

UNDERGROUND IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

- A. The sprinkler system shall include sprinklers, valves, piping fittings, controller, wiring, all of sizes and types as shown on the drawings and specified. The system shall be constructed to grades and conform to areas and locations as shown on the drawings.
B. Sprinkler lines shown on the drawings are essentially diagrammatic. Spacing of the sprinkler heads or quick coupling valves are shown on the drawings and shall be exceeded only with written permission of the Designer.
C. Unless otherwise specified or indicated on the drawings, the construction of the sprinkler system shall include the furnishing, installing, and testing of all mains, laterals, risers and fittings, sprinkler heads, gate valves, control valves, controllers, electric wire, controls, backflow preventers, enclosures, and other necessary specialties and the removal and/or restoration of existing improvements, excavating and backfill, and all other work in accordance with the plans and specifications a required for a complete system.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Irrigation Contractor shall have successfully completed five (5) projects similar in material, size, scope and complexity to that indicated for this Project that have resulted in construction with a record of successful in-service performance. This requirement includes Pump Installation Contractor.
1. Firm Experience Period: Five (5) years of experience
2. Field Foreman Experience: Five (5) years of experience with installing firm.
B. Conference: Before any work is started a conference shall be held between the Contractor and the Owner concerning the work under this contract.
C. It is the Irrigation Contractor's responsibility to coordinate and cooperate with the other Contractors to enable work to proceed rapidly and efficiently.
D. The Contractor shall confine his operations to the area to be improved and to the areas allotted him by the Designer and General Contractor for material and equipment.
E. Contractor shall take all necessary to protect the existing site conditions and vegetation.

1.3 SUBMITTALS

- A. General: Submit in accordance with Shop Drawings, Product Data, and Samples.
B. Shop Drawings and Equipment Product Information:
1. Prior to purchasing materials, submit product information on all sprinkler heads, automatic valves, quick coupling valves, controller, and pipe to be used on the project.
2. Contractor shall review drawings and data to supply actual precipitation rates and times for each zone in maintenance package.
3. Prior to trenching, Contractor shall submit proposed trenching equipment to Designer for approval.
C. Record Drawings and Instructions
1. Upon completion of installation, Contractor shall produce as-built drawings in Autocad 2010 format and furnish one set of reproducible and one set of printed record drawings showing all sprinkler heads, valves, drains, and pipelines to scale with dimensions. These drawings shall have dimensions from easily located stationary points (cross measured) as they relate to all valves, mainlines, and wire. Clearly note all approved substitutions of size, material, etc. Complete, concise instruction sheets and parts lists covering all operating equipment and weathering techniques shall be bound into folders and furnished to the Owner in three (3) copies. Submission of this information is a requirement for final acceptance.

1.4 SITE CONDITIONS

- A. The Contractor shall examine the site, plans and specifications (i.e. system requirements).
B. It shall be the Contractor's responsibility to report in writing to the Designer any deviations between drawings, specification, and actual site conditions. Failure to do so prior to the installing of equipment shall be done at the Contractor's expense.
C. Adjustment of the sprinkler heads and automatic equipment will be done by the Contractor, upon completion of installation, to provide optimum performance.
D. After completion, testing, and acceptance of the system, the Contractor shall verbally instruct the Owner's personnel in the operation and maintenance of the system. All written instruction shall be included in the bound maintenance package as stated in Paragraph 1.3 - Submittals.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Pipe sizes shall conform to those shown on the drawings. No substitutions of smaller pipe sizes will be permitted, but substitutions of larger size may be approved. All pipe damaged or rejected because of defects shall be removed from the site at the time of said rejection.
B. All mainline piping (2 1/2" two and one half inches and larger will be equipped with gaskets.
C. All fittings for mainline pipes two and one half (2 1/2") inches or larger will be equipped with gaskets.
D. All piping downstream of electric valves, sizes (3) inches and smaller, shall be rigid unplasticized PVC 200 PSI working pressure extruded from virgin parent material of the type specified on the drawings. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles and permanently marked with the manufacturer's name, material, size, and schedule type. Pipe must bear the NFS seal.
E. All mainline piping and underground piping under continuous pressure shall be rigid unplasticized PVC-Class 200 PSI working pressure extruded from virgin parent material of the type specified on the drawings. The pipe shall be homogeneous throughout and free from visible cracks, holes, and foreign materials, blisters, wrinkles, and dents.
F. All plastic fittings to be installed shall be molded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld, tight ring tight seal, or screwed connections NO fitting made of other material shall be used except as hereinafter specified.
G. Slip fitting socket tapers shall be so sized that a dry unsoftened pipe end conforming to these special provisions cannot be inserted no more than halfway into the socket. Plastic saddle and flange fittings will not be permitted. Only Schedule 80 pipe may be threaded.
H. Fittings for all Mainline Piping 4" and larger shall be Harco Ductile Iron Gasketed Fittings. All mainline shall utilize approved thrust blocking and or restraints. Thrust Blocking and restraints to be installed as per manufacturer's recommendations for pipe type, pipe size and local environmental conditions.

