SECTION 32 80 00

IRRIGATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. CONTRACTOR shall furnish all labor, materials, supplies, equipment, tools and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, the guarantee/warranty, the installation details, and as specified herein. This shall include repair to existing landscape irrigation systems for all areas disturbed by construction. Complete coverage of all turf areas and irrigation of all planting areas shall be performed using equipment similar to that existing onsite. Items of WORK specifically included are:

1. Procuring all applicable licenses, permits, and fees.

2. Inspecting WORK site prior to construction and ascertaining utility locations.

3. Installing irrigation system, including pumps, filters, sleeving, and other appurtenances.

4. Connecting electrical power supply to the irrigation control system.

5. Maintaining system until final acceptance.

1.02 GENERAL

A. CONTRACTOR shall make an inspection of the PROJECT site where the WORK is to be performed and become aware of the ground structure and obstacles which may be encountered and all other relevant matters in connection with the WORK prior to the submitting a BID(s).

B. CONTRACTOR is expected to base the BID on equipment and materials consistent with the existing irrigation system and in the event there are materials and/or equipment in the BID which do not conform with these specified by OWNER, CONTRACTOR shall be responsible for furnishing such materials and/or equipment which meet such qualifications at no change in the BID price.

C. Substitutions are not encouraged and as a general rule will not be allowed. Substitutions will only be considered following BID award.

D. Precautions have been taken to ensure accuracy and conformance of the CONTRACT DOCUMENTS with the design concept of the PROJECT. Nevertheless, CONTRACTOR shall be responsible for confirming and correlating actual job site dimensions, for acquiring information that pertains solely to the fabrication process or to techniques of construction, and for coordinating the WORK with all other trades.

E. Beginning WORK of this section implies acceptance of existing conditions. There shall be no extra compensation by reason of any matter or thing concerning conditions about which CONTRACTOR may be informed prior to bidding.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. International Association of Plumbing and Mechanical Officials (IAPMO).

2. National Electrical Code (NEC).

3. Underwriters Laboratories, Inc. (UL).

4. Uniform Plumbing Code (UPC).

1.04 SUBMITTALS

A. Materials List: Include pipe, fittings, mainline components, water emission components, and control system components. Quantities of materials need not be included.

B. Manufacturer's Data: Submit manufacturer's catalog cuts, specifications, and operating instructions for equipment shown on the materials list.

1.05 DELIVERY, STORAGE, AND HANDLING

A. CONTRACTOR shall exercise care in handling, loading, and unloading the pipe and fittings. Pipe shall be stored in accordance with the manufacturer's recommendations regarding skids, blocking, etc. to prevent damage to the pipe.

1.06 GUARANTEE AND REPLACEMENT

A. The purpose of this guarantee/warranty is to ensure that OWNER receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.

1. For a period of one (1) year from the date of final completion and commencement of the formal maintenance period, guarantee/warranty irrigation materials, equipment and workmanship against defects. Fill and repair depressions. Restore landscape or structural features damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by a defective item. Make repairs within three (3) days of notification from ENGINEER.

2. CONTRACT DOCUMENTS govern replacements the same as new WORK. Make replacements at no cost in CONTRACT price.

3. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

PART 2 PRODUCTS

2.01 GENERAL

A. Unless otherwise stipulated in the SPECIFICATIONS, all equipment, materials and articles incorporated in this PROJECT are to be new and in the best grade of their respective kinds for the purpose.

B. When the CONTRACT DOCUMENTS call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, CONTRACTOR shall provide the quality and size required by the CONTRACT DOCUMENTS.

C. Work and materials shall be in accordance with the latest edition of the National Electrical Code, Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.

2.02 PIPE AND TUBE

A. Mainline: PVC Class 200 SDR-21 (match existing).

B. Lateral Lines: PVC CC160 SDR-26 (match existing).

2.03 MAINLINE COMPONENTS

A. Point-of-Connection (P.O.C.) Assembly: As shown in the installation details or matches existing.

B. Isolation Gate Valve Assembly: As shown in the installation details.

C. Quick Coupling Valve Assembly: As shown in the installation details.

2.04 SPRINKLER IRRIGATION COMPONENTS

A. Automatic Remote Control Valves Assembly for Sprinkler Laterals: As shown in the installation details. Match existing heads.

