

SECTION 32 84 00

IRRIGATION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product data:

ITEM NUMBER	DESCRIPTION	MANUFACTURER	MODEL NUMBER
1.	pressure supply line	Pipe, Inc	Schedule 40
2.	Lawn head	XYZ Co.	B-44
3.	Etc.	Etc.	Etc.

SAMPLE

B. Quality assurance data:

1. Submit manufacturer's certification that plastic pipe and fittings comply with specification requirements.
2. Submit data confirming that electrical wiring, control motors and electrical devices are U.L. listed.
3. Certify that the water pressure is as intended and anticipated. Provide pressure gage calibration records.

C. Project record documents:

1. Record dimensioned locations and depths for each of the following on a record drawing set of prints. Maintain for this purpose only.
 - a) Point of Connection.
 - b) Sprinkler Pressure Line. Provide dimensions for each 100 l.f. (maximum) along each routing, and for each change in direction.
 - c) Resilient Seat Gate Valves.
 - d) Sprinkler Control Valves.
 - e) Quick Coupling Valves.
 - f) Control Wire Routing.
 - g) Sleeves.
 - h) Other related items as may be directed by the A/E or DPS.
2. Locate dimensions from two permanent reference points (building, monuments, sidewalks, curbs or pavements).
 - a) Dimension accurately at the same scale used on the original drawings, or larger.
 - b) Notes and dimension lettering must be legible.
3. Record changes from the contract drawings, including changes in pressure, and non-pressure lines.
4. Maintain information daily. Keep drawings at the site at all times and available for review of the A/E and the DPS.
5. Irrigation legend shall be changed to accurately reflect the irrigation equipment installed, if not the same as originally specified on the contract documents. This includes flow rates, effective spray diameter/radius and operating pressure of sprinkler heads.

D. Operation and maintenance data:

1. Provide bound manuals detailing operation and maintenance requirements for irrigation systems per Division 1 requirements.
 - a) Provide descriptions of installed materials and systems in sufficient detail to permit maintenance personnel to understand, operate and maintain equipment.

2. Provide the following in each manual.
 - a) Index sheet, stating irrigation contractor's name, address, telephone number and name of person to contact.
 - b) Duration of warranty period.
 - c) Equipment list providing the following for each item.
 - i) Manufacturer's name.
 - ii) Make and model number.
 - iii) Name and address of local manufacturer's distributor.
 - iv) Spare parts list.
 - v) Detailed operating and maintenance instructions for equipment.
 - d) Completed and approved controller chart.

1.02 CONTROLLER CHARTS

- A. Do not prepare charts until record drawings have been approved by the DPS.
- B. Provide one controller chart for each automatic controller installed.
- C. Following approval of controller charts by the DPS, they shall be laminated, including schedule of each head, etc.
 1. Sample of Controller Chart:

1.	S. Field Rotors Colfax side
2.	S. Field Rotors Center
3.	S. Field Rotors N end
4.	S. Field Rotors E side
5.	Sprays S.E. Sidewalk
6.	Colfax tree RWS

- D. Install charts inside a pocket inside the controller cabinet door.
- E. Charts must be completed and approved prior to final acceptance of irrigation system.

1.03 QUALITY ASSURANCE

- A. Qualifications/Certifications:
 1. Pipe installer qualifications: Each installer shall be trained by the manufacturer's representative in correct joint techniques prior to performing work.
 2. Superintendent: A superintendent satisfactory to the A/E shall be present on the site at all times during progress of work and possess certification as a Certified Irrigation Technician (CIT).
 - a) The superintendent shall not be changed, except with the consent of the A/E.
 - b) The superintendent shall have a minimum of five (5) years experience installing irrigation systems of comparable size and complexity.
- B. Explanation of drawings: Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. Drawings are diagrammatic. Carefully investigate the conditions affecting the work and plan accordingly, furnishing fittings, etc., as may be required to meet conditions. Install the work in a manner to avoid conflicts between irrigation systems, planting and architectural features.
- C. Manufacturer's directions: Manufacturer's directions and detailed installation drawings shall be followed. Where manufacturer's instructions are in conflict with the contract documents, the Contractor shall bring these conflicts to the attention of the A/E and DPS prior to construction.

