

SECTION 32 80 00 – IRRIGATION

PART 1 – GENERAL

1.01 CONTRACTOR QUALIFICATIONS

- A. Contractor must have at least two years experience in the irrigation industry.
- B. Contractors will have successfully installed at least two projects of comparable size or show adequate proof of qualifications as may be deemed necessary by owners.

1.02 WORK INCLUDED

- A. Extent
 - 1. The contractor shall furnish all labor, materials and equipment for the proper installation of the irrigation system. The work includes, but is not necessarily limited to, the following:
 - a. Trenching and backfill;
 - b. Automatically controlled irrigation system;
 - c. Test all systems and make operative; and
 - d. Record Drawings.
 - 2. Contractor to provide tap, meter, backflow preventer, pump and electrical service to controller as specified on the drawings.
- B. Permits and Fees: The contractor shall obtain all permits and pay required fees to any governmental agency having jurisdiction over the work. Inspection required by local ordinances during the course of construction shall be arranged as required. On completion of the work, satisfactory evidence shall be furnished the Owner to show that all work has been installed in accordance with the ordinances and code requirements.
- C. Approval: Wherever the terms "approve", "approval," or "approved" are used in the specification, they shall mean the approval of the Owner in writing.
- D. Before any work is started, a conference shall be held between the contractor and the Owner concerning the work under this Contract. Mandatory weekly meetings will be held with the Owner while the work is being done.
- E. Coordination: The Contractor shall coordinate and cooperate with other contractors to enable the work to proceed as rapidly as possible.
- F. Inspection of the Site
 - 1. The contractor shall acquaint himself or herself with all site conditions. The contractor may be required to contact Tennessee One-Call to locate and mark the locations of all underground utilities on the project site. The owner shall reimburse the contractor for the cost of this service. The contractor shall be responsible for insuring that utility markings remain legible throughout the duration of the project. Should utilities not shown on the plans or marked by the locator service be found during excavations, contractor shall promptly notify the Owner 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 plans.
 - 2. Contractor shall make necessary adjustments in the layout as may be required to connect to existing stub outs, should such stub outs not be located exactly as shown, and as may be required to work around existing work at no increase in cost to the Owner.
- G. Protection of Existing Plants and Site Conditions: The Contractor shall take necessary precautions to protect site conditions to remain. All work in the vicinity of trees shall be in accordance with

Vanderbilt Tree Protection Specifications. Should damage be incurred, the Contractor shall repair the damage to its original condition at his own expense.

- H. The Owner reserves the right to substitute, add, or delete any material or work as the work progresses. Adjustment to the contract price shall be negotiated.
- I. The Owner reserves the right to reject materials or work which does not conform to the Contract Documents. Rejected work shall be removed or corrected at the earliest possible time.
- J. Work Schedule: Within 10 days after award of the Contract, the contractor shall submit to the Owner a work schedule.
- K. Record Irrigation Drawings: Prepare Record Drawing on 4 mil double matted mylar which shall show deviations from the bid documents made during construction affecting the main line pipe, controller locations, remote control valves, quick-coupling valves, all sprinkler heads, and manual drains. The drawings shall also indicate and show approved substitutions of size, material and manufacturer's name and catalog number. The drawings shall be delivered to the Owner before final acceptance of the work.
- L. Final Acceptance: Final acceptance of the work may be obtained from the Owner upon the satisfactory completion of all work.
- M. Guarantee: All work shall be guaranteed for one year from date of acceptance against all defects in material, equipment, and workmanship. Guarantee shall also cover repair of damage to any part of the premises resulting from leaks or other defects in material, equipment, and workmanship to the satisfaction of the Owner. Repairs, if required, shall be done promptly at no cost to the Owner.

1.03 LEED REQUIREMENTS FOR PROJECT CERTIFICATION

- A. Invoices and documentation from manufacturer or supplier to include the amounts of post-consumer and post-industrial recycled content by weight for all materials used, and city and state of origin of all materials and city and state of final assembly.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All materials throughout the system shall be new and in perfect condition.
- B. No deviations from specifications shall be allowed unless approved by Owner.

