

SECTION 32 84 00

IRRIGATION SYSTEMS

PART 1

1.1 GENERAL SYSTEM DESCRIPTION

- A. Work Included: Furnish and install new emitter system as described in Contract Documents complete with accessories necessary for proper function.

1.2 INTENT OF CONTRACT DOCUMENTS

- A. It is the intention of this Specification to accomplish the work of installing a new irrigation system to operate in an efficient and satisfactory manner. The Specification can only indicate the intent of the work to be performed rather than a detailed description of the performance of the work. It shall be the responsibility of the Contractor to install said materials and equipment in such a manner that they shall operate efficiently and evenly and support optimum plant growth and health.

The Landscape Architect and/or their Consultant shall be the sole judge of the true intent of the Drawings and Specifications and of the quality of all materials furnished in performance of the contract.

- B. In the event of any discrepancies between the Drawings and the Specification, the final decision as to which shall be made by the Landscape Architect and/or his consultant. The Contractor will be compelled to act on this decision as directed. In the event the installation is contradictory to the direction of the Landscape Architect, the installation shall be rectified by the Contractor at no additional cost. Any such discrepancies shall be immediately brought to the attention of the Landscape Architect by the Contractor.
- C. Make use of all data in all of the Contract Documents including manufacturer's catalogs and verify the information onsite prior to bidding on this work and also at the time of installation.

1.3 QUALITY ASSURANCE

- A. Regulatory requirements: Work and materials shall be in accordance with latest rules and regulations, and other applicable state, county or local laws. Nothing in Contract Documents is to be construed to permit work not conforming to these codes.

1.4 PRODUCT STORAGE

- A. During construction, store and protect materials from damage and prolonged exposure to sunlight.

1.5 WARRANTY

- A. One Year: Shall include filling and repairing depressions and replacing plantings due to settlement of irrigation trenches.

1.6 PERMITS AND REGULATIONS

- A. The Contractor shall give all notices and pay all fees necessary for completion of work under this contract, and shall obtain and pay for all permits and licenses over all or any part of the work as drawn and specified.

1.7 EXAMINATION OF SITE

- A. The Contractor shall be held to have examined the project sites and to have compared it with the drawings and specifications, to have carefully examined all of the Contract Documents and to have satisfied himself as to the conditions under which the work is to be performed before entering into a Contract for this work. No allowance shall subsequently be made on behalf of the Contractor on account of an error, negligence or failure to acquaint himself with the conditions of the sites, existing utility locations and easements, or of the streets or roads approaching the site. Submit any questions in writing prior to commencement of the job.

1.8 SAFEGUARDS

- A. The Contractor shall maintain sufficient safeguards, such as ailings, temporary walks, lights, barricades, etc., against the occurrence of accidents, injuries or damage to any person or property resulting from the work, and shall alone be responsible for the same if such occurs.

1.9 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall continuously maintain adequate protection of all work and materials from damage, destruction, or loss, and shall protect the Owner's property from damage arising in connection with this Contract. He shall make good any such damage, destruction, loss, or injury. He shall adequately protect adjacent property as provided by law and the Contract Documents.
- B. Prior to excavation for irrigation piping or equipment, Contractor shall contact Bluestake (602-263-1100) for location of underground utility lines and take proper precautions to avoid damage to such improvements. In the event of a conflict between such lines and irrigation piping or equipment locations, Contractor shall notify the Landscape Architect who will arrange for the relocation of one or the other. The Contractor assumes responsibility for making repairs for damages resulting from work as herein specified.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials equipment, apparatus and appliances used throughout the systems shall be new and pristine perfect condition.
- B. Equipment or materials installed or furnished without the prior approval of the Landscape Architect will be rejected and such materials removed from the site at no cost to the Owner or Landscape Architect

2.2 PIPE, PIPE FITTINGS, AND CONNECTIONS FOR IRRIGATION SYSTEM:

All pipe shall be free of blisters, internal striations, cracks, or any defects or imperfections. Pipe shall be continuously and permanently marked with Dimension Ratio No., Manufacturer's name, size, schedule, or pressure class, type, and working pressure, material code designation, seal of the testing agency that verified the suitability of the pipe material (NSF). Pipe size schedule shown on Drawings is a minimum. Larger sizes may be substituted without additional cost to Owner or Landscape Architect.