B. Sprinkler Assembly: As shown in the DRAWINGS and installation details.

2.05 PIPE SLEEVE

A. Pipe Sleeve: PVC Schedule 40.

2.06 THRUST BLOCK

A. Concrete for thrust blocks shall meet the following:

1. PSI: Minimum of three thousand five hundred (3,500).

2. Water/cement Ratio: Not greater than fifty-three hundredths (0.53).

3. Air Content: Range between four and eight percent (4-8%).

4. Slump: Maximum of four (4) inches.

2.07 CONTROL SYSTEM COMPONENTS

A. Irrigation Controller Unit:

1. As presented in the DRAWINGS and installation details.

2. Wire markers are to be pre-numbered or labeled with indelible non-fading ink, made of permanent, non-fading material.

3. Primary surge protection arrestors as per manufacturer's recommendations.

B. Control Wire:

1. Type: Electric wire from the controller unit, to each remote control valve shall be American Wire Gauge (AWG) No. 14 solid copper, Type UF cable, UL approved for direct underground burial. Common wire shall be AWG No. 12 solid copper, Type UF cable, UL approved for underground burial.

2. Color: Wire color shall be continuous over its entire length. Use white for common ground wire. Use easily distinguished colors for other control wires. Spare control wires shall be of a color different from that of the active control wire.

3. Splices: As presented in installation details.

2.08 ACCESSORIES

A. CONTRACTOR shall provide to OWNER operating keys, servicing tools, test equipment, other items and spare parts indicated in the General Notes on the DRAWINGS.

PART 3 EXECUTION

3.01 GENERAL

A. Appoint a competent resident superintendent to be onsite whenever the WORK is in progress. The superintendent shall not be replaced without notice to ENGINEER.

B. CONTRACTOR is responsible for locating and avoiding underground utilities, for notifying all appropriate agencies prior to beginning excavation, and for any damage caused by CONTRACTOR. CONTRACTOR is required to notify ENGINEER and the utility company should there be any damage to utilities.

C. ENGINEER and OWNER shall at all times have access to the WORK wherever it is in preparation or progress and CONTRACTOR shall provide proper facilities for such access and inspection.

D. ENGINEER shall have the right to reject materials and workmanship or require their correction. Any rejected or faulty WORK shall be repaired or replaced at no cost to OWNER.

E. Record Drawings:

1. CONTRACTOR shall keep an up-to-date set of DRAWINGS on the job site detailing changes made during construction.

2. After completion of the PROJECT, CONTRACTOR shall furnish OWNER with an “as-built” drawing. The “as-built” drawing shall show the correct location of all piping, valves, heads and control line locations. Instruction sheets and parts lists covering all operating equipment shall be bound in a folder and furnished to OWNER.

3.02 PREPARATION

A. CONTRACTOR shall protect all existing site development including, but not limited to, existing buildings, equipment, underground utilities, walls, materials, etc. Any existing site development damaged by willful or negligent acts of CONTRACTOR or any of CONTRACTOR’s employees shall be replaced or repaired at no expense to OWNER and in a manner satisfactory to ENGINEER before PROJECT acceptance is given. This provision applies to onsite damage as well as to that which may occur to adjacent properties.

B. Until the PROJECT has been accepted, CONTRACTOR shall erect and maintain shoring, barricades, guards, warning signs, and lights as necessary or required for the protection of the public, the WORK, and the workers. To the same ends, provide WORK area safety and institute side security measures, as needed.

C. CONTRACTOR shall stake out the irrigation system. Items staked include sprinklers, pipe, control valves, manual drains, pumping plant, controller, and isolation valves. After staking out the system, OWNER shall be contacted for approval before trenching.

3.03 EXCAVATION AND BACKFILL

A. General: All excavation shall be done by open cut except where boring is permitted or required. All trenches shall be straight with bottoms on uniform slopes. The trench shall be graded along its entire length to ensure firm bedding of the pipe.

B. Excavation: CONTRACTOR shall do all necessary excavation for the proper installation of the WORK. Over-excavation shall be backfilled and hand-tamped prior to installation of the pipe. Any pumping, bracing or shoring shall be included in the unit cost for excavation. CONTRACTOR shall excavate to permit the pipes to be laid at the intended elevations and to permit workspace for installing connections and fittings.

C. Minimum Cover (Distance from Top of Pipe or Control Wire to Finish Grade):

1. 36-inch minimum over mainline pipe.

