

SECTION 32 80 00 – IRRIGATION SYSTEMS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- A. Permits: Contractor shall obtain and pay for any permits required.
- B. Contractor shall be responsible for notifying all utility companies 3 days prior to any trenching.
- C. The current Standard Landscape Specifications and Drawing(s) must be on site at all times for each project.

1.2 SCOPE OF WORK

- A. The intent of the drawings and specifications is to indicate the processes required for the installation of a complete operating irrigation system.
- B. The work consists of furnishing all tools, equipment, material, labor and any processes required to provide a complete operating irrigation system as specified in the drawings and specifications.
- C. Drawings are diagrammatic and must be field verified. Contractor must notify Owner immediately of any discrepancies prior to starting work.
- D. Due to the scale of the drawings it is not possible to show all offsets, assemblies, fittings, etc. for a complete irrigation system.
- E. Under this section the contractor shall provide all necessary assemblies, fittings, etc. to provide a complete fully automatic irrigation system as listed in drawings and specifications with no additional cost to the owner.
- F. Any extra work performed shall be approved in writing by the Owner or Owner's Representative prior to the start of such work.
- G. Any unapproved work shall be at the Contractors expense.
- H. If reclaimed water is used, Contractor shall provide all necessary reclaimed water signage and equipment. The entire irrigation system must be in accordance to the local reclaimed water specifications and as listed in drawings.

1.3 RECORD DRAWINGS

- A. Record accuracy on one set of black and white plans denoting variations in work from original drawings.
- B. Dimension from 2 permanent points of reference (sidewalks, pavement, curbs, street lights, and buildings). Record on as-builts daily or as work is performed. All drafting must be clearly legible and dimensions shall be no small than 1/4" in size.
- C. Show dimensions from the following locations and depths:
 - 1. Point of connection (P.O.C.)
 - 2. Backflow prevention assembly, master valve and flow sensor.
 - 3. Routing of irrigation pressure mainlines and all directional changes.
 - 4. Ball and butterfly isolation valves.
 - 5. Irrigation control valves.
 - 6. Automatic controller (rain sensors and electrical conduits).
 - 7. Sleeves and pull boxes.
 - 8. Other related equipment (as directed by the Engineer).

- D. Maintain as-built drawings on site all times. These drawings are subject to inspection at any time.
- E. Mark changes to reproducible drawings in ink (no ballpoint pen). Erase or use eradicating fluid when revising drawings. Make changes in a manner equal to the original drawings.
- F. Contractor must submit as-built drawings to the Owner inspecting the site, 7 days prior to the start of the maintenance period for approval.
- G. As-built measurements must be transferred to an Autocad digital file by the Landscape Architect or qualified draftsmen prior to turn-over. All site lines must be black, mainline and valves must be red and dimension lines must be blue.

1.4 CONTROLLER CHARTS

- A. As-built drawings shall be approved in writing prior to preparing charts.
- B. Provide 2 controller charts for each controller supplied, showing the area covered by the automatic controller.
- C. The chart shall be a reduced reproduction of the as-built system. If the controller sequence is not legible when reduced, enlarge it to a size that will be legible when reduced.
- D. Charts shall be black line print with a different transparent color used to show area of coverage for each station.
- E. Completed and approved charts must be laminated with plastic 10 mil thick minimum.
- F. Charts shall be completed and approved prior to final inspection of the irrigation system.
- G. Controller access: The Owner reserves the right to have complete access to the controller clocks for monitoring and controlling system failures. The Contractor shall provide the Owner with two sets of keys that are necessary for access to the controller clocks within the designated area. The keys will then become the property of the Owner.

1.5 OPERATION AND MAINTENANCE MANUALS

- A. Prepare and deliver to the Owner, prior to the start of maintenance, all required and necessary descriptive material in complete detail and sufficient quantity properly prepared in 2 individually bound copies and 1 PDF format electronic copy on disk. Describe the material installed in sufficient detail to permit qualified operating personnel to understand, operate and maintain all equipment. Each manual shall include the following:
 1. Index sheet, stating Contractor's address and telephone number.
 2. Duration of warranty period with warranty forms.
 3. List of equipment with names and addresses of manufacture's local representative.
 4. Complete operating and maintenance instructions on all major equipment.
- B. In addition to the maintenance manuals, provide the maintenance personnel with the instructions for major equipment and show written evidence to the Owner at the conclusion of the work that this service has been completed. Contract shall provide at Owner's request, proper training for operations and maintenance of new equipment. Training shall be video recorded with recording provided to the Owner.

1.6 SPARE PARTS AND EQUIPMENT

- A. Prior to the start of maintenance, prepare and deliver to the Owner, all required spare parts, tools and equipment. Spare parts, tools and equipment shall include but are not limited to the following:
 1. 2 quick coupler keys with ¾" bronze hose bib with hand wheel.

