



City of Riverside, California Landscape Irrigation Specification

SECTION 02441 - IRRIGATION

PART 1 - GENERAL

1.01 STANDARD SPECIFICATIONS: The provisions of the "Standard Specifications for Public Works Construction", current edition, shall apply except as modified herein.

1.02 SCOPE: The Work of this Section shall consist of furnishing all labor, materials, equipment, appliances and services necessary for the execution and completion of all **Irrigation Work** as shown on the Plans and as described in the Specifications including, but not necessarily limited to, the following:

- Provide complete operating irrigation systems;
- Installation of new and refurbishment of existing irrigation systems as necessary to provide complete operating irrigation systems for all planting areas within the Work Limits;
- 120 volt electrical service for and connection to the controller;
- Irrigation Controller within lockable Controller Enclosure as designated on the Approved Plans;
- Coordination with Work of other Sections and/or City Inspectors;
- Sleeving;
- Testing;
- Clean-up;
- As-Built by means of Global Positioning System (GPS);
- Replacements, Repairs, Guarantees and Warranty Work.

1.03 RELATED WORK:

Planting 02483

1.04 SUBMITTALS:

- A. Materials List: Contractor shall submit a complete materials list for approval by the Public Works Landscape Inspector prior to performing any Work. Catalog data and full descriptive literature must be submitted whenever the use of items different than those specified is requested. Notarized certificate must be submitted by plastic pipe and fitting manufacturer indicating that material complies with the Project Specifications, unless material has been previously approved, and used on other projects by City. Material list shall be submitted using the following format:

<u>Item</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model No.</u>
1	Pressure Supply Line	Lasco	Sch. 40
2	Lawn Head	Rainbird	2400
etc.	etc.	etc.	etc.

B. "Record" Prints to Reflect 'As-Built' Conditions:

1. Record accurately on one set of blue-line prints all changes in the Work constituting departures from the Plans, including changes in pressure and non-pressure line locations.
2. The changes and dimensions shall be recorded in a legible and workmanlike manner to the satisfaction of the Public Works Landscape Inspector. Prior to final inspection of the Work, submit "record" Mylar prints reflecting the 'As-Built' condition of the system to the Public Works Landscape Inspector's for approval and records. GPS coordinates for each item listed below, shall be noted on the plans and recorded on Compact Disk (CD) in WR format, on an Excel spread sheet to City for approval.
3. Dimension from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavement, etc.). Data to be shown on "record" prints shall be recorded day-to-day as the project is being installed.
4. Show locations and depths of the following items:
 - a) Point of connection, Water Meter and Backflow Device. (GPS)
 - b) Routing of irrigation pressure lines (dimension maximum 100 feet along routing).
 - c) Gate valves. (GPS)
 - d) Irrigation remote control valves, master valves filters, etc. (GPS)
 - e) Quick coupling valves. (GPS)
 - f) Routing of control wires.
 - g) Controllers. (GPS)
 - h) Flow Meters. (GPS)
 - i) Related equipment (as may be directed).
5. Maintain record prints on site at all times.

1.05 INSPECTIONS:

A. Inspections will be required for:

1. Pressure test of irrigation main line.
2. System layout.
3. Coverage test.
4. Final inspection/start of maintenance.
5. Final acceptance.

B. Inspection Requests: Contractor shall notify the Public Works Landscape Inspector a minimum of 48 hours (two working days) in advance for all inspections including the following:

1. Pressure supply line installation and testing
2. System layout
3. Coverage tests
4. Final Inspection

C. Evidence of Inspection by Others: When inspections have been conducted by other than the Public Works Landscape Inspector, Contractor shall show evidence of when and by whom these inspections were made.

D. Requirements for Inspection: No inspection is to commence without "record" prints available on the site. In the event Contractor calls for an inspection without up to date "record" prints, without completing previously noted corrections, or without preparing the system for inspection, the inspection may be canceled.

