SECTION 32 84 00 - PLANTING IRRIGATION

PART 1 – GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

DESCRIPTION OF WORK

The extent of underground sprinkler system is shown on the drawings

Coordination: Coordinate and cooperate with other trades including but not limited to earthwork, landscape work, concrete work, masonry work, electrical and plumbing to enable the work to proceed as rapidly and efficiently as possible.

Guarantee: All work shall be guaranteed for one year from date of final acceptance against all defects and malfunctions in material, equipment and workmanship.

1. The guarantee shall also cover repair of damage to any part of the premises resulting form leaks or other defects in material, equipment and workmanship. Repairs shall be done promptly at no cost to the Owner. The Contractor shall not be responsible for work damaged by others. The guarantee shall state the name of the Owner, providing guarantee, address and telephone number. It shall be signed by the chief executive of the Contractor and notarized. Manufacturer's warranties shall not relieve the Contractor, and the Contractor of his liability under the guarantee.

2. If, within ten (10) days after mailing of a written notice by the Owner to the Contractor requesting repairs or replacement resulting from a breach of warranty, the Contractor shall neglect to make or undertake with due diligence to make the same, the Owner may make such repairs at the Contractor's expense. In the case of emergency where, in the judgment of the Owner, delay would cause serious loss or damage, repairs or replacement may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

On-site Observation: At any time during the installation of the irrigation system the Owner, or Architect, may visit the site to observe work underway. Upon request, the Contractor shall uncover specified work as directed by the Owner, or Architect without additional compensation. Should the material, workmanship or method of installation not meet the standards specified herein, the contractor shall replace the work at his own expense.

Workmanship: All work by the Contractor shall be installed by skilled personnel, proficient in the trades required, in a neat, orderly and responsible manner with recognized standards of workmanship. The Contractor shall have had considerable experience and demonstrated ability in the installation of sprinkler systems of this type. To demonstrate ability and experience necessary for this project, Contractor shall submit, to the Architect, the following:

1. List of three (3) projects completed in last two (2) years of similar complexity to this project. Description of projects shall include:

    A. Name of Project
    B. Location
    C. Owner's name, address and business phone number
    D. Scope of work and contract amount

SUBMITTALS

Product Data: Submit samples and manufacturer's technical data to the Landscape Architect including installation instructions for the underground sprinkler system.

Shop Drawings: If required, submit shop drawings to the Architect for the landscape irrigation system including plan layout and details illustrating location and type of heads, valves, piping circuits, controls and accessories.

Operations and Maintenance Manuals: The Contractor shall prepare and deliver to the Architect at substantial completion a minimum of three (3) hard cover binders with tree rings containing the following information:

1. Index sheet stating the Contractor's address and business telephone number, list of equipment with name(s) and address(es) of local manufacturer's representative(s).

2. Catalog and parts sheets on every material and equipment installed under this contract.

3. Complete operating and maintenance instruction on all major equipment.

4. Provide the Owner's maintenance personnel with instructions for major equipment and show evidence in writing to the Landscape Architect at the conclusion of the project that this service has been rendered.

Equipment: The Contractor shall supply the Owner as part of this contract the following tools:

1. Two (2) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on this project.

2. Two (2) keys for each automatic controller.

3. Two (2) quick coupler keys and two (2) attaching hose swivels for each type of quick coupling valve installed, if required.

The above mentioned equipment shall be turned over to the Owner by the Contractor at the conclusion of the project. Before final inspection can occur, evidence that the Owner has received material must be shown by the Contractor to the Landscape Architect.

ON-SITE CONDITIONS

Inspection of the Site: The Contractor shall acquaint himself with all on-site conditions. Should utilities not shown on the drawings be found during excavations, the Contractor shall promptly notify the Architect for instructions as to further action. Failure to do so will make the Contractor liable for any and all damage thereto arising from his operations subsequent to discovery of such utilities not shown on the drawings.

