

SECTION 328400
PLANTING IRRIGATION

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. General:

1. The extent of base landscape irrigation as shown on the Drawings.
2. Unless otherwise specified, the plans and specifications are intended to include everything obviously requisite and necessary for the proper installation and completion of the work, whether or not each necessary item is mentioned herein. The plans and specifications are intended to be cooperative and any time called for in one and not the other shall be as binding as if called for in both.

1.2 QUALITY ASSURANCE

A. Manufacturing Qualifications:

1. Provide the landscape irrigation system as a complete unit produced by the manufacturers specified for all portions of the work including heads, valves, piping circuits, controller, pump and accessories. Materials shall be purchased from the nearest authorized distributor to the project of the specified products.

B. Installer Qualifications:

1. Acceptable installers per General Conditions of Specifications.

C. Testing:

1. Pressure testing/verification shall be the responsibility of the irrigation contractor.

D. Requirements of Regulatory Agencies:

1. System shall comply with the requirements of state and local codes and ordinances.
2. Electrical devices shall carry Underwriters' Laboratory labels.

1.3 REFERENCES

- A. ASTM D2241 - Polyvinyl chloride plastic pipe.
- B. ASTM D2564 - Solvent cement for polyvinyl chloride plastic pipe and fittings.
- C. ASTM D2239- Flexible Polyethylene pipe.

1.4 SUBMITTALS

- A. As-Builts:
 - 1. Submit as-built drawings after Substantial Completion.
- B. Manufacturer's Data:
 - 1. Submit two copies of manufacturer's specifications and instructions for any materials and products to be substituted for those specified, no later than 10 business days prior to original bid date.

1.5 GUARANTEE

- A. The Contractor shall furnish a written warranty to the effect that all materials and work furnished under this section is warranted for at least one year, shall be free from defects and faulty workmanship and that any defective material or work shall be promptly repaired or replaced without additional cost to the Owner.

1.6 PROJECT/SITE CONDITIONS

- A. Protection:
 - 1. Protect structures, streets, curbs, sidewalks, fences, walls, trees and other existing features from damage.
- B. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted, and then only after arranging to provide temporary water service according to requirements indicated by Owner and construction manager.
- C. Notify Construction Manager no fewer than two days in advance of proposed interruption of water service.

1.7 SEQUENCING/SCHEDULING

- A. Irrigation contractor must coordinate closely his operations with the general contractor including the attendance of regular construction meetings. Extra care should be taken on the delivery and installation of the system.

1.8 OPERATION AND MAINTENANCE

- A. Provide instructions covering full operation, care and maintenance of system and controls. Also provide manufacturers' parts catalogs.
- B. Provide schedule showing length of time each valve is to be open (during May, July and September) to serve as a guide for the owner in establishing an appropriate water-window.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backflow Preventer - Irrigation contractor will be connecting to a service line at the approximate location shown on the plan. Refer to MEP plans as noted for more specifics. The backflow preventer is being installed by others in the building.
- B. Automatic Controller — Controller shown below is the basis of design. Other controllers can be submitted for approval, but will be evaluated on their compatibility with the campus BAS system, described in Part 3 — EXECUTION, Paragraph 3.3. All controllers will have a commensurate weather-station installed. Controller and weather-station locations shown on plan.
 - 1. Weathermatic model #SL4800 with necessary expansion modules (#SLMI.2), or approved equal, as determined by irrigation consultant.
 - 2. Weathermatic wireless weather-station (model #SLW5), or equal, mounted according to manufacturer's specifications.
 - 3. Weathermatic SmartLink wireless network aircard with flow: model #SL-AIRCARD-~~FLOW~~2F
 - 4. Weathermatic flow-sensor: model #SLFSI-T15 (see also Part 3, paragraph 3.3- C and G.)
- C. Controller - Valve Communications.
 - 1. Communication between controller and the valves shall be accomplished by a jacketed 14-gauge single strand wire to each valve. Common wire should be 12 gauge and white in color, with station wires being of other colors.
- D. Valves/Controls.
 - 1. Quick coupling valves.
 - a. Rainbird 5-NP (with non-potable purple cap), or equal.
 - b. All quick coupling valves shall be connected to the mainline by 1" triple-elbow swing joints and placed in valve boxes.