E. Closing in Un-inspected Work: Do not allow or cause any of the Work of this Section to be covered up or enclosed until it has been inspected, tested and approved by the Public Works Landscape Inspector.

F. Coverage test: When the irrigation system is completed, Contractor shall perform a coverage test in the presence of the Public Works Landscape Inspector to determine if the water coverage for planting areas is complete and adequate. The Public Works Landscape Inspector must accept this test before planting may commence.

G. Hydrostatic test:

1. Prior to the installation of any valves, all pressure lines shall be tested under a hydrostatic pressure of 150 psi for a period of not less than two hours. Ball valves and pressure gauges shall be installed at all terminating ends of the mainline and the remainder of all points in between shall be capped and the line fully charged with water after all air has been expelled from the line.
2. All hydrostatic tests shall be made in the presence of the Public Works Landscape Inspector or Inspector's designated representative. No pressure line shall be backfilled until it has been inspected, tested, approved in writing, and the mainline and valve locations have been noted on the "record" prints.
3. Contractor shall furnish the necessary force pump and all other test equipment, and shall perform the test.

1.06 TURNOVER ITEMS:

A. Controller Charts:

1. "Record" prints must be approved by the Public Works Landscape Inspector before charts are prepared.
2. Provide one controller chart for each automatic controller. The chart shall show the entire area covered by the controller, preferably in a single sheet. The chart shall be a reduced copy of the approved "record" print. Reduce the print to a size that is the maximum dimensions that will fit within the controller door without folding. If the controller sequence is illegible at this reduction scale, the chart may be provided as a "multi-sheet" chart to provide adequate legibility.
3. Each control station on the Chart shall be marked with a different color to show its area of coverage.
4. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being minimum 20 mils in thickness. The chart shall be installed in the controller enclosure using Velcro fasteners, and three different color grease pencils (red, black and blue) shall be provided in the enclosure for maintenance notations on the chart.
5. Controller charts shall be completed prior to the final acceptance inspection.

B. Operation and Maintenance Manuals: Within a minimum of 14 calendar days prior to acceptance of construction, prepare and deliver to the Public Work Landscape Inspector all required descriptive materials, properly prepared in two individually bound copies of the operation and maintenance manual. The manual shall describe the material installed and shall be in sufficient detail to permit operating personnel to identify, operate, and maintain all equipment. Spare parts lists and related manufacturer's information shall be included for each equipment item installed. Each complete, bound manual shall include the following information:

1. Index sheet stating Contractor's address and telephone number, including names and addresses and telephone numbers of local manufacturer's representatives.
2. Complete operating and maintenance instructions on all major equipment.

C. Materials to be furnished: The following items shall be supplied as part of this Contract and shall be turned over to the Public Works Landscape Inspector at the conclusion of the Project at the Final Acceptance Inspection:

1. Two (2) special tools/wrenches for disassembly and adjustment of each type of irrigation equipment/heads installed that require such special tools/wrenches.
2. Two keys for each type of automatic controller.
3. One valve box cover key.
4. "Record" prints, CD's and Mylar "As-Built" Plans at Final Acceptance.
5. Documentation of Water Department's inspection and acceptance of backflow device.

1.07 GUARANTEE:

- ##### A. General: The entire irrigation system, including all Work done under this Contract, shall be guaranteed against all defects and fault of material and workmanship for a period of one (1) year following Final Acceptance of the Work as documented by the Notice of Completion filed with the Riverside County Recorder's Office. All materials used shall carry a manufacturer's guarantee of one (1) year. Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by

Contractor at no additional expense to City within fourteen (14) calendar days of receipt of written notice from City.