Protection of Property: The Contractor shall be responsible for the preservation and protection of all site conditions to remain. In event damage does occur, all damage shall be completely repaired by the Contractor to its original condition. All the costs of such work shall be charged to and paid by the Contractor.

1. Trenching: All trenching or other work under the limb spread of any and all plant materials to remain shall be done by hand by the Contractor or by other methods so that no limbs, branches or major roots are damaged in any way.

2. Buildings, Walks, Walls Other Property: Shall be protected by the Contractor from damage. Open ditches left exposed shall be flagged and barricaded by the Contractor. The Contractor shall restore disturbed areas to their original condition.

Private Utilities: The Contractor shall request the Owner, in writing, to locate any private utilities (i.e. electrical service to outside lighting) before proceeding with any excavation. If, after such requests and necessary staking, private utilities which were not staked are encountered and damaged by the Contractor, they shall be repaired by

the Owner at no cost to the Contractor. If the contractor damages staked or located utilities, they shall be repaired at the Contractor expense.

1. The Contractor shall take whatever precautions are necessary to protect these underground lines from damage and in the event damage does occur, all damage shall be repaired by the Contractor. All cost of such work shall be paid by the Contractor unless other arrangements have been made.

PART 2 – MATERIALS

PIPING AND FITINGS

General Provisions: All materials throughout the system shall be new and in perfect condition.

Polyvinyl Chloride Pipe (PVC):

1. Laterals: Polyvinyl chloride (PVC) pipe shall conform to the requirements of ASTM Designation D 2241, Class 1120 or 1220. All lateral piping shall be Class 160.

2. Main Line Under Pressure: Polyvinyl chloride (PVC) pipe shall conform to the requirements of ASTM Designation D2241, Class 1120 or 1220, Class 160 unless otherwise noted on the plans.

3. Pipe Markings: All PVC pipe shall bear the following markings:

    A. Manufacturer's name
    B. Normal pipe size
    C. Schedule or class
    D. Pressure rating of P.S.I.
    E. NSF (National Sanitation Foundation) approval
    F. Date of Extrusion

Copper Pipe: Copper pipe shall e seamless, type "K", drawn temper, ASTM B883.

PVC Fittings:

1. Fittings for PVC Pipe: Shall be schedule 40 PVC with solvent weld joints and conform to the requirements of ASTM Designation D 2466 as furnished by manufacturer of pipe.

2. Fittings for Gasketed Pipe: For gasket pipe up to 8" and couplings up to 12", fittings shall be Schedule 40 rubber ring fittings with sealed bell spigot, o-ring, ring-tite mechanical joint, flanged or IPS threaded. All fittings for gasketed pipe shall be thrust blocked as per detail and o the size recommended by manufacturer of fittings.

3. All Fittings: Shall bear the manufacturer's name or trademark, materials designation, size, applicable I.P.S. schedule and NSF seal of approval.

PVC Joints:

1. PVC pipe 3 inches and larger shall have provisions for expansions and contraction provided in the joints. All joints, except solvent weld and threaded joints, shall be designated for push-on make-up connection. A push-on joint may be a coupling manufactured as an integral part of the pipe barrel consisting of a thickened section with an expanded bell with a groove to retain a rubber sealing ring of uniform cross section similar and equal to Johns-Manville Rint-Tite and David Meter Dav-Tite, or may be made with a separate twin gasketed coupling similar and equal to Certain Teed Fluid-Tite.
   Joints in PVC pipe smaller than 3 inches shall be solvent welded in accordance with the recommendations of the pipe manufacturer using the solvent cleaner and welding compound furnished with the pipe.

Copper Fittings:

For Copper Tubing: Type K copper, ASTM B88 ANSI B 16.22 wrought copper or cast brass, 150 p.s.i. recessed solder joint type fittings

Dielectric Protection: Use dielectric fittings at connection where pipes of dissimilar metal are joined.