2. 18-inch over lateral pipe.

3. 12-inch over lateral pipe to pop-up sprinklers.

4. 12-inch over lateral pipe to rotary sprinklers.

D. Backfill: The material excavated from the trenching may be used for backfill when meeting the following standards. The material placed directly on top of the pipe to a depth of six (6) inches shall be free of all foreign matter and rock. After this, rock two (2) inches in diameter or less will be allowed in the backfill material. All rock or foreign matter not incorporated in the backfill material shall be hauled off the site at CONTRACTOR's expense. In the event clean backfill material from the excavation is insufficient, CONTRACTOR shall import clean fill material as needed.

E. Compaction. All trenches shall be compacted within the pipe area by hand-tamping or by water puddling. If water is used to compact the ditch, it shall be applied after the backfill has been brought to the top of the pipe. After the initial backfill has been properly placed and tamped around the pipe, the remaining backfill material may be placed and compacted by machine. All trenches shall be compacted to the density of the surrounding material. Special attention shall be given to traffic areas to protect the pipe and to avoid future settlement because of poor compaction. Any settlement occurring within the guarantee period shall be repaired at no additional cost to OWNER.

3.04 PIPE INSTALLATION

A. General:

1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends.

2. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.

B. Mainline Pipe and Fittings:

1. Threaded Plastic Pipe: Use only strap-type friction wrenches for threaded plastic pipe.

2. PVC Rubber-Gasketed Pipe: Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.

3. PVC Solvent Weld Pipe:

a. Use primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.

b. Cure for thirty (30) minutes before handling and twenty four (24) hours before allowing water in pipe.

c. Snake pipe from side to side within the trench.

C. Lateral Pipe and Fittings:

1. Threaded Plastic Pipe: Use only strap-type friction wrenches for threaded plastic pipe.

2. PVC Solvent Weld Pipe:

   a. Use primer and solvent cement. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.

   b. Cure for thirty (30) minutes before handling and twenty four (24) hours before allowing water in pipe.

   c. Snake pipe from side to side within the trench.

D. Permissible Deflection at Joints: Whenever it becomes necessary to deflect the pipe from a straight line in either a horizontal or vertical plane, the degree of deflection shall be within the limits set forth by the manufacturer and shall be approved by OWNER.

E. Deviations for Utility Structures: Whenever existing utility structures, conduits, ducts, pipes or other obstructions to grade and alignment of the pipe are encountered, they shall be permanently supported, protected, removed, relocated or reconstructed by CONTRACTOR through the cooperation of the utility company involved.

F. Deviations for Existing Tree Roots: Avoid cutting tree roots larger than one (1) inch in diameter.

G. Thrust Blocking: All pipe, fittings, and valves shall be carefully placed in the trenches with concrete thrust blocks to be poured at all fittings that result in a change of flow direction in the main line on pipe larger than three (3) inches. Any concrete that is judged to be of inferior quality shall be replaced at OWNER's request. The thrust blocks shall be left exposed for forty eight (48) hours for inspection.

H. Sleeves: All pipe under pavement shall be in sleeves PVC Schedule 40 and shall be sized two (2) times the diameter of pipe being sleeved.

3.05 SPRINKLER INSTALLATION

A. General. All sprinklers shall be installed by CONTRACTOR at the locations indicated on the DRAWINGS. It shall be the responsibility of CONTRACTOR to notify OWNER or OWNER's representative of any deviation which may affect the spacing or location of the sprinkler heads. Unless written permission is given, CONTRACTOR shall not extend the head spacing beyond one hundred percent (100%) head-to-head coverage.

B. Sprinkler Heads. All sprinkler heads shall be installed in strict accordance with the manufacturer's recommendations. Provide a swing pipe assembly for each sprinkler head. Prior to the installation of the nozzles, all piping shall be thoroughly flushed. Sprinklers shall be installed at grade.

3.06 CONTROL EQUIPMENT

A. General: All manual and/or automatic control valves, automatic controllers, pressure reducing valves, check valves, vacuum breakers, and other control equipment shall be installed at the locations shown on the DRAWINGS or as specified by OWNER. In addition to these SPECIFICATIONS, CONTRACTOR shall follow the local code

requirements. In the event that a discrepancy exists between these SPECIFICATIONS and the local codes, the adopted code shall prevail.