2. 2 quick coupler lid keys.
3. 1 valve box covers wrench or key.
4. 2 wrenches and screw drivers for adjustment and disassembly for each type of sprinkler head used in the irrigation system.
5. 6 extra sprinkler heads of each type and size used in the irrigation system.
6. Remote radio device for irrigation controller(s) for systems 30 stations or greater and if otherwise specified.

1.7 WARRANTY

- A. Provide written warranty in form approved that all work with defects in workmanship and materials will be repaired or replaced at no cost to the Owner for a period of 1 year from the date of Final Acceptance by the Owner's Representative.
- B. This form shall be transferred onto the Contractor's letterhead and must contain the following:

****Name of Project****

We hereby warrant that the irrigation system we have furnished and installed for ****Name of Project**** is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications. Ordinary wear and tear and unusual abuse or neglect expected. We agree to repair or replace any defects in material or workmanship, which may develop during the period of 1 year from the date of final acceptance, and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time after receipt of such written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of such written notice from the Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense and we will for the cost and charges therefore upon demand.

Project Name: _____

Owner: _____

Landscape Architect: _____

Location: _____

Signed: _____ Title: _____

Address: _____

Telephone: (____) _____

Date of Signature: _____

1.8 INSPECTIONS

- A. Site inspections and notification time:
 1. Pre-construction conference: 7 days
 2. Pressure line installation and testing: 48 hours
 3. Controller Installation: 48 hours
 4. Lateral line and sprinkler installation: 48 hours
 5. Coverage test: 48 hours

6. Final Grading:	48 hours
7. Weed abatement:	48 hours
8. Tree and shrub observation and layout:	48 hours
9. Finish grade prior to hydro-seeding:	48 hours
10. Acceptance to commence maintenance:	48 hours
11. Monthly maintenance walk:	48 hours
12. Final Inspection:	7 days

- B. No field inspections will commence unless record drawings are current and available for observation upon request by the Owner's Representative

1.9 IRRIGATION SYSTEM TESTING

- A. Owner's Representative must be notified 48 hours prior to any irrigation testing or inspections.
- B. Contractor shall perform a pressure test to all pressure lines in the presence of the Owner's Representative.
- C. All pressure lines must be tested under hydrostatic pressure in accordance with pressure provided by applicable utility provider and be proven watertight.
- D. Pressure lines must maintain pressure for a period of 2 hours. If pressure drop occurs, Contractor shall replace joints and repeat test until no pressure drop is achieved.

1.10 PRESSURE LINE OBSERVATION

- A. Prior to any backfilling of any trench(s), Contractor shall call for field observation for verification of material, depths, clearances and warning tape by the Owner's Representative.
- B. Any trenching covered, that was not inspected or approved, shall be made visible for observation at the cost of the Contractor.

1.11 CONTROLLER TESTING

- A. Contractor shall test, in the presence of the Owner's Representative that all control wires and extra control wires are functioning properly.
- B. Contractor shall provide sufficient manpower and/or radio devices to complete such testing in a timely manner.

1.12 LATERAL LINE TESTING

- A. Prior to any backfilling of any trench(s), Contractor shall call for field observation for verification of material, depths and clearances by the Owner's Representative.
- B. All sprinklers and assemblies shall be made visible for observation and verification, that all material has been installed per plans and specifications.
- C. Any trenching covered that was not inspected or approved shall be made visible for observation at the cost of the Contractor.

1.13 COVERAGE TEST

- A. Contractor shall perform a coverage test in the presence of the Owner's Representative. All irrigation sprinkler systems must provide 100% head to head coverage. Any areas not receiving head to head coverage shall be corrected and retested per the Owner's Representative.
- B. Permanent power must be connected prior to scheduling of the coverage test.

- C. Contractor shall provide sufficient manpower and/or radio devices to complete such testing in a timely manner.
- D. All heads must be adjusted to prevent over spray to buildings, walks, streets etc. (See adjusting the system section).
- E. No planting or hydro-seeding shall take place until the coverage test has been approved in writing by the Owner's Representative. Tree planting may commence upon approval from Owner's representative.

1.14 FINAL IRRIGATION INSPECTION

- A. All irrigation systems shall be tested in the presence of the Owner's Representative and under complete automatic operation and proven to be leak free irrigating designated areas per plans and specification with the least amount of over spray as possible.
- B. Contractor shall provide as-built record drawings and controller charts at final irrigation inspection for approval prior to laminating of controller charts.
- C. All irrigation turn over items shall be turned into the Owner's Representative prior to the start of maintenance.