2. Automatic valves/filter assemblies: The automatic control valves shall be plastic valves operated by low-power solenoid, normally closed, manual flow adjustment, as indicated on plans, for all drip irrigation
 - a. Rainbird X CZ-100-PRF, or equal.
 - b. Rainbird 100-PGA and 150-PGA series valves, or equal, for all non-drip irrigation zones.
 3. Gate/IsolationValves
 - a. Rainbird X CZ-100-PRF, or equal.
 - b. Rainbird 100-PGA and 150-PGA series valves, or equal, for all non-drip irrigation zones.
 4. Flush Valves for Drip Tubing: at the end of each drip zone area, there shall be a manual flush valve installed on the end of the drip tubing. The valve will be installed in a 6" round valve box.
 - a. Netafim TL SOV. or equal.
- E. Valve Enclosure.
1. Control valves and quick-coupling valves shall be enclosed in a fiberglass valve box. Valve boxes are to be filled with a minimum of 6" of washed gravel below pipe level to insure adequate drainage.
 - a. Carson
 - b. Armour
 - c. Rainbird
- F. Pipe:
1. Main line piping shall be Class 200 polyvinyl chloride (PVC) solvent-weld pipe or Flexible Polyethylene (PE). Pipe shall carry the N.S.F. seal of approval and meet the following specifications: ASTM D-2241, SDR 21, SDR 11.5 for (PE) pipe, or latest revisions. Laterals shall be Class 160 (or 200) PVC, SDR 26, solvent-weld pipe; all 1" pipe shall be Class 200 PVC, SDR 21.
 2. Drip Tubing shall be flexible polyethylene pipe with .5-.6 gph emitters spaced at 18 inches on center. Pipe shall be installed at 18 inches on center. Tubing must be stapled or anchored in place to prevent heaving.
 - a. Netafim TLCV6-18xx or Rainbird XFCV-06-18, or equal.
 - b. Netafim stainless steel staples TES6
- G. Sprinkler Heads:

1. Spray heads, both 4" and 12" shall be installed as shown on the plans.
 - a. Rainbird 1804 and 1812 spray bodies with MPR nozzles, or equal.
 - b. All models shall have built-in pressure-regulation (PRS), or equal.
 - c. All spray heads shall have check-valves installed.
2. Rotors (both 3/4" inlet and 1/2" inlet) shall be installed as noted on plans.
 - a. Rainbird 3500 rotor, or equal
 - b. Rainbird 5004 rotor, or equal
3. Sleeves:
 - a. Sleeves shall be twice the nominal size of the pipe to be carried within, unless noted differently. Sleeves for control wire only shall be 2" diameter, placed alongside (or above) each sleeve for the mainline.
 - b. Under walks, paving and where indicated on drawings, install Schedule 40 PVC (ASTMD-1785). Tape ends of sleeves and mark sleeve locations with above grade stakes with appropriate annotation, (ex:"irrigation sleeve"). Stakes shall be protected. Do not backfill over sleeve locations behind back of curbs or along walk edges, until work has been completed.
 - c. Where sleeves are shown on the plan, provide and install an additional 4" diameter Schedule 40 PVC sleeve for future use.
4. Pipe fittings:
 - a. PVC fittings shall be solvent weld Schedule 40 standard weight. Attachment shall be made with both a primer and solvent cement as approved by the manufacturer.
 - b. Drip tubing and PE pipe will be connected by PVC barbed connectors.
5. Manufacturer/Supplier
 - a. The materials chosen for the design of the sprinkler system have been specifically referred to by manufacturer, enabling the Owner to establish the level of quality and performance required by the system design. After award of contract and prior to beginning work, the contractor shall submit for approval three copies of the complete list of materials to be installed. Substitutions will be allowed after review and approval from the irrigation consultant.
6. Acceptable manufacturers of sprinkler heads and control valves, and controller (Weathermatic):
 - a. Toro
 - b. Rainbird

- c. Irritrol
- d. Weathermatic (controller)
- e. Hunter
- f. Netafim

PART 3 - EXECUTION

3.1 WATER SUPPLY

A. General:

1. Comply with requirements of the Local Plumbing Code.
2. Install piping, valves, controls and sprinklers in accordance with manufacturer's written instructions.
3. Verify the location of the service line being provided, as shown on the plan.

B. Automatic Controllers

1. Connect remote control valves to controller in a sequence corresponding with station settings, as denoted on the plan.
2. Communication circuitry shall be run, wherever possible, along with the mainline pipe.
3. A minimum of 12 inches of wire shall be left at each valve to provide slack.
4. Controller is to be located as noted on the plan.
5. Verify that a conduit/sleeve is in place to run communication wire from controller to the field. This is to be supplied by others.
6. Install weather-station on, or near, southwest corner of the building.

C. Irrigation Heads:

1. Install check valves on all heads on the system.

D. Piping:

1. Pipe may be assembled and welded on the surface.
2. Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before applying solvent with a non-synthetic bristle brush.

3. When pipe is pulled into the ground, all PVC pipe shall be solvent welded at least 2 hours before pulling.
4. Make all connections between plastic pipe and metal valves or steel pipe with threaded fittings using plastic male adapters.
5. Use dielectric fittings at connection where pipes of dissimilar metal are joined.
6. Lay pipe on solid subbase, uniformly sloped without humps or depressions.
7. Trenches (or pulls) shall be snaked, or the pipe snaked, within the trench to allow for expansion and contraction of pipe.
8. Drip tubing must be stapled to the ground prior to mulch being installed.

E. Closing of Pipes and Flushing Lines

1. Cap or plug 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 the installation. Thoroughly flush out water lines and before installing heads, valves, and other hydrants.
2. Test in accordance with industry standards and pipe ratings.
3. Upon completion of the testing, the Contractor shall complete assembly and adjust sprinkler heads for proper distribution.