- A. Plastic Pipe:
 - 1. Pressure lines and sleeves: Schedule 40 PVC (polyvinyl chloride) Solvent Weld Pipe complying with ASTM Designation D-1785, latest edition.
 - 2. Non-Pressure Lines: Pressure Class 200 PVC SDR21, PVC-1120, Type 1, Grade 1, complying with ASTM designation D-2241 PVC SDR-PR Pipe Specification.
- B. Plastic Pipe Fittings:
 - 1. Threaded Type: Schedule 80, Type 1, Grade 1, 1. Polyvinyl Chloride (PVC) per ASTM D1784, D2464, and D2467, uniformly grey in color, manufactured by Spears or approved equal.
 - 2. Slip socket Type: Schedule 40, Type 1, Grade 1, Polyvinyl Chloride (PVC) per ASTM D-2466 and D-1784 uniformly white in color. Manufactured by Spears or approved equal. (Note: Use epoxy coated steel fitting for rubber ring and gasketed mainline.)
- C. Copper Pipe:
 - 1. Copper pipe shall be Type "K" in accordance with. ASTM B88. Copper pipe shall be jointed with the appropriate solder type wrought copper pressure fittings for 2 1/2 inch and smaller sizes.

2.3 PIPE CONNECTION MATERIALS

- A. Joint compound for threaded connections: Teflon tape, or approved equal UL listed.
- B. Adhesive solvents and primer for all classes and schedules of PVC: Slow drying solvent cement shall be used whenever ambient air temperature is 90 degrees F. or higher. P-70 purple primer and slow-set solvent cement as manufactured by Industrial Polychemical Service, Gardena, California.
- C. Solvent for Slip-Fit flex vinyl hose and fittings: Shall be P-70 primer and #795 solvent cement as manufactured by Industrial Polychemical Service, Gardena, California.

- D. All cans of solvents and primers shall have labels intact and shall be stamped with the date of manufacture. No cans dated over two years old will be permitted.

2.4 AUTOMATIC SPRINKLER SYSTEM

- A. Control Valves: Shall be of size and type indicated on Drawings.
- B. Control wire shall be UF-UL listed, color coded copper conductor direct burial size No. 14 AWS. Tape control wire to side of main line every 10 feet. Where control wire leaves main or lateral line, enclose it in Class 200 PVC conduit. Use waterproof wire connectors at splices and locate all splices within valve boxes.

2.5 AUTOMATIC CONTROLLERS

- A. Control Valves: Shall be of size and type indicated on Drawings.
- B. Control wire shall be UF-UL listed, color codes copper conductor direct burial size No. 14 AWS. Tape control wire to side of main line every 10 feet. Where control wire leaves main or lateral line, enclose it in Class 200 PVC conduit. Use waterproof wire connectors at splices and locate all splices within valve boxes.
- C. Make and Models as shown on Drawings. Contractor to provide 110V Power to controllers on a dedicated circuit. Submit shop drawing of electrical schematic to Landscape Architect prior to installing controller.

2.6 PRESSURE REDUCING VALVES, Y-STRAINERS, AND FLUSH VALVES

- A. Make and Models as shown on Drawings.

2.7 VALVE BOXES

- A. Rectangular or round heavy duty plastic valve boxes with brown or tan bolt-down lid or approved equal. Valve boxes shall be large enough for easy removal or maintenance of valves. Minimum size for rectangular boxes shall have top dimensions of 13 inches x 20 inches x 12 inches deep. Valve box tops to be factory marked with the work "Irrigation". Provide and install Manufacturer's valve box extensions as required to enclose valves and equipment.

2.8 BACKFILL MATERIALS

- A. Irrigation Pipe Trench Backfill
 1. 2 - inch cover and bedding for pressure irrigation mainline and all Non-Pressure Laterals: Screened soil having no rock or debris larger than 1/4 inch.
 2. Other Backfill Materials: Clean native soil with no rock or debris larger than 1/2 inch.