- B. Form of Guarantee: Guarantee shall be submitted on Contractors own letterhead as follows:

GUARANTEE FOR IRRIGATION SYSTEM

PROJECT: _____

LOCATION: _____

We hereby guarantee the irrigation system we have furnished and installed against defects in materials and workmanship, ordinary wear and tear and unusual abuse, or neglect accepted, and that the Work has been completed in accordance with the Plans and Specifications. We agree to repair or replace any or all of the Work, together with any other adjacent Work which may be displaced by so doing, that may prove to be defective in its workmanship or materials within a period of one (1) year after the date the Notice of Completion for the above named Project is filed with the County Recorder by the City of Riverside, California, at no additional cost to City. We shall make such repairs or replacements within 14 calendar days following written notification by City. When the immediate repair or replacement of the Work is necessary to ensure the public safety and welfare, which would be endangered by continued usage of the facility, such circumstance will be deemed an operational emergency. In the event of such an emergency, after City contacts our firm and after authorizing 24 hours to initiate repairs, if we fail to initiate and diligently complete such repairs in a timely manner, the Director may direct City forces to perform such functions as the Director may deem necessary to correct the Work and immediately place the facility back in operational condition. If such procedure is implemented, we shall bear all expenses incurred by City. In all cases, the judgment of the Director shall be final in determining whether an operational emergency exists. In the event of our failure to make such repairs or replacements within the time specified after receipt of written notice from City (other than an operational emergency), we authorize City to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PRINTED NAME & TITLE: _____

SIGNATURE: _____

ADDRESS: _____

PHONE: () _____
(Area Code) Number

- C. Operational Instruction: After the system has been completed, Contractor shall instruct the Public Works Landscape Inspector in the operation and maintenance of the system and shall furnish a complete set of operating instructions.
- D. Trench Settlement: Any settling of trenches which may occur during the one-year period following acceptance shall be repaired to City's satisfaction by Contractor without any additional expense to City. Repairs shall include the complete restoration of all planting, paving or other improvements of any kind, which are damaged as a result of the Work.

PART 2 - MATERIALS

2.01 GENERAL: All materials shall conform with Section **212 - 2 IRRIGATION SYSTEM MATERIALS** of the Standard Specification except as modified herein.

2.02 PIPE AND FITTINGS:

- A. General:
1. Pressure supply lines 2 inches in diameter and up to 8 inches in diameter shall be either Class 315 solvent weld PVC or Class 200 rubber gasket type PVC. Solvent weld and ring type pipe shall not be used together on the same pressure supply line.
 2. Pressure supply lines 1-1/2 inches in diameter and smaller shall be minimum schedule 40 PVC.
 3. Non-pressure lines shall be minimum schedule 40 PVC.
- B. Steel Pipe: Amend Standard Specifications Section **212-2.1.2 Steel Pipe** to read:
 "All steel pipe shall be hot-dipped galvanized", and add: "All fittings for steel pipe shall be 250 pound rated galvanized malleable iron, banded pattern. Pipe sizes indicated on the Plans are nominal inside diameter, unless otherwise noted."
- C. Plastic Pipe:
1. Add the following to Standard Specifications Section **212-2.1.3 Plastic Pipe for Use with Solvent Weld Socket or Threaded Fittings:**
 "All plastic pipe shall bear the following markings: manufacturer's name, nominal pipe size, schedule or class, type of material, pressure rating in PSI, NSF seal of approval, and date of extrusion."
 2. Amend Standard Specifications Section **212-2.1.3 Plastic Pipe for Use with Solvent Weld Socket or Threaded Fittings** to read:
 "All plastic pipe fittings shall be standard weight schedule 40 and shall be injection molded of an improved PVC fitting compound. All threaded plastic fittings shall have injection molded threads. No cut threads will be accepted on PVC pipe and fittings. All tees and ells shall be manufactured in injection molds that are side gated. All threaded nipples shall be standard weight schedule 80 with molded threads.
 3. Amend first sentence of Standard Specifications Section **212-2.1.4 Plastic Pipe for Use with Rubber Ring Gaskets** to read:
 "All rubber gasket PVC pipe, couplings, and fittings shall conform to ASTM D 2241 Type 1, Grade 1, 2000-PSI design stress"; and add the following to the Section: "Couplings, rubber gaskets, and fittings shall be as approved by the pipe manufacturer. Ring-type rubber gasket couplings shall permit a five (5) degree deflection of the pipe at each coupling (2-1/2 degrees each side) without ex-filtration or infiltration, cracking or breaking."
- D. Asbestos Cement Pipe (ACP): Is not approved for use on City projects.