3.2 SYSTEM DESIGN

- A. Lay out work as closely as possible to the drawings. The drawings, though carefully drawn, are generally diagrammatic to the extent that all offsets and fittings are not necessarily shown as they will exist on site.
- B. The Contractor shall be responsible for full and complete coverage of irrigated areas as to spacing and precipitation rates being matched and shall make any necessary adjustments to the system at no additional charge to the Owner. Revisions to the irrigation system must be submitted to the landscape architect in written form for approval.

3.3 IRRIGATION CONTROL SEQUENCE OF OPERATION

- A. Irrigation system shall be controlled via the campus wide Invensys Niagara web based building automation system (BAS).
- B. Irrigation contractor shall furnish and install 24 VAC pilot operated valves for each zone and one for main line isolation. Irrigation contractor shall wire valves back to a central location as shown on the plans.
- C. Irrigation contractor shall install a main line flow meter (furnished by BAS contractor) and wire back to the central location. Recommended: Weathermatic flow-sensor: model #SLFSI-T15

- D. BAS contractor shall furnish a key locked panel at the central location. Panel shall contain hand/off/auto switches for each zone. Panel shall also contain off/auto switch for the main line isolation valve. Panel face shall contain displays for instantaneous and total flow.
- E. Main line isolation valve shall be continuously energized. Zones shall be cycled by the BAS based on time of day schedules. When scheduled on, the zones will be energized in sequence, one at a time, for their preset cycle time. Initial cycle times shall be eight minutes for spray zones and twenty minutes for rotary zones.
- F. Logic shall be provided in the BAS to shut down the system if rain is sensed by both of WMU's global rain sensors. Schedule shall be overridden if rain was sensed by both sensors during a 24- hour period prior to the scheduled on time.
- G. BAS shall monitor system flow and compare it to the design flow for the energized zone. BAS shall de-energize the zone valve and generate a zone alarm if flow exceeds design. If the sensor continues to sense flow the BAS shall de-energize the main line isolation valve and generate a main line alarm. Recommended: Weathermatic flow-sensor: model #SLFSI-T15
- H. Use of quick coupler connections will cause a main line alarm and de-energize the main line valve, Ground crews will need to place the main line valve local override in hand to use the quick couplers.
- I. BAS contractor shall add a graphic screen to WMU's BAS showing the irrigation zones, status of the zone and main line valves, flow and flow alarms. Flow alarms shall be manually reset from the graphic screen. Each zone and main line valve shall have a click point for overriding the zone on or off for a programmable time period. Alarm shut down shall be a higher priority than the software override.
- J. BAS contractor shall set up schedule screens for each system.

3.4 TRENCHING, BACKFILLING AND COMPACTING

- A. Pulling, Excavating and Trenching.
 - 1. Trenching, backfilling and compacting shall be as per Sitework Specifications - Trenching and Backfilling for utilities.
 - 2. If trenching, trenches shall be made wide enough to allow a minimum of 6 inches between parallel pipe lines. If pulling, the same lateral distance shall be observed.
- B. Minimum Cover:
 - 1. An absolute minimum of 12-inches cover shall be held over laterals and control wires. Mains shall be 18" (16" minimum) below finished grade.
 - 2. Drip Tubing shall be installed prior to mulching. Tubing shall be pinned down every two-feet with stainless steel staples.
- C. Backfill:
 - 1. Backfilling and backfill material shall be as per Sitework Specifications. Backfilling shall be done in 6" layers and compacted after each layer, to prevent excessive settling.

2. 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.
3. Where pipe is pulled into the ground, slit-domes shall be compacted to original grade after pulling.

D. Pavements, Walks, Etc.

1. Communication wire must be placed in sleeving under pavement, walks, etc.
2. Sleeves required shall be furnished by this Contractor, unless directed otherwise.

3.5 TESTING

A. Operational Testing:

1. Perform operational testing after backfill is completed and sprinkler heads are adjusted to final position.
2. Demonstrate to the Owner that system meets coverage requirements and that automatic controls function properly.
3. Coverage requirements are based on operation of one circuit at a time, unless noted differently.

3.6 TRAINING

A. Personnel Training:

1. Contractor shall be responsible for the training of as many personnel as the Owner shall deem necessary.
2. Contractor shall be responsible for one closing and one opening of the system during the appropriate times of the year as part of the training of the Owner's personnel.
3. Contractor training shall include general trouble-shooting and operation of the system with reference to drip tubing, valve, and controller.

3.7 SPARE PARTS

A. Submit spare parts as pertains to warranted materials, described by manufacturers' warranties.

B. Provide:

1. One extra control valve of each size and type.
- 2.

One key for quick coupling valves.

3. Owners/operational manuals available on controller, drip tubing, valves, spray heads and controller.

3.8 CLEAN UP

- A. Remove debris, resulting from work of this Section, from the site.

3.9 ADJUSTMENT

- A. After completion of all landscape work, if applicable, contractor shall return to the jobsite to perform any final adjustments to the system that might be deemed necessary.
- B. Maintenance shall include, in addition to initial start-up, one winterization and one spring start-up the following year.

END OF SECTION 328400