- D. The Contractor shall not willfully install the irrigation system when it is obvious in the field that obstructions, grade differences or discrepancies in dimensions exist that might not have been considered during the design. Such obstructions or differences shall be brought to the attention of the A/E prior to starting work.

1.04 WARRANTY

- A. Warranty the irrigation system to for a period of twenty-four (24) months. Also see General Conditions of the contract and Division 1 requirements.
- B. Correct problems which develop in the system due to faulty materials or workmanship during the warranty period.
- C. Provide written report to DPS of warranty work performed.
- D. Make repairs and replacement within 2 calendar days when notified.
- E. DPS reserves the right to make temporary repairs during warranty and landscape maintenance periods as necessary to keep systems in operating condition without voiding the Contractor's warranty, nor relieving the Contractor of his responsibility.
- F. Contractor shall provide "winterization" and "spring startup" for the system during the warranty and landscape maintenance periods. Notify the DPS before performing winterization or spring startup.

PART 2 PRODUCTS

2.01 GENERAL PIPING

- A. Pressure supply lines downstream of the point-of-connection: CL-200 PVC.
 - 1. Pressure supply lines 3" and larger: Ring tight for mainline.
 - 2. Mainlines: Ring tight fittings.
- B. Non-Pressure lines: CL-160 PVC or CL-200 PVC.
- C. Water supply lines 3" and below (including pipe through backflow preventer): Type K copper, rigid; silver brazed underground fittings, solder above ground fittings, ASTM B-88.
- D. Sleeving pipe:
 - 1. PVC, Class CL-200.
 - 2. Sleeves shall be at least two (2) pipe sizes larger than line carried.
 - 3. Sleeve valve wiring separately in 1-½" minimum pipe.

2.02 PLASTIC PIPE AND FITTINGS

- A. Identification Markings: Identify pipe with the following indelible markings.
 - 1. Manufacturer's Name.
 - 2. Nominal Pipe Size.
 - 3. Schedule or Class.
 - 4. Pressure Ratings in p.s.i.
 - 5. NFS (National Sanitation Foundation) Seal of Approval.
 - 6. Date of Extrusion.
- B. Pipe (Solvent Weld type):
 - 1. Manufactured from virgin polyvinyl chloride compound in accordance with ASTM D 2241 and ASTM D 1784, cell classification 12454-B, Type I, Grade I.
 - 2. Fittings: Standard weight, Schedule 40, injection molded PVC Comply with ASTM D 1784 and D 2466, cell classification 12454-B.
 - 3. Threads, where required: Injection molded type.

4. Tees and Ells: Side gated.
5. Threaded Nipples: ASTM D 2464, Schedule 80 with molded threads.
6. Joint Cement: Depending on time of year when installation is performed, use type as recommended by manufacturer of pipe and fittings to match temperature conditions.
7. Weld-on Cement:
 - a) 710 up to 2" (excluding Sch 80).
 - b) 705 up to 6" (excluding Sch 80).
 - c) 711 up to 12" (including Sch 80).
 - d) 725 up to 6" (hot and cold, under 40o F).
8. Joint Primer: Type recommended by manufacturer of pipe and fittings.
9. Weld-on Primers.
 - a) P-68 purple.
 - b) P-70 purple.
 - c) P-75 Aqua blue.

2.03 ELECTRICAL WIRING AND SERVICE

A. Line voltage:

1. Contractor shall provide line voltage electrical supply and connections to irrigation equipment.
2. Color code wires from building to controller as follows:
 - a) Hot: Black.
 - b) Common: White.
 - c) Switch: Red.
 - d) Ground: Green.