Pressure Pipe And Main Line Conduit Through Buildings: Both shall be PVC-Schedule 40 with underwriters' Laboratories label. Conduit shall be twice the diameter of the enclosed pipe.

Sleeves:

1. General: The location of sleeves shown on the drawings is schematic. The Contractor shall make any adjustments necessary to accommodate existing vegetation, utilities, or other conditions. Sleeving shall be minimum of 18" below finish grade.

2. Sleeve Material: Sleeves shall be Schedule 40 PVC, conforming to the requirements of ASTM 1785. See irrigation plan for size and location. If size is not shown, sleeves shall be installed to carry required piping and control wiring and shall be a minimum of 2 sizes larger than pipe carried by sleeve.

Solvent Cement:

1. General: The Contractor shall provide solvent cement and primer for PVC solvent weld pipe and fittings recommended by the manufacturer. Pipe joints for solvent weld pipe shall be belled end. Pipe joints for gasketed pipe shall be integral ring type. Insert gaskets will not be accepted.

Valves:

1. Gate Valves:

   A. Gate valves for ¾" through 2-1/2" shall be of brass or bronze construction, solid wedge, I.P.S. threads, non-rising stem with wheel operating handle, for a continuous working pressure of 150 psi.

   B. Gate valves for 3" and larger: Iron body, brass or bronze mounted AWWA gate valves, with a clear waterway equal to the full nominal diameter of the valve, rubber gasket for a continuous working pressure of 150 psi. Valve shall be equipped with a square operating nut.

2. Quick Coupling Valves: Brass two-piece body designed for working pressure of 125 psi operable with quick coupler. The cover shall be a spring loaded self closing type of cadmium plated cast iron, with a yellow thermo plastic rubber cover. The valve shall be opened and closed by a brass key of the same manufacturer having a ¾" outlet able to accommodate a ¾" swivel hose ell. Key size and type as shown on plans.

3. Drip Valve Assembly: Type and size as shown on drawings.

   A. Wye strainer shall be of plastic construction, with 120 mesh nylon screen and ½"

   B. Control valve shall be two way, solenoid pilot operated, shall be made of synthetic, non-corrosive material, shall be diaphragm activated and slow closing. The valve shall have a freely pivoted seat an seal retainer mounted without attachment to the diaphragm.

4. Pressure Reducing Valve: The valve shall be of plastic or brass construction with manual adjusting nut. It shall have a pressure regulating module capable of regulating outlet pressure between 15 and 100 psi. Module shall have an adjusting screw for setting pressure and a valve connection for monitoring pressure.

5. Electric Control Valves:

    A. Size and type as shown on the drawings. Provide units with manual flow adjustment and manual bleed nut.

    B. The electric control valve shall be a normally closed 24 volt A.C., 60 cycle solenoid actuated globe pattern. Valve pressure rating shall not be less than 200 psi.

    C. The valve body and bonnet shall be constructed of heavy cast brass, plastic or nylon, diaphragm shall be of nylon reinforced nitrile rubber. Solenoid coil shall be encapsulated in molded epoxy.

    D. The valve shall be actuated by a lower power, solenoid actuator.

    E. The valve shall have a flow control stem and cross handled for regulating or shutting off the flow of water and a bleed screw for manual operation without electrically energizing the solenoid coil.

    F. The valve construction shall be such as to provide for all internal parts to be removable form the top of the valve without disturbing the valve installation.

6. Valve Boxes: Valve boxes shall be as specified on drawings

Irrigation Wiring:

Wiring for connecting the electric control valves to the controllers shall be type UF, 600 volt, single strand, solid copper with PVC insulation 4/64 inch thick. Use red for “hot” or lead wires, and white for the common wire. Size control wires to carry the required current as per manufacturer’s guidelines.

Automatic controllers:

1. General Provisions: Furnish a low voltage system manufactured expressly for control of automatic electric control valves of underground sprinkler systems. See the irrigation plan for controller specification.