2.03 VALVES AND VALVE BOXES:

- A. Valves:
1. Ball Valves: All ball valves shall be bronze bodied, capable of withstanding a minimum working pressure of not less than 150 psi.
 2. Manual Control Valves: Add the following to Standard Specifications Section **212-2.2.3 Manual Control Valves:** Anti-siphon-type valves shall be all bronze with swivel-type replaceable seating members and an approved vacuum breaker as an integral part of assembly.
 3. Quick-Coupling Valves: Add the following to Standard Specifications Section **212-2.2.6 Quick Coupling Valves and Assemblies:** Quick coupling valves shall have locking vinyl cover and shall be 1" in size.
 4. Remote Control Valves: Add the following to Standard Specifications Section **212-2.2.4 Remote Control Valves:**
 - a) Valves shall be spring-loaded, self-cleaning, packless diaphragm activated, of a normally closed type.
 - b) Valve solenoid shall be corrosion-proof and constructed of stainless steel molded in epoxy to form one integral unit, and shall be 24 volt A.C., 2.0 watt maximum (2" and smaller valves).

- c) Valve shall close against flow without chatter and with minimum closing surge pressure (minimum 5 seconds closing time per valve).
 - d) Valve shall be completely serviceable in the field without removing valve body from line.
- B. Boxes:
- 1. Concrete Valve Boxes: Add the following to Standard Specifications Section **212-2.2.7 Valve Boxes:**
Remote control valve boxes shall be rectangular concrete boxes with non-hinged locking cast-iron covers. Valve station numbers shall be welded in two-inch-high (2") numerals on lids. Gate valve boxes shall be round concrete boxes with cast iron covers marked "G. V." with letters cast or tooled in the cover.
 - 2. Plastic Valve Boxes: (For use on Drip Irrigation Systems only)
 - a) General: Valve boxes and covers shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical reactions. The covers shall be secured with a hidden latch mechanism or bolts. The cover and box shall be capable of sustaining a load of 1,500 pounds. Valve box extensions shall be by the same manufacturer as the valve box. The box covers shall be factory embossed for the designated use and valve station numbers in 2" high letters. Boxes and covers shall be as manufactured by AMETEK or City approved equal.
 - b) Rectangular Plastic Boxes and Covers: Shall be a minimum of 12" wide x 18 long", with depths as necessary to protect the valve and provide the clear dimensions as detailed and/or specified. The covers shall be embossed with words or initials to identify the use for the box (e.g. "Flush Valve" or the letters "F.V.", and Air Relief Valve or the letters "A.R.V.") as noted on the Plan.
 - c) Round Plastic Boxes and Covers: Shall be minimum 12" diameter, round boxes with covers embossed with words to identify the use for the box (e.g. "Quick Coupler Valve" or the letters "Q.C.V.") and shall be marked as noted on the Plans

2.04 BACKFLOW PREVENTION DEVICE: Add the following to Standard Specifications Section **212-2.3 Backflow Preventer Assembly:** The backflow prevention unit shall be a reduced pressure type vacuum breaker of the size, manufacture, and model number as indicated on the Plans. If not indicated, the device shall be the same size as the water service and the manufacturer and model number shall be as approved by the Public Works Landscape Inspector.

2.05 IRRIGATION HEADS: All irrigation heads shall be as shown on the Plans and shall conform with Section **212-2.4 Sprinkler Equipment** of the Standard Specifications. All heads used on the same control valve shall be matched precipitation rate heads. All heads used on turf shall be minimum 6" pop-up types; all heads used in shrub areas shall be minimum 12" pop-up types.