2.2 SLEEVES

- A. All sleeves shall be Class 200 PVC or stronger. All sleeves are required at every crossing indicated on drawings. (Size Noted)
B. All sleeves shall be installed under proposed pavement area prior to subgrade and base construction.
C. Sleeves shall have a minimum horizontal separation of 24" and a maximum of twenty-four (24) inch clearance below bottom of curb.
D. All sleeves shall have a minimum horizontal separation of twenty-four (24) and maximum of thirty-six inches from center to center.
E. Stub up sleeve pipe twelve (12) inches above ground surface and cap. Paint cap with fluorescent orange paint for easy identification.
F. The location of all sleeves shown on the plans is diagrammatic. The contractor shall make any adjustments necessary to accommodate existing vegetation, utilities, or other existing conditions.
G. If the road crossings are designated as being bore locations the bore must be ample size to accommodate the size sleeve specified.

2.3 CONTROL SYSTEM

- A. The Controller shall be two-wire, decoder based system (as stated on plans).
B. Install Rain/freeze sensor (as shown on plans)
C. Install Moisture sensors (as shown on plans)
D. Contractor shall be responsible for proper and complete addressing of decoders at all remote control valve locations.

2.4 CONTROL WIRE

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- A. The biLine wire must be Polyethylene double-jacketed or UF-B UL PVC double-jacketed two-conductor solid core designed for direct burial systems.
B. The following is a list of approved products:
1. Coleman Cable #51452
2. Paige P7072D-Rev 12, P7296D, P7295D, P7360D and P7354D
3. Regency 14/2 and 12/2, "Maxi Cable" or "UF-B"
C. Joining of underground wires shall be made with watertight connectors in valve boxes. No splicing between boxes is acceptable.
D. All splices and connections should be made with DBR-6 or equivalent on the biLine side and DBY or equivalent on the valve side. Installation procedures from the manufacturer must be followed to assure a robust, waterproof connection. Provide enough extra wire length (about 24-36 inches) at valve boxes so that you can easily work with the wire, with biCoder and with biSensor units.
E. Contractor shall adhere to installation specifications, including all related surge protection requirements, as put forth by manufacturer of control system..
1. Each Lightning Arrestor protects a 300 foot radius. Place every 600 feet along biLine
2. Place a Lightning Arrestor at the end of the biLine that is the maximum distance from the Controller, or if looped at the point of maximum distance from the Controller.
3. Place a lightning arrestor at the end of any branch of the biLine that exceeds 50'.

2.5 IRRIGATION VALVES

- A. Zone Control Valves
1. Globe-type diaphragm valves of normally closed design, with bronze bodies or heavy-duty plastic and covers (type noted on drawings). Operation accomplished by means of an integrally mounted heavy-duty 24 volt AC solenoid complying with National Electrical Code, Class II Circuit, solenoid coil potted in epoxy resin within a plastic-coated stainless steel housing. Solenoids shall be completely waterproof, suitable for direct underground burial. Provide a flow stem adjustment in each valve.
2. To be installed with Single Station Decoder (as specified on plans).

2.6 VALVE BOXES

- A. All valves shall be installed in thermoplastic valve access boxes of the size required to permit access to the valve. Valve boxes shall include black thermoplastic locking covers. Manufacturer - Carson or approved equal.
B. All valve boxes shall be installed on at least a two (2) cubic foot gravel base to provide foundation and drainage.
C. All valve box elevations shall be 1/2" below finished grade.

2.7 THRUST BLOCKS

- A. Place one cubic ft. of concrete for each inch of pipe diameter for thrust block. Thrust shall not allow vertical or horizontal movement of pipe in any direction unless otherwise noted on design. Thrust blocking shall be provided on all piping three (3) inch diameter and larger.

2.8 DRIP IRRIGATION

- A. Drip Irrigation equipment shall be as specified on plans (emitter types, emitter flow rates, etc).

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

- A. Trenches for pipe sprinkler lines shall be excavated of sufficient depth and width to permit proper handling and installation by any other method the Contractor may desire if approved by the Owner, pipe manufacturer, and Designer. The backfill shall be thoroughly compacted and leveled off with the adjacent soil level. Selected fill dirt or sand shall be used if soil conditions are rocky. In rocky areas, trenching depth shall be two (2) inches below normal trenching depth to allow for this bedding. The fill dirt or sand shall be used in filling (4) inches above the pipe. The remainder of the backfill shall contain no lumps or rocks larger than three (3) inches. The top three (12) inches of backfill shall be topsoil, free of rocks, subsoil, or trash. Any open trenches or partially backfilled trenches left overnight or left unattended shall be barricaded to prevent undue hazard to the public.
B. The Contractor shall backfill in six (6) inch compacted lifts, as needed, to bring the surface to original density.
C. In the spring following the year of installation, the Contractor shall repair and reseedment of the trenches by bringing them to grade with topsoil, and seeding with the existing lawn type(s). Watering and maintenance of the repaired areas shall be the Owner's responsibility.