B. Low voltage:

1. Connection between controller and remote control valves: Direct burial #14 AWG UF with PE jacket.
2. Splices, where permitted.
 - a) Waterproof, using 3M DBY splice kit for connection (min. 300’).
 - b) Contain in an accessible valve box. 10” round or standard branded valve box with “WS” branded on cover.
 - c) Direct bury splices must be in boxes.
3. Wire sizing shall be according to manufacturer’s recommendations, in no case less than #14 AWG.

C. Conduit:

1. Underground between controller and mainline trench: Schedule 80 PVC.
2. Exterior above ground: rigid metal conduit.

D. Color code wires from controller to valves as follows:

1. Spares – Black.
2. Controller – Red.
3. Spare Common – Yellow.
4. Regular Common – White.

2.04 MANUAL DRAIN VALVES

- A. Buckner 22000 series, or approved equivalent. Drain valves to be installed only in pits before the backflow preventer.

2.05 ISOLATION VALVES

- A. 2" and smaller, unless otherwise indicated: Ball valve, schedule 40, threaded.
- B. 2½" and larger, unless otherwise indicated: Nibco 200 psi Push On-IPS resilient seated gate valve with 2" square operator nut.

2.06 QUICK COUPLING VALVES

- A. Buckner Valve or Rainbird quick coupler mounted in valve box per DPS standard detail.

2.07 SWING JOINTS

- A. Quick Couplers: reference DPS standard detail.
- B. All other locations: Lasco or Blu-Lock premanufactured swing joints.

2.08 AUTOMATIC CONTROLLER

- A. Install DBC (Denver Brass and Copper Co.) controller assembly.
 - 1. Provide capability for Rain Master Eagle Plus system (antenna, flow sensor, and other components needed for central controls).
 - 2. The controller shall have at least two (2) more zones than are shown on the drawings as spares.
 - 3. All controllers are to be outside when possible. Controllers mounted inside require DPS approval.
 - 4. Provide DBC box/boxes with additional terminal blocks pre-wired.
 - 5. Provide line-voltage disconnect switch with ground fault protection. Locate inside vandal-proof cabinet.
 - 6. Provide one Rain Master Pro Max handheld remote with installation of Rain Master Eagle Irrigation Controller.
 - 7. Contractor maintains the I-Central subscription for the site until the system is turned over to DPS at the end of the warranty period.
- B. Install one 8' ground rod with 8 gauge bare copper within 10' of the controller at exterior applications.
- C. Install Rain Sensor Enclosure. One per site in an on the controller enclosure or on the building out of reach where it will be subjected to accurate amounts of precipitation.

2.09 REMOTE CONTROL VALVES

- A. Hunter ICV
 - 1. Spring-loaded, packless diaphragm activated, normally closed type.
 - 2. Valve Solenoid: 24 volt AC, 4.5 watt maximum, 500 milliamp maximum surge, corrosion proof, stainless steel construction, epoxy encapsulated to form a single integral unit.
 - 3. Provide bleeder valve to permit operation in the field without power at the controller.
- B. Provide isolation valve on supply side of each electric control valve. Reference DPS standard detail.

2.10 POP-UP SPRINKLER HEADS

- A. Acceptable Manufacturers:
 - 1. Rainbird 1800 SAM-PRS series.
 - 2. Hunter Institutional Series.
- B. Plastic body pop-up.
- C. Removable plastic spray nozzle Rainbird "U" series nozzles.
- D. Provide full, half, third or quarter circle patterns.
- E. Minimum pop-up height 4".

- F. Connection: Lasco or Blu-Lock pre-manufactured swing joint or Rainbird SA Series premanufactured swingjoint/Swing pipe assembly.

2.11 ROTARY SPRINKLER HEADS

- A. Acceptable Manufacturer: Hunter I series.
- B. Connection: Lasco or Blu-Lock pre-manufactured swing joint.
- C. Part Circle Heads: Variable arc setting capability.

2.12 VALVE BOXES

- A. Acceptable Manufacturer: Carson Brooks Jumbo.
- B. Locking bolt-down type, furnished with lid and 3" gravel sump
- C. Contractor shall provide gravel. Reference DPS standard detail.
- D. Jumbo size valves boxes for all valves. Provide extensions as needed.
- E. Ten inch round boxes or larger if needed to prevent crowding at wire splices, isolation valves and quick couplers. Reference standard DPS detail.
- F. Tamper-proof bolts.