2.06 ELECTRICAL MATERIALS:

- A. Conduit: Amend Standard Specifications Section **212-3.2.1 Conduit** to read: All conduit below grade shall be schedule 40 PVC of sufficient size to carry all proposed wiring. Conduit above grade shall be galvanized steel per the Standard Specifications. Low Voltage (24 volt) wiring shall be provided with a separate conduit/sleeve from both high voltage wiring (110/120 volt and higher) and the irrigation mainline sleeve.
- B. Electrical Service: Materials for electrical service shall comply with the standard specifications, governing utility agency standards, and requirements of all applicable codes. All controllers serving landscape areas that will **not being turned over to the City** for maintenance, shall be powered through a **metered** electrical service. Controllers serving landscape areas to be maintained by the City shall be powered through a non-metered electrical service.
- C. Wire: Add the following to Standard Specifications Section **212-3.2.2 Conductors:** "All low voltage conductors shall be 14 gauge for control and 12 gauge for common wires. All low voltage common wire shall be white with a colored stripe. Stripe color shall be different for each controller installed. All low voltage control wire shall be of one color other than white or green. A different color control wire shall be used for each controller installed."

2.07 CONTROLLER UNIT: Add the following to Standard Specifications Section **212-3.3 Controller Unit:**

- A. Controller: Shall be wall mounted type, as indicated on the Plans, with a heavy duty watertight case and locking hinged cover, installed within a lockable stainless steel enclosure.
- B. Controller Enclosure: Shall be Stainless Steel, sized to fit the controller and the other electrical components as required per Standard Detail 4060, irrigation controller electrical pedestal shall be Myers Power Products, Inc. – Catalog # MEUG22X-ENC-RIV Stainless Steel Enclosure, or City approved equal. The equipment shall conform to the requirements of the City of Riverside. Complete pedestal shall be UL Listed under Standard 508, Enclosed Industrial Control Equipment.
 Enclosure shall be Rainproof NEMA Type 3R, fabricated from 12 gauge corrosion resistant stainless steel, minimum grade 304. Enclosure shall include vandal resistant hinged door with 3-point latch assembly and folding “T” handle behind lockable cover. Enclosure shall be equipped with stainless steel mounting pans, adjustable from front to back. All interior sheet metal shall be stainless steel. Mounting pans shall have painted exterior grade ¾” plywood panels. Enclosure shall have interior mounting flanges for attachment to padmount base (Myers part number 519100) encased in 4” minimum concrete.
 Pedestal shall be equipped with insulated neutral and ground lug. Pedestal shall be wired for 120V 1Ph 2W with a 15 ampere circuit breaker, 10,000 A/C rated, installed. All factory wiring shall be 600 volt rated copper.

PART 3 - EXECUTION

- 3.01 GENERAL: All Work shall conform with Section **308 LANDSCAPE AND IRRIGATION INSTALLATION** of the Standard Specifications except as modified herein. No Work of this Section other than sleeving under pavement shall commence prior to the completion and acceptance of all Grading Work.

Add the following to Standard Specifications Section **308-5.1 General**:

- A. Irrigation System Design & Water Supply:
 - 1. The irrigation system design is based upon an available water pressure of ____ p.s.i. at a flow rate of ____ g.p.m. Individual stations are designed to this minimum p.s.i. The system is also designed to withstand a maximum pressure of ____ p.s.i. Contractor shall verify the size of the existing water supply/meter and the existing operating water pressure at the water supply location shown on the Plans prior to starting construction. Contractor shall notify the Public Works Landscape Inspector in writing of any discrepancies noted. Failure to provide such written notification may cause Contractor to provide for modifications to the irrigation system as necessary to provide for a fully operational system providing 100% coverage at the operating pressure available, all at no additional cost to City.
 - 2. Connection to, or the installation of, the water supply shall be at the location shown on the Plans. Minor changes caused by actual site conditions shall be made at no additional cost to City.
- B. Electrical Service: Contractor shall provide either a **metered** (for areas to be maintained by **other than the City**, such as an HOA) or non-metered electrical service (for areas to be maintained by the City) as required, and shall make the final 120 V connection to the irrigation controller.
- C. Code Requirements: Prior to all Work of this Section, Contractor shall carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence. Verify that the irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

In the event any equipment or methods indicated on the Plans or in the Specifications is in conflict with local codes, immediately notify the Public Works Landscape Inspector prior to installing the Work. If this notification is not provided, Contractor shall assume full responsibility for the cost of all revisions necessary to comply with all codes.