3.2 INSTALLATION OF PLASTIC PIPE

- A. Plastic pipe shall be installed in a manner that permits expansion and contraction as recommended by the manufacturer.
B. Plastic pipe shall be cut with a handsaw or hacksaw with the assistance of a square in a square cut. Burrs at cut ends shall be removed prior to installation so that a smooth unobstructed flow will be obtained.
C. All plastic-to-plastic joints shall be solvent weld joints or slip seal joints. Only the solvent recommended for the pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer. The Contractor shall assume full responsibility for the correct installation.
D. The joints shall be allowed to set at least twenty-four (24) hours before pressure is applied to the system on PVC pipe.

3.3 CONTROLLER AND ELECTRICAL CONNECTIONS

- A. All electrical connections shall conform to the National Electrical Code, latest edition.
B. Control wires installed beneath walks, drives, or other permanent surfaces shall be placed in sleeves. Wires shall be spliced only at valve boxes.
C. Leave twenty-four (24) inch loop of wire at each valve for expansion/contraction and servicing.
D. Controllers and valves shall be from the same company e.g. (Rain Bird, Toro or approved equal).
E. 120 VAC electrical power supply to the controller location shall be supplied by others.

3.4 FLUSHING AND TESTING

- A. After all new sprinkler piping and risers are in place and connected for a given section and all necessary division work has been completed and prior to the installation of sprinkler heads all control valves shall be opened and a full head of water used to flush out the system.
B. Sprinkler main shall be pressure tested as follows:
1. Two (2) hour pressure test at 1.5 times the system operating pressure
2. Twenty four (24) hour pressure test at the system operating pressure
If leaks occur, repair and repeat the test until no leaks occur (pressure does not drop). Give Designer twenty-four hours notice prior to testing.
C. Testing of the system shall be performed after completion of the entire installation and any necessary repairs shall be made at the Contractor's expense to put the system in good working order before final payment by the Owner.
D. Adjustment of the sprinkler heads, and automatic equipment, will be done by the Contractor upon completion of installation to provide optimum performance. Minor adjustments during the guarantee period will be made by the Owner.
E. After completion, testing, and acceptance of the system, the Contractor will instruct the Owner's personnel in the operation and maintenance of the system.

3.5 CLEAN UP AND PROTECTION

- A. During irrigation work, Contractor shall keep project site clean and orderly
B. Upon Completion of Work, clear grounds of debris, superfluous materials and all equipment. Remove from site to satisfaction of the Owner's Representative.

3.6 WINTERIZING THE SYSTEM

- A. Contractor's responsibility to winterize the Irrigation system the first winter following Substantial Completion of the Project.

3.7 INSPECTION

- A. Periodic Inspections will be made by the Landscape Architect/Owner's Representative to review the quality and progress of the work. Work found to be unacceptable must be corrected within a timely matter (to be determined by Owner's Representative). Remove rejected materials promptly from the project site.
B. It will be the responsibility of the Irrigation Contractor to provide a reliable communication system (i.e. Two way radios or remote radio control activation system) for Substantial Completion and all periodic inspections.

PART 4.0 - CODES, PERMITS, WARRANTY, AND GUARANTEE

4.1 CODES AND ORDINANCES

- A. All materials, installation parameters, and operations shall conform to all applicable codes and ordinances. It is the Contractor's responsibility to investigate and follow all regulations. Contractor is responsible to verify applicable codes and ordinances prior to submitting bid. Before bid submittal, it is the Contractor's responsibility to notify the Irrigation Consultant/Designer at least 5 days before bid submittal, of any changes due to code or ordinance discrepancies. If the Contractor does not comply with this process and notification, the Contractor shall be responsible for the necessary installation change and redesign costs for non-compliance.

4.2 PERMITS AND FEES

- A. The Contractor shall obtain, at his expense, all required permits and shall pay all required fees. Any penalties imposed due to failure to obtain any permit or pay any fee shall be the responsibility of the Contractor.

4.3 WARRANTY AND GUARANTEE

- A. The Contractor shall furnish a certificate of warranty registration and written guarantee of work and materials for a one year period from the date of final acceptance of the Irrigation System by the Owner and the Designer.

END OF SECTION

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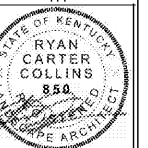
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IRRIGATION PLANS

IRRIGATION DETAILS



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