

ITEM 04615.60 M - IRRIGATION LINES AND LINE FITTINGS:

DESCRIPTION:

- A. The work required under this Item shall consist of furnishing all labor materials and equipment necessary to complete all irrigation system work as indicated on the plans or as ordered by the Engineer.
- B. The major items of work include, but are not limited to the following:
1. Verify underground utility locations.
 2. Furnishing and installing a fully operational automatically controlled irrigation system.
 3. Trenching and backfilling.
 4. Irrigation lines and line fittings under this Item shall be considered to include piping, dripperlines, tubing, hoses, couplings, crosses, elbows, tees, adapters, unions, non-motorized valves, gauges with boxes and covers, spray heads, dripper heads, air vacuum relief valves with boxes and covers and any other parts or pieces not required under other Items required to complete the installation of the irrigation system.
 5. Testing of system and making it operative.

MATERIALS:

- A. General:
1. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings and capacities as indicated in the plans or proposal under "Irrigation Lines and Line Fittings."
 2. All materials shall meet the requirements of the AWWA , ASSE and USC Foundation for Cross Connection Control.
 3. All materials throughout the system shall be new and in perfect condition.
- B. Piping: Provide pipes of one of the following materials of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.
1. Polyvinyl Chloride (PVC): Sized as shown on the drawings. All PVC pipe shall be continuously and permanently marked with manufacturer's name, material and schedule or type. Pipe shall conform to U.S. Department of Commerce Commercial Standard CS 256-

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63, or latest revision. All PVC pipe shall be SDR 26.

2. Fittings: Schedule 40, polyvinyl chloride (PVC) weight as manufactured by Spears or approved equal. Solvent weld or insert fittings are acceptable. No saddle type clamping or fittings shall be used. Fittings to conform to ASTM D-2466.

C. Valves:

1. Gate/Drain Valves: Shall be sized for mains. The valves shall be all bronze solid wedge, screw bonnet rated at 200 WOG.
2. Quick Coupling Valves: Shall be as noted on drawings and shall be brass with locking top, and located up stream of all remote control valves.
3. Remote Control Valves: Electronically operated solenoid valves installed in valve boxes of appropriate size and type for valves specified, with manual shut-off valve to match pipe size.

D. Dripperline and Integral Dripperline Components:

The dripperline shall be pressure compensating dripperline or 17 mm, 12 mm, or 8mm non-pressure compensated dripperline as indicated on the plans. Dripper flow rate and spacing shall be as indicated on the plans.

E. Reduced Pressure Backflow Prevention Units:

Reduced pressure backflow prevention units shall be provided as indicated on the plans and shall be in compliance with local codes.

F. Solvent Cement:

Compatible with PVC pipe and/or in conformance with ASTM D-2564.

G. Control Wires:

Twenty-four volt solid wire, UL approved for direct burial in ground. Minimum wire size shall be 0.82 mm² gauge. All wire to be Paige wire or approved equal.

H. Underdrain Filter Type II:

The Underdrain Filter Type II shall meet the materials requirement as specified under Section 605-202 (Granular Filter Materials) of the Standard Specifications, except that stockpiling of materials shall not be required.

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CONSTRUCTION DETAILS:

A. Prior to beginning any work under this Item, the Contractor shall supply the Engineer with proof that the firm or firms performing this work has a minimum of three years experience in the construction of irrigation systems. Work under this Item shall be as specified on the plans and/or proposal under Irrigation Lines and Line Fittings.

B. Codes and Standards:

1. All work and materials shall be in compliance with all applicable State, Health Department and local ordinances and standards.
2. All work shall meet the requirements of the AWWA, ASSE and the USC Foundation for Cross Connection Control.

C. Utility and Protection:

Existing Utilities:

1. Contractor shall call for underground utility strikeout prior to irrigation construction and acquaint themselves with all site conditions. Should utilities not shown on the plans be found during excavations, the Contractor shall promptly notify the Engineer for instructions as to further action.

D. Permits and Fees:

The contractor shall obtain all permits and pay required fees to any governmental agency having jurisdiction over the work. On completion of the work, satisfactory evidence shall be furnished to the Engineer to show that all work has been installed in accordance with the ordinances and code requirements.

E. Drawings, Specifications and Detail Sheets:

Scale and Dimensions:

1. Consider drawings and specifications as being compatible and therefore work called for by one and not the other shall be furnished and installed as though called for by both. When discrepancies exist between scale and dimension or between the work to be accomplished, they shall be called to the Engineers attention immediately. The Engineer's decision regarding such discrepancies shall be final and binding.

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2. Where diagrams have been made to show piping connections, etc., the contractor is cautioned that these diagrams must not be used for obtaining lineal runs or number and type of fittings.
3. All measurements including exact amount of material shall be verified at the site.

F. Piping Arrangement:

Suggestions for changes in location of piping, etc, if advisable in the opinion of the Contractor, shall be submitted to the Engineer for approval before proceeding with the work.

G. Installation of Piping and Fittings:

1. Excavation and Trenching:

- a. The Contractor shall perform all excavations as required for the installation of the work included under this Item, including shoring of earth banks to prevent cave-ins. The Contractor shall trench, each day, only as much as required for the day's work.
- b. Trenches shall be made wide enough to allow minimum of 50 mm between parallel pipe lines. Trenches for pipelines shall be made of sufficient depth to provide minimum cover from finish grade as follows or as ordered by the Engineer:
 1. 375 mm minimum cover over main lines or as indicated on the plans.
 2. 300 mm minimum cover over control lines from controller to valves or as indicated in the plans.
 3. 100 mm to 150 mm cover over dripperlines.