2. Exterior Control Enclosure: Manufacturer’s standard weatherproof enclosure with locking cover, complying with NFPA 70 (National Electric Code)

3. Interior Control Enclosure: Manufacturer’s standard with locking cover, complying with NFPA 70.

4. Circuit Lightning Protection: The control station shall be protected with a lightning arrestor installed in cabinet. A Rainbird LPP-K primary surge protector shall be installed by the Contractor on both legs of the 110 V power lines and a Rainbird LPV-K valve output surge protector shall be installed by the Contractor to protect the valve circuitry.

5. Electro-Mechanical And Computer Controllers: Controllers shall be of manufacturers size and type shown on the drawings.

6. Master controller shall be as indicated on the drawings and installed as per manufacturers recommendations.

Sprinklers Heads:

1. Provide sprinkler heads as indicated on the drawings

PART 3 – EXECUTION

INSPECTION

Examine the areas and conditions under which the landscape irrigation system is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

PREPARATION

Provide sleeves to accommodate piping under walks or paving. Coordinate with other trades and install to accurate levels prior to paving work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

TRENCHING AND BACKFILLING

Excavation: Stake out the location of each run of pipe, sprinkler heads, sprinkler valves and isolation valves prior to trenching. Excavation shall be open vertical construction sufficiently wide to provide free working space around the work installed and to provide ample space for backfilling and tamping. Trenches for pipe shall be cut to required grade lines, and compacted to provide accurate grade and uniform bearing for the full length of the line. The bottom of trenches shall be free of rock or other sharp edged objects. Minimum cover shall be as follows:

1. Pipe and Wire Depth:

Mainline	12” at top of pipe from Finish Grade
Lateral Piping (rotor)	12” at top of pipe from Finish Grade
Lateral Piping (pop-up)	12” at top of pipe form Finish Grade
Control Wiring side of mainline	

2. Vibratory Plow: Lateral piping may be installed through use of vibratory plow method if Architect determines soil conditions satisfactory for this method of installation. Vibratory plowing does not relieve the Contractor of minimum pipe depths.

Minimum Clearances: All pipelines shall have a minimum clearance of six inches from each other and from lines of other crafts. Parallel lines shall not be installed directly over one another. No lateral line shall be installed in the mainline trench.

INSTALLATION OF PIPING

PVC Pipe and Joints: Do not install solvent weld pipe when air temperature is below 40 degree Fahrenheit. Installation shall be in accordance with the manufacturer’s instructions.

1. Only the solvent recommended by the pipe manufacturer shall be used. All PVC pipe and fittings shall be installed as outlines and instructed by the pipe manufacturer, and it shall be the Contractor’s full responsibility to make arrangements with the pipe manufacturer for any field assistance that ma be necessary. The Contractor shall assume full responsibility for correct installation.

2. Flexible Plastic Pipe: Snake pipe in trench as much as possible to allow for expansion and contraction. Insert fittings into the pipe up to the stop ridges.

BACKFILLING PROCEDURES

Initial backfill on PVC lines shall be acceptable fill material, free of foreign matter. Existing and proposed plant locations shall take precedence over sprinkler and pipe locations. Coordinate the placing of trees and shrubs with the routing of lines and final head locations.

1. Backfill and Compaction: Do not backfill in freezing weather except with the written approval from the Architect. Leave trenches slightly mounded to allow for settlement after the backfilling is completed. Clean the site of the work continuously of excess waste materials as the backfilling progresses, and leave in a neat condition. No trenches shall be left open for a period of more than 48 hours. Protect open trenches as required

   Carefully backfill excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand, and other approved materials, free of rock and debris over 1" in size. Backfill shall be compacted to original density of surrounding soil without dips, sunken areas, or irregularities.

   Conform to Section 02200 requirements for methods and required compaction percentages.

   Hand place the first 6" of backfill (or to top of pipe) and walk on so as to secure the position of the pipe and wire.

   No Wheel rolling will be allowed. Remove rock or debris extracted from backfill material and dispose of off-site. Fill any voids left in backfill with approved fill material.