- B. Pea gravel (for use around drains and valves)
 - 1. 1/2 inch maximum round, water worn, washed rock.

PART 3 EXECUTION

3.1 GENERAL

- A. Contractor shall obtain all information pertaining to locations of all existing and proposed utilities, lines, and appurtenances prior to irrigation installation.
- B. Contractor shall be responsible for making connections to existing piping, valves, conduit, and appurtenances not in his contract utilizing proper adaptation tools and procedures. Water line shut downs/trenching at mains are Contractor's responsibility. No change orders for connections or installation are warranted.

3.2 LAYOUT AND VERIFICATION

- A. Locations and drawings are diagrammatic and approximate only. Actual work shall be changed and adjusted to meet existing conditions and obtain complete water coverage. All fittings that are necessary for proper connections such as swing joints, offsets, and reducing bushings are not shown but shall be installed as directed.
- B. Minor changes in locations of irrigation equipment and piping from locations shown on drawings shall be made to avoid utilities, structures, etc. at the Contractor's expense.
- C. The Contractor shall be held responsible for relocation of any items without first obtaining the Landscape Architect's approval. The Contractor shall remove and relocate such items at his expense if so directed by the Landscape Architect.
- D. Before starting work on irrigation system, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths. The Contractor shall be aware of the fact that the Drawings are based on horizontal dimensions. Actual measurements taken along the slope of a bank will differ from those shown on the Drawings.

3.3 TRENCHING AND BACKFILLING

- A. Over-excavate trenches 2 inches and bring back to indicated depth by filling with backfill material specified in this Section. Lay pipe on bedding material providing a firm, uniform bearing. Unless otherwise specified, the minimum depth of cover over pipelines and conduits shall be as follows:
 - 1. Pressure Irrigation Mainline: 18 inches minimum.
 - 2. Non-Pressure Lateral lines servicing Emitters: 12 inches minimum.
 - 3. Sleeves under Paving: 10 inches minimum below sub-base.

- B. Do not cover pressure main, non-pressure lateral sprinkler pipe, or fittings until Landscape Architect has inspected and approved systems. Balance of trench backfill material shall be as specified. Compact backfill soil using recommended mechanical compaction equipment to densities as follows:
Under pavement: 95%.
In landscaped areas: 90%.

3.4 SLEEVING

- A. Sleeve all water lines and control wires under walks and paving. Size sleeve two pipe sizes larger than pipe to be sleeved and extend sleeves 6 inches minimum beyond walk or pavement edge.

3.5 INSTALLING PLASTIC SOLVENT WELD PIPE

- A. Install plastic pipe in a manner to provide for expansion and contraction as recommended by Manufacturer. Cut plastic pipe square and remove burrs at cut ends prior to installation so unobstructed flow will result.
1. Do not make solvent weld joints if ambient temperature is below 40 degrees F.
 2. Clean mating pipe and fitting with clean, dry cloth and apply one coat of P-70 primer to each.
 3. Apply uniform coat of specified solvent to outside pipe.
 4. Apply solvent to inside fitting in a similar manner.
 5. Reapply a light coat of solvent to pipe and quickly insert into fitting.
 6. Give pipe or fitting a quarter turn to insure even distribution of solvent and make sure pipe is inserted to full depth of socket.
 7. Hold in position for 15 seconds minimum or long enough to secure joint.
 8. Wipe off solvent appearing at outer shoulder of fitting to PVC pipe.
 9. Allow Joints to set at least 24 hours before applying pressure
 10. Tape threaded connections with Teflon tape as per manufacturer's written recommendations.