2. Pipe and Assembly:

- a. Install remote valves where shown and group together where practical. Place valves not closer than 150 mm to walk edges, buildings and walls. Locate all valve boxes in planting beds unless otherwise directed or noted.
- b. No pipe shall be laid when, in the opinion of the Engineer, trench or weather conditions are unsuitable. When pipe laying is not in progress, the open ends of the installed pipe shall be closed by approved means to prevent entrance of trench water and other foreign material into the line(s). Enough backfill shall be placed in the center sections of the

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- pipe to prevent floating. Any pipe that has floated shall be removed from the trench and re-laid.
- c. PVC pipe and fittings shall be solvent welded using solvents and methods as recommended by the 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.
 - d. Pipe may be assembled and welded on the surface. Snake pipe from side to side in the trench to allow for expansion and contraction.
 - e. Make all connections between plastic pipe and metal valves or steel pipe with threaded fittings using plastic male adapters.
3. Dripperline Installation:
- a. Install all dripperline as indicated on drawings. Use only Teflon tape on all threaded connections.
 - b. Clamp fittings with Oetiker clamps when operating pressure exceeds specific dripperline fittings requirements.
 - c. When installing dripperline on-surface, install soil staples as listed below:
 - 1. Sand Soil: One staple every 1 meter and two (2) staples on each change of direction (tee, elbow or cross).
 - 2. Loam Soil: One staple every 1.25 meters and two (2) staples on each change of direction (tee, elbow or cross).
 - 3. Clay Soil: One Staple every 1.5 meters and two (2) staples on each change of direction (tee, elbow or cross).
 - d. Line Flushing Valves: All systems shall be installed with Automatic Line flushing Valves as indicated on drawings.
 - e. Air/Vacuum Relief Valves: Each independent subsurface irrigation zone shall be installed with an Air/Vacuum Relief Valve at the zone's highest points(s).
 - f. Pressure Regulator: A pressure regulator shall be installed at each zone valve or on the main line to ensure operating pressures do not exceed system requirements. The pressure regulator shall be as indicated on drawings.
 - g. Disc Filter: A disc filter shall be installed at each zone valve or on the main line to

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- ensure proper filtration. The disc filter and mesh shall be as indicated on the plans.
- 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.
 - i. Thoroughly flush all water lines before installing valves and other hydrants.
4. Automatic Controllers: Connect remote control valves to controller in a logical sequence to correspond with specification of the Engineer.
5. Automatic Control Wiring:
- a. Install control wires, sprinkler mains and laterals in common trenches whenever possible.
 - b. Install control wires at least 150 mm below finish grade and lay to the side and below main line. Provide expansion curls as described by the manufacture's instruction.
 - c. Control wire splices will be allowed only in runs more than 150 meters. Connections of all underground wires shall be by the use of wire nuts, covered with waterproof splice for each wire per installation instructions provided by the manufacturer or as otherwise required by local ordinance.
 - d. All wires passing under existing or future paving, construction, etc., shall be encased in galvanized steel conduit extending at least 300 mm beyond edges of paving or construction.
6. Backfilling and Compacting:
- a. After the system is operating, and required tests and inspections have been completed, backfill excavations and trenches with clean soil.
 - b. Backfill for all trenches, regardless of type of pipe covered, shall be compacted to minimum ninety (90) percent density.
 - c. Compact trenches in areas to be planted by thoroughly flooding the backfill.
 - d. Dress off all areas to finish grades.

H. Sleeves:

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1. Sleeves for Control Wires: Under all roadway areas, walks, and where indicated on the plans, use galvanized heavy wall steel conduit (minimum size 25 mm ID).
2. Sleeves for Irrigation Pipe: Under all roadway areas, walks and where indicated on the plans, use galvanized heavy wall steel conduit. The ID of the sleeve shall be two times (2) the OD of the sleeved pipe.

I. Valve Boxes:

1. Valve boxes shall be of appropriate size and type for valve specified or as otherwise indicated on the drawings. All valve boxes in roadways or sidewalks shall be cast iron construction with locking lid. All valve boxes shall have 150 mm Deep Bed of Underdrain Filter Type II; blocking and wrapped with filter fabric as indicated on details.

J. Field Quality Control:

Hydrostatic Test:

1. Request the presence of the Engineer and representative from Town of Penfield at least 48 hours in advance of testing.
2. Testing to be accomplished by the Contractor and in the presence of the Engineer.
3. Center load piping with small amount of backfill to prevent arching or slipping under pressure.
4. Apply a continuous and static water pressure of sixty 419 kPa (60 PSI) when welded plastic joints have cured at least 24 hours and with the risers capped as follows:
 - a. Mainline and submains to be tested for one (1) hour.
 - b. Lateral lines to be tested for one (1) hour.
5. Repair leaks resulting from tests.
6. The lines shall then be retested until satisfactory.

K. Protection:

The Contractor shall be responsible for all irrigation work until finally inspected, tested and accepted. After delivery, and before and after installation, protect work against theft, injury or damage. This includes protecting all open ends of work with temporary covers or plugs during

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construction, to prevent entry of obstruction material.

METHOD OF MEASUREMENT:

The quantity to be paid for under this Item will be measured as the number of linear meters of irrigation line to be furnished and installed to satisfactorily complete the work in accordance with the plans and specifications or as ordered by the engineer. This included conducting test and supplying any other fittings or parts not specified under other items.

The number of linear meters of irrigation line and fittings will be measured along their laying length. Laying length shall include supply mains, supply headers, exhaust headers, irrigation pipe, irrigation tubing and irrigation dripline.

BASIS OF PAYMENT:

The unit price bid per linear meter for this Item shall include all costs associated with the installation of this Item, including materials, labor, equipment, excavation, backfilling and testing.