- D. Grades: Contractor is to keep within the specified material depths with respect to finish grade. Failure to obtain specified material depths may subject Contractor to adjusting the grades or depth of lines until acceptable depths of cover are achieved, all as directed by the Public Works Landscape Inspector and at no additional cost to City.
- E. Coordination with Work of Other Trades: Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other Work. Special attention shall be given to coordination of piping locations versus tree and shrub locations and sleeve locations versus pavement installation to avoid conflicts.
- F. Maintain Record Prints: Contractor shall maintain "record" prints on site at all times. Upon completion of the Work, transfer all "record" information on changes and dimensions to reproducible sepia Mylar or photo Mylar prints and CD's. The changes and dimensions shall be recorded in a legible and workmanlike manner, to the satisfaction of the Public Works Landscape Inspector.

3.02 TRENCHING AND BACKFILLING:

A. Trenching:

1. Add the following to Standard Specifications Section **308-2.2 Trench Excavation and Backfill**: Dig trenches and support pipe continuously on bottom of ditch. Where lines occur under paved areas, depth dimensions shall be considered below subgrade.
2. Amend Standard Specifications Section **308-2.2, Subparagraph 2 Waterlines continuously pressurized**) to read: Water lines continuously pressurized - minimum 18 inches, maximum 24 inches. (These measurements are to be from subgrade elevation for piping under pavement.)
3. Amend Standard Specifications Section **308-2.2, Subparagraph 3 Lateral sprinkler lines**) to read: Lateral irrigation lines - minimum 12 inches and maximum 16 inches. All main lines and lateral lines running parallel to other such lines shall have a minimum horizontal separation of 12".
4. Add the following to Standard Specifications Section **308-2.2 Trench Excavation and Backfill**: Where it is necessary to excavate adjacent to existing trees, Contractor shall avoid injury to trees and tree roots. Excavation in areas where 2-inch and larger roots occur shall be done by hand. All roots 2 inches and larger in diameter shall be tunneled under and shall be heavily wrapped with wet burlap to prevent scarring or drying. Where trenching machine is run close to trees having roots smaller than 2 inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making a clean cut through the roots. Roots 1 inch and larger in diameter shall be painted with two coats of tree seal or approved equal. Trenches adjacent to trees shall be closed within 24 hours.
5. Permanent Resurfacing: Add the following to Standard Specifications Section **308-5.1 General**: All surface improvements damaged or removed as a result of Contractor's operations shall be reconstructed by Contractor to the same dimensions, except for pavement thickness, and with the same type materials used in the original Work. Trench resurfacing shall be 1 inch greater in thickness than existing pavement. Concrete pavement shall be removed and replaced in "full panels" with no horizontal dimension less than five (5) feet. Contractor shall review the planned limits and lines of concrete removal and replacement with the Public Works Landscape Inspector prior to sawcutting for Removal Work.

B. Backfill:

1. Amend Standard Specifications Section **308-2.2 Trench Excavation and Backfill** to read: " Backfill shall be uniformly tamped in 4-inch layers under and around the pipe for the full width of the trench and the full length of the pipe. Materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to dry density equal to adjacent undisturbed soil and shall conform to adjacent grades."

2. Add the following to Standard Specifications Section **308-2.2 Trench Excavation and Backfill**:
 - a) Flooding in lieu of tamping is not allowed without specific prior written approval of the Public Works Landscape Inspector.
 - b) Under no circumstances shall the wheels of any vehicle not designed for the purpose of soils compaction be used to compact backfill.

