same manufacturer as the drip emitters.

2.7 QUICK COUPLERS

- A. Shall have all parts contained in a two-piece unit and shall consist of a coupler water seal valve assembly and a removable upper body to allow the spring and key track to be serviced without shut down of the main.
- B. Metal parts shall be brass.
- C. Lids shall be lockable vinyl covered and have springs for positive closure on key removal.
- D. Furnish ____ hose swivels and operating keys for each size coupler to the Resident Engineer.

2.8 LOW VOLTAGE CONTROL VALVE WIRE

Wire: Solid copper wire, Underwriters Laboratories Inc. approved for direct burial in ground. Size of wire shall be in accordance with manufacturer's recommendations, but in no case less than No. 14.

2.9 SPLICING MATERIALS: EPOXY WATERPROOF SEALING PACKET. LOW VOLTAGE CONTROLLER CABLE

Multi-strand cable, Underwriters Laboratories Inc. approved for direct burial in ground. Size and type of wire shall be in accordance with manufacturer's recommendations.

2.10 SLEEVE MATERIAL

PVC-1120-5DR 17, Schedule 40.

2.11 WARNING TAPE

Standard, 4-Mil polyethylene 76 mm (3 inch) wide tape, non-detectable type blue with black letters, and imprinted with "CAUTION BURIED IRRIGATION WATER LINE BELOW".

A. TRACER WIRES

No. 14, Green, Type TW plastic-coated copper tracer wire shall be installed with non-metallic irrigation main lines.

PART 3 - EXECUTION

3.1 PIPE LAYING - GENERAL

- A. Do not lay pipe on unstable material, in wet trench or when, in the opinion of Resident Engineer, trench or weather conditions are unsuitable for the work.
- B. Allow a minimum of 80 mm (3 inches) between parallel pipes in the same trench.
- C. Hold pipe securely in place while joint is being made.
- D. Do not work over, or walk on, pipe in trenches until covered by layers of earth well tamped in place to a depth of 300 mm (12 inches) over pipe.
- E. Full length of each section of pipe shall rest upon the pipe bed with recesses excavated to accommodate bells or joints. Do not lay pipe on wood blocking.
- F. Install irrigation lines to avoid heating trenches, electric ducts, storm and sanitary sewer lines, and existing water and gas mains, all of which have right of way.
- G. Clean interior of pipe of foreign matter before installation. Keep pipe clean during laying operations by means of plugs or other methods. When work is not in progress, securely close open ends of pipe and fittings to prevent water, earth, or other substances from entering.
- H. Minimum cover over water mains shall be 750 mm (30 inches). Control valves shall never be less than 80 mm (3 inches) below finished grade. Cover laterals to minimum depth of 600mm (24 inches).
- I. Existing sidewalks and curbs shall not be cut during trenching and installation of pipe. Install pipe under sidewalks and curbs by jacking, auger boring, or by tunneling. Repair or replace any concrete that cracks, due to settling, during the warranty period.
- J. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- K. Warning tape shall be continuously placed 300 mm (12 inches) above sprinkler system water mains and laterals.

3.2 LAYING PLASTIC PIPE

- A. Shall be snaked in trench at least 1 meter to 100 meters (1 foot per 100 feet) to allow for thermal construction and expansion and to reduce strain on connections.

B. Joints

1. Solvent Welded Socket Type: ASTM D2855.
2. Threaded Type: Apply liquid teflon thread lubricant of teflon thread type. After joint is made hand tight (hard), a strap wrench should be used to make up to two additional full turns.

3.3 LAYING EMITTER HOSE

- A. Use Type 1/11 solvent weld.
- B. Bushing for adaptation from PVC Schedule 40 fittings to flex-vinyl hose shall be line size by 10 mm (3/8 inch) insert bushings.

3.4 INSTALLATION OF QUICK COUPLERS

- A. Quick couplers shall be placed on temporary nipples extending at least 80 mm (3 inches) above finished grade. After final grading is established, remove temporary nipples, ensuring that no dirt or foreign matter enters outlet, and install sprinkler heads and quick couplers at ground surface as detailed.
- B. Install quick coupling valves on a swing joint assembly.

3.5 INSTALLATION OF CONTROL WIRING

- A. Wiring from master controllers to satellites and stub-cuts for future extension shall be located in trench with new mains or in separate trench at back of curb.
- B. Wiring bundles located with piping shall be set with top of the bundle below top of the pipe. No two wires in any bundle shall be of the same color. Wires shall be bundled, and tied or taped at 4.5 m (15 foot) intervals. A numbered tag shall be provided at each end of a wire, i.e., at valve, at field located controllers and at master controller. The number at each end of wire to be the same.
- C. Splicing shall be held to a minimum. A pullbox shall be provided at each splice. No splices will be allowed between field located controllers and remote control valves.
- D. Provide 300 mm (12 inch) expansion loops in wiring at each wire connection or change in wire direction. Provide 600 mm (24 inch) loop at remote control valves.

3.6 TRACER WIRE INSTALLATION

- A. Tracer wire shall be installed on bottom of trench, adjacent to vertical pipe projections, carefully installed to avoid stress from backfilling, and shall be continuous throughout length of pipe with spliced joints soldered and covered with insulation type tape.

- B. Tracer wire shall follow main line pipe and branch lines and terminate in yard box with gate valve controlling these main irrigation lines. Provide sufficient length of wire to reach finish grade, bend back end of wire to make a loop and attach a Dymo-Tape type plastic label with designation "Tracer Wire."
- C. Record locations of tracer wires and their terminations on project record documents.

3.7 SETTING OF VALVES

- A. No valves shall be set under roads, pavement or walks.
- B. Clean interior of valves of foreign matter before installation.
- C. Where pressure control valves are installed adjacent to remote control valve, they shall be housed in the same valve box.
- D. Set valve box cover flush with finished grade.

3.8 SLEEVING

- A. Furnish and install where pipe and control wires pass under walks, paving, walls, and other similar areas.
- B. Sleeving to be twice line size or greater to accommodate retrieval for repair of wiring or piping and shall extend 300 mm (12 inches) beyond edges of paving or construction.
- C. Bed sleeves with a minimum of 100 mm (4 inches) of sand backfill above top of pipe.

3.9 TEST AND FLUSHING

- A. Pressure Test: Pressure test lines before joint areas are backfilled. Backfill a minimum of 300 mm (12 inches) over the pipe to maintain pipe stability during test period. Test piping at hydraulic pressure of 1025 kPa (150 psi) for two hours. Maximum loss shall be 3 L/25 mm pipe diameter/300 m (0.8 gallons/inch pipe diameter/1000-feet). Locate pump at low point in line and apply pressure gradually. Install pressure gage shut-off valve and safety blow-off valve between pressure source and piping. Inspect each joint and repair leaks. Line shall be retested until satisfactory.
- B. Flushing: After testing, flush system with a minimum of 150 percent of operating flow passing through each pipe beginning with larger mains and continuing through smaller mains in sequence. Flush lines before installing quick couplers and heads.
- C. Operation Test: Operate the entire portion of the repaired system to demonstrate the complete and successful operation of all equipment.

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