2.02 P.V.C. PIPE AND FITTINGS

- A. All plastic pipe from sizes 3/4" through 1-1/2" should be Class 200 Polyvinyl Chloride Pipe (P.V.C.), Type 1120 or 1220, and shall conform to CS-256-63.
- B. P.V.C. pipe shall be continuously marked with identification of the manufacturer, type, class and size.
- C. All fittings to be used on specified P.V.C. pipe shall be Schedule 40 P.V.C., Type 1, and must be of domestic manufacture. All fittings shall be identified as to pressure rating or schedule.
- D. Solvent for use of P.V.C. pipe and fittings shall be of a type approved by the manufacturer of the pipe.
- E. All plastic pipe from sizes 2" through 4" shall be belled-spigot type, un-plasticized P.V.C., Class 200.
- F. Fittings for belled-spigot type pipe shall be of the same manufacture as the pipe and shall be either un-plasticized P.V.C. or asbestos-cement with brass inserts for tapped outlets.
- G. Make all connections between plastic pipe and metal valves or steel pipe with threaded fittings,

using plastic male adapter

- H. Cap or plug all openings as soon as lines have been installed to prevent the entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

2.03 RISERS AND SWING JOINT NIPPLES

- A. Sprinkler heads using less than 6.5 gpm shall be connected to lateral line with 3/8" poly pipe (.69-.70, O.D., .59-.60 I.D., 100 wall thickness, 80 psi pressure rating) with insert fittings.
- B. Sprinkler heads using 6.5 to 10 gpm shall be connected to lateral line with a P.V.C triple swing joint with Schedule 80 nipple and Schedule 40 P.V.C or Marlex street el.

2.04 115 VOLT ELECTRIC WIRING

- A. All 115 volt AC wiring shall be installed in accordance with local electric codes.
- B. 115 volt service to controllers shall consist of one black and one white wire with ground.
- C. All wiring shall be located in rigid conduit and buried to a minimum depth of 18".
- D. All splices in wiring shall be made watertight using approved methods which conform to UL classifications.

2.05 CONTROL LINES

- A. 24-volt electric
 - 1. Electric control lines from controller to automatic valves shall be direct burial UF (U.L. Approved) wire of a different color than the 110 volt service to controllers.
 - 2. The 24-volt common ground shall be of one continued color and a different color than the other 24 volt lines and the 1120 volt service.
 - 3. All wire splicing shall be minimized, with such splices made waterproof with the use of Scotchlok or Pen-Tite kits
 - 4. All 24-volt wiring shall be done in accordance with existing codes.

2.06 LOCATOR WIRING

- A. Contractor shall install a 16 gauge locator wire on all main and lateral lines.
- B. Wire shall be connected at all pipe intersections to provide a continuous run from the controller box to the ends of the system.
- C. Coil an additional 18" of wire in the controller box to allow attachment of locating device.

2.07 SPRINKLER HEADS

- A. All sprinkler heads shall be as specified on the irrigation design plan.
 - 1. The body of the sprinkler shall be constructed of cyclac material, the sprinkler shall be easily serviced from the top of the sprinkler, shall have an accessible screening device, and shall perform to manufacturer's specifications concerning diameter of throw and gallonage at given pressures.
 - 2. Spacing of the heads on this project shall not exceed the manufacturer's maximum recommendations.
- B. All sprinklers shall be installed as per manufacturer's specifications.

2.08 CONTROL EQUIPMENT

- A. Automatic controller shall be specified on the irrigation design plan.

1. The controller shall be encased in a sturdy, lockable, wall-mount box and must be easily accessible for maintenance.
 2. Minor timing adjustments of the controller shall be possible to be made in the field.
 3. There shall be no time lags between sections or stations and the controller will be of a compatible type for operating the automatic control valve.
 4. If the timing mechanism of the controller has to be removed from the field for service, the controller shall be capable of continued manual operation.
- B. Automatic control valves shall be as specified on the irrigation design plan.
1. They shall be of the same operation type as the controllers.