2.13 BACKFLOW PREVENTION ASSEMBLY

- A. Acceptable Manufacturers:
 - 1. Febco 2" and smaller 825YA with unions on inlet and outlet of backflow.
 - 2. Febco 2.5" and larger 880V.
- B. Backflow enclosures:
 - 1. Hotboxes:
 - a) Hot boxes shall be provided for exterior backflow prevention assemblies.
 - b) Hot boxes shall have tamper proof locking.
 - c) Hot boxes shall have auxiliary heat and power source shall be designed by A/E
 - 2. Vandal proof cages:
 - a) If DPS approves use of enclosure other than a hotbox a "Guard shack" enclosure shall be used to protect the backflow assembly.
 - b) "Guard shack" shall have tamper proof locking.

2.14 MASTER CONTROL VALVE AND FLOW SENSOR

- A. Install hydrometer, a combination master valve, water meter and flow sensor unit, as provided by Denver Brass Co. Master valve to be normally open.
- B. Flow sensor to be Brass up to 2 1/2" and Plastic for 3" and 4" sensors.
- C. Master Control Valve and Flow Sensor need to be accessible and in separate jumbo box so they can be serviced.
- D. Flow Sensing wire to be EV-CAB-SEN from DBC no substitutions.
- E. A separate common and valve wire are needed for the Master Control Valve, provide different colors that the rest of the system wires.
- F. Wireless Signal Assembly can be used for wireless flow sensing with DPS approval in situations where standard installation is cost prohibitive.

2.15 BOOSTER PUMPS

- A. Specify when required; consult with the Grounds QAQC during Design Development.

2.16 IRRIGATION WATER METER

- A. A/E shall specify when required.

2.17 ROOT WATERING SYSTEM

- A. Acceptable Manufacturer.
 - 1. RainBird, RWS Series.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Before irrigation work commences, a pre-installation conference shall be held with the DPS, the Contractor, the A/E, the plumbing subcontractor's on-site representative, the irrigation subcontractor's on-site representative, the DPS Plumbing Department irrigation specialist and DPS Grounds.
 - 1. The A/E shall provide a meeting report.
- B. Notifications by Contractor:
 - 1. Notify the A/E and the DPS of the following with 72 hours minimum notice.
 - a) System layout.
 - b) Trench excavations for depth of trench prior to backfill.
 - c) Pressure supply line installation and testing.
 - d) Coverage tests: Prior to landscape planting.
- C. Provide up-to-date Record Document irrigation drawings at each meeting, review, test, and inspection.

3.02 WATER PRESSURE

- A. Prior to beginning irrigation installation, the Contractor shall verify that the water pressure is as designed, intended and anticipated at the point of connection.
 - 1. Existing pressure shall be checked utilizing a calibrated pressure gage.
 - 2. Written submittal shall be provided prior to start of work.
 - 3. Provide pressure gage calibration records with the submittal.
 - 4. Written confirmation from the DPS shall be obtained prior to the start of work.

3.03 WATER SERVICE CONNECTION

- A. Make connections to water sources at locations indicated and make minor changes in location as may be necessary due to actual conditions.
- B. Notify the DPS 72 hours in advance of water service interruption.

3.04 LAYOUT

- A. Piping and equipment layout is indicated diagrammatically on the plans.
- B. Piping and equipment shall be installed inside planting areas whenever possible.
- C. Minimize the number of lines below asphalt and concrete.
- D. Lay out sprinkler heads and other items, and make minor adjustments required due to differences between actual site conditions and the contract documents. Minor adjustments shall maintain the original design intent.
- E. Mark line layout with paint.
- F. Flag heads and valves.
- G. System layout shall be approved by the A/E and DPS.
- H. Maintain and protect layout through the completion of trenching.