3.03 PIPE INSTALLATION:

- A. General: Add the following to Standard Specifications Section **308-5.2.1 Irrigation Pipeline Installation, General**:
 1. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. However, no hydraulic driving is permitted under asphaltic concrete pavement.
 2. Cutting or breaking of existing pavement is not permitted except as approved in writing by Public Works Landscape Inspector. When approved, all necessary repairs and replacements will be made at no additional cost to City.
 3. Carefully inspect all pipe and fittings before installation, removing all dirt, scale and burrs and reaming; install pipe with all markings up for visual inspection and verification.
 4. Contractor shall install concrete thrust blocking per the manufacturer's recommendations at all changes of direction and terminal points of pressure pipe.
 5. Parallel lines shall not be installed directly over one another. Provide a minimum of 12" horizontal separation for all parallel lines.
 6. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope on all threaded plastic-to-metal connections, except where noted otherwise.
 7. Constant pressure piping under pavement shall be sleeved using class 315 solvent weld PVC and non-pressure lines in schedule 40 PVC sleeves. All wiring shall be sleeved under pavement using gray schedule 40 PVC. Each line shall be separately sleeved.
 8. Do not install multiple assemblies ("manifold") on plastic lines. Provide each equipment assembly (e.g. RCV, quick coupler, gate valve, head, backflow device) with its own connection to its service line.
- B. Plastic Pipe: Add the following to Standard Specifications Section **308-5.2.3 Plastic Pipeline**:
 1. Exercise care in handling, loading, unloading and storing plastic pipe and fittings, store plastic pipe and fittings under cover until ready to install; transport plastic pipe on a vehicle with a bed long enough to allow pipe to lay flat, avoid undue bending and any concentrated external load.
 2. 360 applicators shall be used to apply primer and solvent on pipe sizes 2-1/2 inches and larger.

3.04 BACKFLOW INSTALLATION: Add the following to Standard Specifications Section **308-5.3 Installation of Valves, Valve Boxes, and Special Equipment**: Install backflow assemblies at locations approved in the field by the Public Works Landscape Inspector and at heights required by local codes.

3.05 VALVE AND VALVE BOX INSTALLATION:

- A. Valves:
 1. Amend Standard Specifications Section **308-5.3 Installation of Valves, Valve Boxes, and Special Equipment** to read: Valves shall be the same size as the pipeline in which valves are installed unless otherwise specified on the Plans. Valves shall be installed a minimum of three feet in horizontal distance apart, each with its own connection to the pressure main line.
 2. Amend Standard Specifications Section **308-5.3 Installation of Valves, Valve Boxes, and Special Equipment** to read: Install quick couplers within valve boxes per the Public Works Department's standards at maximum 75' o.c., and maximum 50' from ends of all planting areas.
 3. Add the following to Standard Specifications Section **308-5.3 Installation of Valves, Valve Boxes, and Special Equipment**: Valves shall be installed in shrub areas whenever possible. No valves or valve boxes other than quick coupler valves shall be installed within a designated turf area.
- B. Valve Boxes:

1. General: Valve boxes shall be installed with a minimum of 2" vertical clearance between the box and all pipelines and valve components and/or special equipment within the box. Valve boxes found resting on either the valve, special equipment or pipelines shall be cause for rejection of the installation.
2. Uses:
 - a) Concrete Valve Boxes:
 - i) Rectangular: Unless noted otherwise on the Plans, each remote control valve, all wire splices, flow meters and each master control valve shall be installed within a rectangular concrete valve box.
 - ii) Round: Unless noted otherwise on the Plans, each quick coupler valve and each gate valve shall be installed within a round concrete valve box.
 - c) Plastic Valve Boxes: (for drip irrigation systems only)
 - i) Rectangular: Unless noted otherwise on the Plans, each drip irrigation flush valve, and each air relief valve shall be installed within a rectangular plastic valve box.
 - ii) Round: Unless noted otherwise on the Plans, ball valves and/or gate valves shall be installed within a round plastic valve box.