2.09 GATE VALVES

- A. Gate valves shall be of brass with screwed connections, non-rising stems, and cross handles, with a minimum pressure rating of 200 psi.
1. All gate valves shall be installed using a valve box to provide access to the handle.
 2. Gate valves shall be used in any case where a manual drain valve is required.

2.10 MANUAL DRAIN VALVES

- A. Shall be installed at all low points in the irrigation system.
- B. Locate valves in a valve box with a gravel sump at least 24" deep.

2.11 AUTOMATIC DRAIN VALVES

- A. Shall be installed where lateral pipe will not drain by manual drain.

2.12 MISCELLANEOUS SYSTEM COMPONENTS

- A. Sleeves
1. Schedule 40 P.V.C. - Plastic pipe shall be provided under all walks and paving and where indicated on drawings for irrigation piping and control wires.
 2. Sleeve shall extend a minimum of 18" beyond edges of paving or construction. Depth of sleeve shall be 12" to 24" below sub-grade of paving. To aid in location of sleeve during construction, install a glued elbow fitting at all sleeve ends. Install a vertical pipe from elbow to 6" min. above finished grade. Install a glued cap fitting at top of sleeve extension.
- B. Service Saddles
1. All service saddles shall be Smith-Blair double strap, all bronze.
- C. Locator Wire
1. All locator wire shall be 16 gauge U.F. Color of locator wire shall be different than that of any control wires. Locator wire shall extend continuously from controller along all main and lateral lines. At controller, 18" of locator wire shall be coiled in controller box and tagged as follows:
Locator wire only - do not use for control wire.

PART 3 – EXECUTION

3.01 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall continuously protect both his work and the Owner's property from damage arising in connection with work on this contract.
- B. The Contractor shall avoid damage to any buildings, equipment, utilities, sidewalks, landscaping,

above ground or underground structures or installations of any kind, and shall be held responsible for any damage that occurs as a result of his work or leakage of the irrigation system which he is installing.

- C. The Contractor shall operate or drive his equipment or vehicles only in areas or corridors designated by Owner before work is commenced.
- D. The Contractor shall adequately protect adjacent property as provided by law and shall provide and maintain all passageways, guard fences, lights and other facilities for protection required by Vanderbilt.
- E. The Contractor shall securely cover all trenches and openings into the section of the system he is working on and components of the system as it is being installed, or barricade with a 6' tall chain-link fence mounted on 8' tall steel posts if excavations are to remain open overnight, to prevent obstructions in the pipe, and the breakage, misuse, or disfigurement of the equipment or hazards to pedestrians.

3.02 LANDS FOR MATERIAL STORAGE

- A. The Contractor has the right to erect temporary construction facilities for storage and protection of his materials and equipment on the lands set aside by the Owner for materials storage.

3.03 HANDLING OF MATERIALS

- A. The Contractor shall be responsible for correct procedures in loading, unloading, stacking, transporting and handling all materials to be used in the system.
- B. The Contractor shall avoid rough handling which could affect the useful life of the equipment.
- C. Pipe shall be handled in accordance with the manufacturer's recommendations on loading, unloading, and storage.

3.04 CLEANING PREMISES

- A. The Contractor shall continuously keep a neat and orderly area in which he is installing the system. Disposal of rubbish and waste material resulting from the installation shall be continuous.
- B. Upon completion of the system installation, the Contractor shall remove from the Owner's property, at his own expense, all temporary structures, rubbish, and waste materials resulting from the installation of said system.

3.05 INSPECTION OF WORK IN PROGRESS

- A. The Owner shall be responsible for inspecting the Contractor's work in progress, and shall notify the Contractor of any work which does not meet the specifications of this contract. The Contractor shall correct such work.