3.05 GENERAL INSTALLATION

- A. Contractor shall examine the site for conditions that will adversely affect execution, permanence and quality of work and shall immediately notify the A/E and the DPS, in writing, of items that will adversely affect the work.
 - 1. Verify that final grading has been completed and accepted by the A/E and the DPS, before proceeding with remaining work.
 - 2. Exercise extreme care in excavating and working near existing utilities. Contractor is responsible for damage to utilities caused by his operations or neglect. Contractor shall obtain locates from utilities for the locations of utilities prior to the start of work. Also refer to other DPS standards regarding utilities.
- B. Soil Conditions: Investigate soil type and conditions in which lines are to be installed and allow for the same in installation. No extras will be allowed due to difficulty in trenching. A soils report is available from the DPS for review prior to bid and during construction activities.
- C. Commencement of work shall indicate that the Contractor accepts site conditions and water pressures without recourse.
- D. Mainlines shall have concrete thrust blocks installed at changes of direction such as tees, ells, cross tees, etc.
 - 1. Each thrust block shall include a minimum of four cubic feet of 3,000 psi concrete with a minimum of two square feet poured against undisturbed earth.
 - 2. Wrap pipe, tees, ells, cross tees, etc., with four mil poly or other fabric to prevent bonding of concrete to the irrigation component.
 - 3. Refer to DPS standard thrust block details.
- E. Brass pipe and threaded fittings: Assemble using Teflon tape applied to male threads only.
- F. Plastic pipe and threaded fittings: Assemble using Teflon tape applied to male threads only.
- G. Tape open ends of pipe during installation to prevent entry of foreign matter into the system.
- H. All sprinkler heads shall be installed with Lasco or Blu-Lock premanufactured swing joints. No “funny pipe” is allowed.
- I. Valve boxes shall be installed with lids level with finished turf elevation, and shall have a minimum 2” clearance above any piping passing into or through the boxes.
- J. Irrigation heads:
 - 1. Locate approximately as indicated on drawings. Do not exceed the maximum or minimum spacing indicated by manufacturer.
 - 2. Flush lateral lines with full head of water and install heads after hydrostatic test is completed.
 - 3. Install lawn heads to be level with turf or mulch.
 - 4. Keep heads 1-½” below level of adjacent sidewalks and other hardscapes.
 - 5. Locate part-circle heads minimum 6” from walks and 12” from walls, fences, and other boundaries, unless otherwise indicated or approved by the DPS.
 - 6. Allow no backwash or overspray onto walls or fences.
- K. Low flow equipment:
 - 1. Install low flow valve assembly in separate valve box.
 - 2. Use of drip tubing is prohibited.
 - 3. Use specialized tools for installation methods per manufacturer’s recommendations.
- L. Locate isolation valves in easily accessible locations. Do not locate above ceilings or in crawl spaces unless there is easy and direct access.
- M. Rain sensor mounting: Refer to standard DPS detail for mounting requirements.

3.06 TRENCHING

- A. Also refer to other DPS standards for trenching.

- B. Following approval of layout, excavate trenches to required depths at pipe invert.
- C. Maintain bottom of trenches flat to permit piping to be supported on an even grade continuously for full run.
- D. Main line to be at least 2' deep, 4' maximum, zone and lateral to be no shallower than 1' deep, but typically 18".
- E. Pipes below asphalt and concrete shall be installed in PVC sleeves. Sleeves shall drain to one end.
- F. Depth of bury to top of pipe in landscape areas.
 - 1. Main lines: 18" to 24" (minimum).
 - 2. Lateral lines: 12" to 16" (minimum).
- G. Depth of bury to top of pipe in athletic/sports fields.
 - 1. Main lines: 18" to 24" (minimum).
 - 2. Lateral lines 16" to 20" (minimum).

3.07 LINE CLEARANCES

- A. Provide not less than 6" clearance between each irrigation line and not less than 12" clearance between lines of other trades.
- B. Do not install parallel lines directly over any other line.