B. Automatic Valves. Use brand model and size noted on DRAWINGS. Automatic control valves shall be installed in accordance with the manufacturer's recommendations. Install as indicated on the DRAWINGS and installation details.

1. Flush mainline before installation of remote control valve assembly (RCV).

2. Install where indicated on the DRAWINGS. Wire connectors and waterproof sealant shall be used to connect control wires to remote control valve wires. Install connectors and sealant per the manufacturer's recommendations.

3. Adjust RCV to regulate the downstream operating pressure.

C. Irrigation Controller Unit:

1. The location of the controller units shall be as shown on the DRAWINGS.

2. Install one valve output surge protection arrestor on each control wire and one for the common wire.

3. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with the identification number (see DRAWINGS) of the remote control valve to which the control wire is connected.

4. Connect control wires to the corresponding controller terminal.

D. Control Wire:

1. Bundle control wire where two (2) or more are in the same trench. Bundle with pipe wrapping tape spaced at ten-foot (10') intervals.

2. Control wiring may be pulled into the soil utilizing a vibratory plow device specifically manufactured for pipe pulling. Minimum burial depth equals minimum cover as shown on the DRAWINGS.

3. Provide a twenty-four inch (24") excess length of wire in an eight-inch (8") diameter loop at each ninety degree (90°) change of direction, at both ends of sleeves, and at one-hundred foot (100') intervals along continuous runs of wiring. Do not tie wiring loop. Coil the twenty-four inch (24") length of wire within each remote control valve box.

4. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install control wires along the entire length of the mainline. Provide a twenty-four inch (24") length of wire from each end of the spare control wires coiled in the control enclosure and provide a twenty-four inch (24") length of coiled wire for each spare control wire in a six-inch (6") round valve box at each distal end of the mainline pipe.

5. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box

which contains an irrigation valve assembly, or in a separate six-inch (6") round valve box.

6. Unless noted on DRAWINGS, install wire parallel with and under PVC mainline pipe.

7. Protect wire not installed with PVC mainline pipe with a continuous run of warning tape placed in the backfill six (6) inches above the wiring.

3.07 FIELD QUALITY CONTROL

A. Major Inspections: CONTRACTOR shall obtain approval of ENGINEER at these points in construction before proceeding to next operation.

1. Trenching and Mainline Installation, Including Thrust Blocks: ENGINEER shall review thrust blocking and observe a pressure test of the mainline before any backfilling.

2. Head Layout: ENGINEER shall review irrigation head layout before installation of the heads.

3. Final Punch List: ENGINEER shall prepare a punch list at the completion of construction and observe coverage, controller, and pump operation and other appropriate system functions.

B. Periodic Spot Checks:

1. ENGINEER may make periodic spot checks to observe the WORK in progress.

2. Follow-up visits will occur as needed.

3. Check for proper operation/coverage of sprinkler system.

C. System Adjustment: Adjustment of the sprinkler heads, control systems, and performance tests shall be done by CONTRACTOR to provide OWNER with a professional, complete installation. All performance tests shall be made in the presence of OWNER or OWNER's representatives. CONTRACTOR shall pay particular attention to coverage and system operation. Any areas which do not conform to designed operation requirements because of unauthorized changes or poor installation practices shall be immediately corrected by CONTRACTOR at no additional cost to OWNER.

D. Acceptance:

1. Once the system is operating in conformance with these SPECIFICATIONS, OWNER will issue written final acceptance of the system.

2. In unusual cases, OWNER may elect to accept the system even though the corrections on the final punch list have not been made by CONTRACTOR. In such cases, the cost of completing the WORK will be deducted from CONTRACTOR's final payment in accordance with the BID SCHEDULE.

3. If the system is not in acceptable condition by the end of the watering season, CONTRACTOR is responsible for winterizing the system and restarting it the following spring.

4. OWNER is not required to make partial or staged acceptances of the irrigation system.

3.08 RESURFACING

A. In areas where it becomes necessary to remove the existing pavement on sidewalks, roads, paths or driveways, it shall be replaced by CONTRACTOR with a similar surfacing at least equal to the quality of the original. Prior to replacement, all exposed edges shall be trimmed to a neat straight line (saw cut) to provide an unobtrusive patch.

3.09 CLEANING

A. Upon completion of WORK, remove from the site all machinery, tools, excess materials, and rubbish.

END OF SECTION