PART 2: IRRIGATION SPECIFICATIONS MATERIALS

2.1 BACKFLOW PREVENTION DEVICES

- A. Backflow prevention units shall be approved by Texas Commission on Environmental Quality (TCEQ).
- B. Backflow assemblies shall be installed using brass ells, unions, nipples and stainless steel handles.
- C. Type: Febco 825YA or Owner approved equal.

2.2 PRESSURE REDUCING VALVES

- A. Pressure reducing valves shall be of PVC construction and be adjusted from 25 PSI to 125 PSI.
 - 1. Manufacturer: Wilkens 500HLR or Owner approved equal.

2.3 WYE STRAINERS

- A. Wye strainer shall be bronze construction with a stainless steel screen element. Wye strainer shall have a standard filtration size of 80 mesh.
 - 1. Manufacturer: Wilkens 100YSBR or Owner approved equal.

2.4 SHUT-OFF VALVES

- A. Ball Valve:
 - 1. Shut-off valves 2½" and smaller shall be PVC ball valves.
 - 2. Ball valves shall have a 1 piece body construction. Ball valves shall have a working pressure of not less than 150 PSI and shall conform to AWWA standards.
 - a. Manufacturer: NIBCO T-580 or Owner approved equal

2.5 Quick Coupler Valves

- A. Quick coupler valves shall have a body constructed of red brass with a wall thickness shall be warranted to withstand normal working pressure of 150 PSI without leakage with female threads (penning at base).

Quick coupler valve shall have a hinge cover constructed of red brass with leather-like vinyl cover bonded to it in such a manner that it becomes a permanent type of cover. Quick couplers used with potable water shall have vinyl covers yellow in color. Quick coupler valves used for reclaimed water shall have vinyl covers purple in color with the appropriate reclaimed water warnings in English and Spanish as well as the International "Do Not Drink" symbol.

B. All quick coupler valves must have a schedule 80 ball valve to isolate mainline from quick coupler valve. Mainline shall be the size of quick coupler valve from mainline tee to quick coupler.

1. Manufacturer: Potable Water: Rainbird 44LRC, Rainbird 33LRC or Owner approved equal.

2. Manufacturer: Reclaimed Water: Nelson #7645

2.6 REMOTE CONTROL VALVES

A. The remote control valve shall be normally closed 24 VAC solenoid actuated globe pattern, spring-loaded diaphragm type. The valve shall be pressure rated up to 200 PSI at 150° F.

B. The valve shall have a 600 lb. test fabric reinforced rubber diaphragm assembly with self-cleaning stainless steel screen.

C. Remote control valve body and bonnet shall be brass and the valve shall have a stainless steel control/shut-off and manual operator.

1. Manufacturer: Rainbird PESB-PRS or Owner approved equal.

2.7 MASTER CONTROL VALVES

A. The master control valve shall be a switchable normally closed or open 24 VAC solenoid actuated globe pattern, spring-loaded diaphragm type. The valve shall have up to 220 PSI at 150° F pressure rating.

B. The body bonnet shall be plastic and the valve shall have a stainless steel control shut-off stem and manual operator.

C. The valve shall have a 600 lb. test fabric reinforced rubber diaphragm assembly with self-cleaning stainless steel screen.

D. The master valve shall be capable of regulating pressure.

E. Install downstream of filter.

1. Manufacturer: Rainbird PESB-PRS or Owner approved equal.

2.8 FLOW METER

A. Flow meter shall be constructed of a schedule 80 tee whenever possible with a solid state a-ring sealed epoxy fused sensor housing and nylon impeller.

B. Flow meter must be installed and wired per manufacturer's specifications.

C. Irrigation zones must be sized so that the specified flow meter is capable of reading the minimum and maximum gallons per minute for all proposed zones.

D. Install downstream of master valve.

1. Manufacturer: Shall be Owner approved.

2.9 RAIN SENSOR + FREEZE SENSOR

- A. Rain sensor shall be a heavy-duty plastic container with epoxy sealed electronics installed within a 1/8" thick steel enclosure. Mount sensor on controller enclosure or building eave per manufacturer's specifications. Sensor shall be wired per manufacturer's specifications.

- 1. Manufacturer: Rainbird WR2-RFC or Owner approved equal

2.10 FILTRATION DEVICE (RECLAIMED WATER)

- A. Filter shall be manufactured with a steel powder coat or stainless steel body with an 80 mesh filtration element and a stainless steel basket.
- B. Filter must comply with all EMWD requirements.

- 1. Manufacturers: Yardney, Ag Products or Owner approved equal.

2.11 BOOSTER PUMP

- A. Engineer shall determine manufacturer of booster pump.
- B. The booster pump must be controlled by a flow switch activator. Pump relay switches will not be allowed.
- C. The booster pump must be pre-assembled from the manufacturer with an enclosure and pressure regulator.
- D. Pump size, pressure regulator settings and relay timing shall be determined by the landscape architect and the pump manufacturer and approved by Owner.
- E. Pumps with VFD motors are recommended when low volume drip valves and high flow spray head or rotor valves are used together.