VALVES

Isolation Valves: Shall be sized corresponding to adjacent pipe size. Specified valve boxes shall be installed flush with finish grade in such a manner that surface forces applied to their exposed area will not be transmitted to the piping in which the valve is installed.

Gate Valves: shall be installed where shown on the drawings. See details

Quick Coupling Valves: Shall be installed on the mainline pipe in the areas shown on the drawings. The connection between the mainline and quick coupler valve shall be with a treaded pipe and a triple swing joint.

Electric Control Valves: Shall be installed in specified valve boxes. The valve shall have 3" of 3/8" pea gravel installed below the bottom of the valve. The valve shall be connected to the mainline as shown in the details. If the valve box does not extend to the base of the valve, a valve box extension shall be installed. Electric control valves shall be installed where shown and grouped together where practical. Place no closer than 12 inches to walk edges, buildings and walls.

Adjust the valve to provide flow or rated operating pressure required for each sprinkler circuit.

CONDUIT AND SLEEVES

Conduit and Sleeves for Control Wring and Main/Lateral Pipe: Provide and install where necessary and as indicated on the drawings.

1. Coordinate installation of sleeves with work of other disciplines.

CONTROLS

Connect electric control valves to controllers in a clockwise sequence to correspond with station settings beginning with Stations 1, 2, 3, etc. Automatic controller shall be provided and installed as noted on the drawings. See electrical drawings for connection to power source.

CONTROL WIRE

Control wiring between the controller and electric valves shall be buried in mainline trenches or in separate trenches.

Electrical connections at each valve will allow for pigtail so that the solenoid can be removed from the valve with sufficient slack to allow ends to be pulled 12" above ground for examination and cleaning.

An expansion loop shall be provided at every valve at 100' o.c. The expansion loop shall be formed by wrapping wire at least eight times around a ¾" pipe and withdrawing the pipe. The wire shall be color coded as specified, bundles and taped every ten feet. The wire shall be laid I the trench prior to installing the pipe, being careful to install the wire beneath and approximately 6" to the side of the main pipe line.

Electrical connections to electric control valves shall be made with Rainbird Pen-Tite connectors or approved equal.

CONNECTION TO WATER SOURCE

Connect the irrigation system to the water source specified on the Irrigation Plan and Irrigation Schedule.

SPRINKLER HEADS

GENERAL PROVISIONS:

1. Sprinkler head shall be installed as detailed on the drawings

2. Spacing of heads shall not exceed the maximum recommended by the manufacturer.

HEAD TYPES:

1. Pop-Up Rotary Sprinkler Heads: Shall be installed on 18" lengths of flexible polyethylene pipe and be set with top of head flush with finish grade. Heads in turf areas shall be installed with a green concrete donut.

2. Spray Pop-Up Sprinkler Heads: Shall be installed and set with top of head flush with finish grade. Heads shall be installed on flexible polyethylene pipe. Set heads so that spray pattern is not interrupted by plant stems or foliage.

3. Shrub Heads: All shrub heads shall be mounted on PVC Risers and adjusted to 3" taller than the height of adjacent plant material. Paint risers black or dark green.

4. Drip Emitters: Type indicated on drawings. Install emitters accordance with the drawings.

COMPLETION

Flushing: Before sprinkler heads are set, flush the lines thoroughly to make sure there is no foreign matter in the lines.

1. Flush the mainlines form dead end fittings for a minimum of five minutes under a full head of pressure.

Testing: Notify Architect and Owner forty eight (48) hours in advance of testing.

2. Irrigation system shall be visually inspected, zone by zone, by the Owner and Architect to insure proper operation of all irrigation materials.

Adjustment and Coverage of System: Coordinate pressure testing with adjustments and coverage test of system so both may occur at the same time. Balance and adjust the carious components of the system so that the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments on the controllers

CLEAN-UP

Remove from the site all debris resulting form work of this section.

END OF SECTION