3.06 IRRIGATION HEAD INSTALLATION: Amend Standard Specifications Section **308-5.4.1 Sprinkler Head Installation and Adjustment, General** to read: Irrigation heads shall be installed as designated on the Plans and per the Public Works Department's standard details. Upon coverage testing of the system if 100% coverage is not afforded by the system as designed, additional heads shall be added as necessary to achieve 100% coverage.

3.07 CONTROLLER INSTALLATION: Add the following to Standard Specifications Section **308-5.5 Automatic Control System Installation**:

- A. Controller Installation: The controller location, as shown on the Plans, is diagrammatic. The final location of the controller(s) shall be as approved by the Public Works Landscape Inspector before installation. Typical controller location shall be mid-block 3' behind the sidewalk. If replacement of existing controller(s) is a part of the project, Contractor shall remove the existing controller(s) and replace with the replacement unit as specified. Contractor shall install all conduit runs, 120V wire and cable, and 24V control wire, as necessary for a complete and operational system.
- B. Controller Enclosure:
 - (1) Conventional Type: The controller shall be wall mounted within a Myers Power Products, Inc. Catalog # MEUG22X-ENC-RIV, stainless steel vandal resistant enclosure, unless noted otherwise on the Plans. Controller enclosure shall be located in shrub areas and/or adjacent to other hardscape items. Enclosure shall have the service address applied to the upper half of the enclosure in a location visible from the roadway in 3" black vinyl numerals. A 4" thick concrete slab for maintenance access shall be provided, size approximately 15 sq. ft., line, grade and dimensions as directed by the Public Works Landscape Inspector.
- B. Coordination of Controller Location with Various Service Connections: Contractor shall coordinate the electrical service with the approved controller location. Contractor shall verify the locations of 120V power prior to installing controller(s) and shall coordinate final assembly mounting locations with the needed utilities. Contractor shall furnish and install grounding rods and ground wires for each controller. Ground rod shall be installed inside base of pedestal.
- C. Controller Connections: Contractor shall inspect, test, and certify all low voltage control wire splices and ground rod installations as applicable. Any repairs as necessary to provide properly operating wiring are to be made by Contractor at no additional cost to City. After repairs are satisfactorily completed, Contractor shall connect the ground wires to the ground rods and the controller(s).

- D. **Controller Programming:** Following establishment of the turf, the irrigation system shall be programmed to operate during the periods of minimal use of the Project area (i.e., 11:00 p.m. through 6:00 a.m.).

3.08 **WIRING:**

- A. **Wiring:** Add the following to Standard Specifications Section **308-5.5 Automatic Control System Installation:**
1. All splice connections shall occur in a valve box. All wire runs between the valve and the controller shall be a continuous run with no splices unless noted otherwise on the Plans.
 2. All low voltage-wiring splices shall be made-up with Spears DS-100 Dri-Splice wire Connectors filled with DS-300 Sealant or Christy's Electra Seal #RHES-5 Sealant or City approved equal.

- 3.09 **FINISHING AND TESTING:** Amend Standard Specifications Section **308-5.6.2 Pipeline Pressure Test** to read: Pressure test the mains - minimum 2 hours at 150 PSI. Add the following to Standard Specifications Section **308-5.6.2 Pipeline Pressure Test:** Center-load all plastic pipe prior to pressure testing. The entire system shall be operating properly before any planting operations commence.

- 3.10 **COMPLETION CLEANING:** Add the following to Standard Specifications Section **308 LANDSCAPE AND IRRIGATION INSTALLATION:** Upon completion of the Work, Contractor shall smooth all ground surfaces, remove excess materials, rubbish, debris, etc., sweep adjacent streets, curbs, gutters, walkways and trails, and remove construction equipment from the premises.

END OF SECTION

JF-DR/02441.MAS
02/24/06