3.06 MARKING LOCATIONS OF IRRIGATION PIPING AND SPRINKLER HEADS

- A. The Contractor shall mark the proposed location of all irrigation piping and sprinkler heads on the ground with spray paint prior to trenching. Marked areas shall be limited to one week's worth of work. The Contractor shall notify the Owner of the marking at least three business days prior to the start of trenching, and shall not proceed with trenching until receiving written approval of the marking from the Owner. The Contractor is responsible for re-marking lines as necessary so that they remain visible until trenching is done.

3.07 EXCAVATION

- A. All excavation shall be unclassified and shall include all materials encountered except materials which cannot be excavated by normal mechanical excavation means (30 hp trencher). Such exceptions shall be brought to the attention of the Owner and an adjustment in price shall be agreed upon before excavation of these areas proceeds. Such price adjustments and agreement shall include responsibility for disposal of the unsuitable materials removed from the trench and the acquiring of additional backfill material.
- B. Any trenching to be located within the drip-line of an existing tree shall be done by hand. Any root under 1" in diameter which crosses the trench shall be cut cleanly with pruning shears or a fine-toothed saw. If any roots over 1" in diameter are encountered during trenching, the Owner shall be contacted immediately for a decision on rerouting the piping or cutting the root. All trenching in tree root zone shall run radially to the trees.
- C. Minimum depth of cover over piping 2" and larger shall be 18", minimum cover over piping smaller than 2" shall be 12".
- D. In existing lawn areas, remove and preserve sod over trenches, and replace it after backfilling trenches.
- E. Backfill material shall be free from rocks or other materials which may damage pipe or cause excess settling. Backfilling shall be done in 6" layers, and tamped after each layer to reduce settling.
- F. Backfilling of trenches containing plastic pipe shall be done when pipe is cool to avoid excessive contraction in cold weather. Such backfilling can be done in early morning hours or the pipe may be water-cooled prior to backfilling procedures.
- G. If trenching is necessitated through existing asphalt roadways, the Contractor shall cut the asphalt to the width of the trench prior to trenching. Removal of cut asphalt and replacement of all asphalt shall be the responsibility of the Contractor.
- H. The Contractor shall exercise reasonable care to avoid causing damage to any and all underground utilities and structures. The Owner shall advise the Contractor of any underground utilities or structures of which he is aware. Utility locating services shall be called upon to pinpoint location of any underground utilities on the site of the project.
- I. All disturbed lawn areas are to be dressed off to finish grade and seeded with a mixture of 50% Rebel Fescue and 50% Falcon Fescue.

3.08 INSTALLATION OF SYSTEM MAIN

- A. Installation of the system main shall be in accordance with the Manufacturer's instructions and shall proceed from the point of connection of supply for the system pumping station, reservoir, or existing line.
- B. Concrete thrust blocks shall be installed at any directional change in the pipeline in accordance with pipe manufacturer's instructions. (Pipe 3" and larger).
- C. The main shall be flushed and pressure tested for 24 hours prior to making any lateral connections.
- D. Locator wire shall be laid on top of all main lines before closing trench.

3.09 INSTALLATION OF LATERAL LINES

- A. Lateral lines may be installed by standard trenching techniques or by "pulling in" pipe. If the pull-in method is used, the pipe "plow" shall be a vibratory type and equipped with a turf roller device to prevent tearing of the turf. The "Mole or Bullet" which precedes the pipe and is used to form the opening for the pipe, shall not be less than 1" larger in diameter than the outside diameter of the

pipe. Starting and finishing holes shall not exceed a 2'-square opening, with the sod removed from such holes to be preserved and replaced. Locator wire shall be pulled in with lateral piping or laid on top of all lateral lines before closing trench.

3.10 SPRINKLER HEADS

- A. All sprinklers shall be installed on swing joints as per manufacturer's specifications.
- B. The sprinkler head shall be installed so that the top is slightly above the finished grade level. If finished grade has not been established, the sprinkler will be extended a minimum of 2" above existing level and marked with a stake to prevent damage by equipment.
- C. Backfill around the swing joint and sprinkler shall be free of large rocks, roots, or foreign debris.