3.08 BACKFILLING

- A. Also refer to other DPS standards for backfilling.
- B. Do not backfill more than is necessary over any line for stability until it has been inspected and tested. The A/E and the DPS will then approve the satisfactorily tested and satisfactorily inspected portion of the system for backfill.
- C. Place accepted backfill material in 6" loose lifts, and compact each lift.
- D. Compact trench backfill to a dry density equal to adjacent undisturbed soil. Restore to adjacent grade, free of dips, depressions, humps or other irregularities.
- E. Compaction by truck or other vehicles is not permitted.
- F. Puddle each trench thoroughly and assure that no settlement occurs.
 - 1. Exception: Do not puddle in expansive soil areas indicated by the Soils Report.

3.09 EXISTING TREES

- A. Where necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees and tree roots. Refer to section 32 01 90.33 Protection and repair of existing trees.
- B. Trench no closer than 6' from trunk of existing trees.
- C. Cut no roots over 2" diameter; hand trench around roots.

3.10 EXISTING PAVEMENTS

- A. Piping sleeves under pavements may be installed by jacking, boring or by hydraulic driving except as otherwise specified or directed by DPS.
- B. Obtain permission from DPS prior to cutting or breaking existing pavements.
- C. At locations where cutting is approved, make clean cuts using power saws. Make cuts at approved locations only. New pipe shall then be installed in sleeves.
- D. Sidewalk cuts shall remove full sidewalk panels only. No narrow cuts will be allowed.
- E. Restore affected site and landscape elements to original condition, including grades and landscaping. Restoration work shall match the original condition, including type, strength, texture and finish.

3.11 SYSTEM FLUSHING

- A. After sprinkler pipe lines and risers are in place and connected, and prior to installation of sprinkler heads, thoroughly flush lines with a full head of water.
- B. Do not install sprinkler heads until lines have been flushed to the satisfaction of the A/E and the DPS.

3.12 VALVE BOX IDENTIFICATION

- A. Brand the box identification number with characters from the “Brand New Industries Inc.” valve box branding kit. This will include numbers and letters.
- B. Permanently mark each valve inside of box with same identification as valve box cover. Use “Christies Valve ID Tags” or equal to identify valves. Attach the tag to the valve via wire or cable tie and mark clearly with permanent marker. Use yellow ID tags for potable water irrigation systems and use purple ID tags for non-potable water irrigation systems.

3.13 ELECTRICAL WIRING

- A. The A/E shall specify electrical wiring installation requirements.
- B. Low voltage wiring:
 - 1. Place wiring in the same trench and routing as pressure supply lines unless otherwise approved.
 - 2. Install wiring to the side of mainlines whenever possible and not below or above.
 - 3. When more than one wire is placed in a trench, tape wires together at 15 ft. o.c., maximum.
 - 4. Provide a 24" expansion loop at each connection and directional change. Loops to be brought up and within irrigation box for easy access.
 - 5. Wire shall be run in PVC conduit underground between controller and mainline trench.
 - a) Sleeve conduits through foundation walls, asphalt, concrete, etc., and under asphalt and concrete walks, driveways, parking areas, etc.
 - b) PVC conduit is prohibited above ground or in building interiors.
 - 6. Rigid metal conduit shall be used on exteriors above ground.
 - a) Transition from PVC conduit to rigid metal conduit five (5) feet from building wall and/or controller location.
 - 7. Use continuous wire between controller and remote control valves.
 - 8. Splicing:
 - a) Except as otherwise approved, do not splice wire at any point.
 - b) At locations where splicing is allowed, make splices within an approved box.
 - c) Wire splicing shall not occur in a valve box, quick connect box or any box used for a purpose other than wire splicing.
 - d) Each controller shall have its own separate ground wire.
 - 9. Spare wires:
 - a) Provide two spare common wire for each controller, installed to end of each mainline.
 - b) Provide one spare control wire for every 10 zones, two minimum for each controller.

3.14 BOOSTER PUMPS

- A. Design, testing and installation of booster pumps to be coordinated with and approved by the DPS Grounds Shop.