3.6 METAL PIPE

- A. All threaded pipe connections shall be made using Teflon tape applied to male threads only. (Note: Do not tape Acme threads on swing joints.)
- B. Metal to non-metallic connections: couplings connecting metal to non-metallic items shall be of the-same material as the metallic item or as shown on respective detail.
- C. When connection is plastic to metal, PVC male adapters complete the connection. Joints shall be made with two wraps of Teflon tape and hand-tightened plus one turn with a strap wrench.
- D. Conduit Installation: Metallic Conduit shall be used and assembled as per Manufacturer's written specifications and per local codes where wiring is routed above grade.
- E. Stub conduit into control cabinetry as indicated by manufacturer.

3.7 PIPE CLOSING AND FLUSHING

- A. Pipe closing: Openings in piping system are to be capped and plugged, leaving caps and plugs in place until removal is necessary for completion of installation. Prevent dirt and debris from entering pipe and equipment at all times.
- B. Flushing: All pipes and tubing are to be thoroughly flushed out before installing valve caps, or sprinkler heads. After flushing, proceed to install aforementioned equipment, and center load the lines. Joints, fittings, and connections are to remain visible.

3.8 PURGING

- A. Immediately prior to hydrostatic testing, all irrigation lines shall be thoroughly purged of all entrapped air.
- B. Mainline piping system may be tested in sections. Lateral systems shall be tested valve by valve.
- C. Adjust zone control valves and install temporary caps in order to force water to be discharged from a single outlet.
- D. Introduce water into lines to be tested at full operating pressure head. Observe water flow at end discharge point until determination is made that all air and residual debris have been expelled from the line.

3.9 HYDROSTATIC PRESSURE TESTING

- A. While the necessary piping system components are exposed, and under the direct observation of the Landscape Architect, all piping is to be subjected to a hydrostatic testing.
 - 1. Contractor is to supply all testing equipment including caps, valves, pumps, tanks, and gauges.
 - 2. Calibration of pressure gauges shall be such that accurate determination of potential pressure loss can be ascertained.
 - 3. Pressure gauges are required at a minimum of two locations on the section of piping being tested.
- B. Piping shall be tested as follows:
 - 1. Test supply lines of 150 psi for a minimum of four (4) hours with an allowable loss of 5 psi.
 - 2. Test lateral lines at 76 psi for a minimum of one (1) hour 2. with an allowable loss of 5 psi.
 - 3. Test Drip Emitter lines at 40 psi for a minimum of one 3. (1) hour with an allowable loss of 3 psi.
- C. Remedy any failures and retest until the system meets the requirements. During the tests, regardless of the amount of leakage, all detectable leaks are to be stopped and all defects corrected.
- D. Materials and installation procedure used for making corrections are to be the same as specified herein.

3.10 INSTALLATION OF DRIP IRRIGATION

- A. Entire drip irrigation system shall be installed per details on drawings.
- B. Do not install emitters until flushing, purging, and pressure testing of system is completed.

3.11 CONTROL VALVES AND CONTROLLER

- A. Install controllers, control wires, and valves as detailed on Drawings and in accordance with manufacturer's written recommendations and according to electrical codes. Install only one remote control valve box positioned over valve so that all parts of valve can be reached for service. Install pea gravel sump as detailed on drawings. Valve box shall be reasonably free from dirt and debris. Clearance between the highest part of the valve and the bottom of valve box and/or the valve box knock-outs shall be a minimum 2 inches (the box must not rest on piping)

3.12 FIELD QUALITY CONTROL

- A. Test pressure and lateral lines and make certain there are no leaks before backfilling. Notify Landscape Architect prior to testing.

3.13 MAINTENANCE

- A. Provide the following services during the maintenance period:
 - 1. On a daily basis, check complete operation of the irrigation system. Adjust equipment to obtain maximum efficiency.
 - 2. During the last two weeks of the maintenance period, provide equipment familiarization and instruction on the total operation of the system to the grounds maintenance personnel who will assume responsibility for system operation.

3.14 QUICK-COUPLING VALVE (RAINBIRD 44RC)

Height: 6" (15,2 cm)

1"(26/34) Rubber Cover, 2-Piece Body

Pressure: 5 to 125 PSI (0,35 to 8,63 bar)

Flow: 10 to 125 GPM (2,27 to 28,38 m³/h;0,63 to 7,88 l/s)

END OF SECTION