3.11 CONTROL LINES

- A. All control lines shall be installed in a neat and orderly fashion and may be installed in the main and lateral trenching or in their own separate trench. The lines shall be bundled together and taped every 5-10'.
- B. Control line connections shall be as approved in a preceding section of these specifications.

3.12 CONTROL EQUIPMENT

- A. All automatic valves and controllers shall be installed following the recommendations of the manufacturer of said equipment.
- B. The location of all controllers shall be approved by the Owner's representative before the actual installation of said controllers.

3.13 VALVE BOXES, DRAINS, ETC.

- A. All valve boxes, drain boxes, or any other miscellaneous marker or access box shall be installed so the top of said structure is at finished grade.

3.14 TESTING SYSTEM

- A. Upon completion of the irrigation system and after sufficient time has been allowed for solvent weld joints to cure, the entire system shall be tested for proper operation.
- B. All air will be flushed from the system and all components will be checked for proper operation.
- C. The Contractor shall request the presence of the Owner in writing at least 48 hours in advance of testing.
- D. The contractor shall repair leaks resulting from tests.
- E. If Owner discovers leak during warranty period, Owner notifies Contractor. Contractor must respond within 48 hours of written notification to begin repairs.

3.15 BALANCE AND ADJUSTMENT

- A. The Contractor shall balance and adjust the various components of the sprinkler system so the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to pressure regulators, pressure relief valves, part circle sprinkler heads and individual station adjustment on the controller.
- B. The Contractor has the right to call in the Owner's representative to aid in the balancing and adjustment of the system.

3.16 NOTICE OF COMPLETION

- A. When the Contractor is satisfied that the system is operating properly, that it is balanced and adjusted, that all work and cleanup is completed, he shall issue the notice of completion to the Owner. The notice of completion shall include the request for final inspection with date and time given.

3.17 FINAL INSPECTION WITH OWNER'S REPRESENTATIVE

- A. The Owner will respond to the notice of completion by the Contractor and shall appear at the given time for a tour of the project with the purpose of making it the final inspection.
- B. Any inconsistencies to the specifications shall be noted by the Owner and a written copy of corrections shall be given to the Contractor.

3.18 ACCEPTANCE OF THE SYSTEM

- A. The Owner may accept the system even though the corrections on the final inspection have not been made by the Contractor. In such a case, there will be deductions for the incomplete or incorrect work based on previous provisions of these specifications. Such deductions shall be made from the final payment.

3.19 AS-BUILT PLAN ACCEPTANCE

- A. Acceptance of the system is based on the furnishing by the Contractor of a completed "as-built" plan which is acceptable to the Owner or Owner's representative.

3.20 TRAINING OF MAINTENANCE PERSONNEL IN OPERATION AND MAINTENANCE OF SYSTEM

- A. Upon completion of the system, the Contractor shall train maintenance personnel designated by Owner in the day-to-day operation and maintenance of the system.
- B. The Contractor shall, at no additional cost to the Owner, conduct one draining and winterizing of the system in November, and one reactivation of the system in March. The Contractor shall notify the Owner in writing at least 14 days prior to conducting winterizing and reactivation, and shall train maintenance personnel designated by Owner in each procedure.
- C. The Contractor shall provide three (3) copies of all pertinent operation and maintenance literature to Owner upon final acceptance of the system.

3.21 WARRANTY AND GUARANTEE CERTIFICATES

- A. The Contractor shall furnish a certificate of warranty registration and a guarantee or work and materials for a one year period from date of final acceptance of the system. Final payment for the system shall not be made unless this certification is presented to the Owner.
- B. Warranty will not include damage due to pilferage, vandalism, or damage by environmental extremes such as earthquakes, floods, etc.

END OF SECTION