3.15 PRESSURE TESTS

- A. Contractor shall provide equipment necessary to test systems, including air compressor.
- B. Schedule testing 72 hours in advance so the A/E and the DPS may observe pressure testing.

- C. Pressure supply lines shall be filled with water for at least 24 hours prior to testing and shall be tested under minimum 150 p.s.i. hydrostatic pressure for a period of two (2) hours unless otherwise approved. If the pressure loss is greater than 2 PSI over the testing period, repairs shall be made and the system re-tested until it passes. Piping may be tested in sections to expedite work.
- D. Contractor shall provide a written report to the A/E and the DPS stating the starting pressure and ending pressure and listing the equipment used.

3.16 COVERAGE TESTS

- A. Perform coverage tests after sprinkler system is completed and pressure testing is completed.
- B. Prior to planting, provide coverage testing in the presence of the A/E and DPS.
- C. Assure all lawn and planting areas are watered completely and uniformly.
- D. Make necessary adjustments, including realignment of heads, to provide required coverage as directed by the A/E and the DPS. The Contractor shall provide a written and signed report of the coverage testing to the A/E and the DPS.

3.17 SYSTEM PROGRAMMING AND ADJUSTMENT

- A. Valves: Adjust controls and pressure reducing valves to attain the required pressure (as shown on sprinkler head legend) at the sprinkler head.
- B. Heads: Adjust for alignment and coverage.
- C. Contractor shall make alterations to the system to provide specified coverage.
- D. Make final adjustments prior to planting.
- E. Controller settings
 - 1. Prior to the Owner's acceptance of the irrigation system, program the irrigation controller on a regular basis to ensure adequate but not excessive watering for the seasonal period and establishment of the landscape.
 - 2. Conform to municipality requirements imposed on the Owner, such as watering periods, water application rates, and drought restrictions.
 - 3. For information on responsibility of clock adjustments refer to maintenance section 32 91 00.

3.18 WINTERIZATION

- A. Installer is responsible for winterization of the entire site irrigation system (including the existing system) during the warranty and landscape maintenance periods.
- B. Unless modified by extremely mild weather conditions, the system shall be shut down and winterized by November 25.
- C. In the week immediately prior to winterizing of the system, landscape areas shall receive a minimum of 1-½" of water (either through natural conditions or operation of the system).
- D. Winterize the system by closing the main pressure valve, opening valves, removing water from all the lines, including backflow preventer and line to meter, de-energizing the controller, and other required actions. Remove water from drip lines. Lines shall be purged by use of compressed air. Evacuate back flow prevention device and protect.
- E. Submit written certification of time and date of completed winterization to the DPS with two (2) days of completion.

3.19 ACTIVATION/SPRING STARTUP

- A. Installer is responsible for startup of the irrigation system during the warranty and landscape maintenance periods.
- B. Activate the irrigation system no later than April 30th. If weather conditions warrant activating the system prior to April 1st or after April 30th, obtain agreement from DPS.
- C. Notify DPS a minimum of one week before activating the irrigation system.

- D. The system shall not be activated and operated without the Owner present to verify vandalism damage, etc., beyond the responsibility of the Contractor. If Owner is not present during startup, damage discovered subsequent to the startup will be assumed to be covered under the warranty.
- E. To activate the system, pressurize and run each zone a minimum of 15 minutes. Observe for leaks, pressure defects, adequate coverage, and other conditions that may impact the effective operation of the system. Immediately correct leaks or defects.
- F. Submit written certification of time and date of completed startup to the DPS within two (2) days of completion.

3.20 DEMONSTRATION

- A. Train the Facility Manager(s) in proper operation of equipment.
- B. Coordinate and schedule training sessions with the DPS.
- C. Submit written evidence that training has been successfully completed.

3.21 SPARE PARTS AND TOOLS

- A. Deliver the following items to the DPS Grounds shop.
 - 1. Two (2) keys for each automatic controller.
 - 2. Two (2) sockets for opening valve boxes.
 - 3. Two (2) keys for hotboxes or backflow protection.

END OF SECTION 32 84 00