2.12 FILTRATION EQUIPMENT

- A. Filter shall be Turbo-Clean in-filter available from Amiad Filtration Systems Inc. (800) 969-4055.
- B. Specify filter at POC directly downstream of the backflow device. Install per filter detail.
- C. Filter must have an automatic remote control valve with control wiring connected to irrigation controller for automatic flushing per filter detail.
- D. Auto flush valve must be connected to DRIP 2 program within the Calsense controller for District monitoring.

2.13 FERTIGATION INJECTOR

- A. Fertilizer injector must be installed after the flow meter.
- B. Fertilizer injector shall be installed in a jumbo valve box supplied by the manufacturer. Valve box must be set at grade per typical valve box detail.
- C. Fertilizer injector must be installed per manufacturer's installation specifications.

2.14 AUTOMATIC CONTROLLER

- A. The controller shall operate on minimum of 120 volts AC power input and shall be capable of operating up to 4-5.5 VAC 24 volt AC remote control valves at once. The controller shall have a reset circuit breaker to protect the controller from overloading. Controller must be Smart or ET.

- B. The controller shall have independent programmable stations. The controller programming schedule shall be capable of allowing 4 automatic start times per day on 4 separate programs. Station timing shall be variable from 1 to 99 minutes. The controller must have a water budgeting function to allow increasing or decreasing of watering times for all stations at once.
- C. The controller shall have a master valve/remote pump start circuit for use with a master valve to pressurize the system when the programmed cycle starts to activate a remote pump start relay to run the pump during the programmed cycle.
- D. The controller shall have manual watering capabilities for single station operation at any time without changing programmed times.
- E. The controller shall have a factory installed backup program for standby operation and a backup battery to maintain the programs during power loss.
- F. PSP must provide the following information to be Owner approved:
 - 1. Project name and tract number
 - 2. Project location: cross street or address if applicable.
 - 3. Number of controllers on the project and proposed specification.
 - 4. Number of water meters on the project.
- G. Controller compliance letter must be attached with first irrigation plan submittal.
 - 1. Manufacturer: Rainbird or Owner approved equal.

2.15 CONTROLLER ENCLOSURE

- A. All controllers installed outside must be mounted inside a stainless steel enclosure with lockable-hinged doors provided by the controller manufacturer.
- B. The enclosure shall have 1 full time 120 VAC GFCI type circuit with on/off switch and pigtail connection for remote control use.
 - 1. Manufacturer: Rainbird or Owner approved equal.

2.16 ELECTRICAL PEDESTAL

- A. All electrical pedestals must be stainless steel.
- B. All electrical pedestals must comply with local electrical code and agency requirements.
 - 1. Manufacturers: Strongbox #MPS-A16-10K, Rainbird or Owner approved equal.

2.17 CONTROL WIRING

- A. All control wiring for connections between remote control valves and controllers shall be direct burial AWG-F wire install in accordance with manufacturer's specifications.
- B. All splices shall be sealed with waterproof connectors and waterproof sealant.
- C. All extra wires shall be sealed with waterproof connectors.
- D. Wiring shall be buried adjacent to mainline wherever possible and for more than 1 wire they shall be bundled at every 10' using black electrical tape.
- E. Expansion curl shall be provided within 3' of each connection and at all changes in direction. Provide a 2' expansion loop for every 100' of run.

- F. Wire size shall not be less than #14. Provide #12 for runs over 2500’.
- G. All common wires shall be #12.
- H. Control wires shall be black or red in color. If additional controllers are installed, provide white wire with colored stripe.
- I. Common wire shall be white in color. If additional controllers are installed, provide white wire with colored stripe.
- J. Contractor shall provide one extra wire for every 5 valves and 2 extra wires shall be provided for every valve in any isolated area and the extra wires shall extend past the last valve in a group. Extra wires shall be orange in color and looped in every valve box and made accessible for future use if needed.
- K. No wire splices shall be permitted unless run is longer than 2500’ or approved by Owner’s Representative.
 - 1. Manufacturer: Paige or Owner’s approved equal.

2.18 VALVE BOXES

- A. Rectangular valve boxes shall be 9½” wide by 16” long and 11” high. Round valve boxes shall be 1” diameter and 10¼”. All valve boxes shall be constructed of rigid polyolefin.
- B. Valve boxes shall have locking covers.
- C. Rectangle valve boxes shall be used for control valves, master control valves, pressure regulators, flow sensors, wye strainers, filtration devices, ball valves, butterfly valves and pull boxes.
- D. Round valve boxes shall be used for quick coupler valves.
- E. All valve boxes to be green in color unless otherwise specified for use of reclaimed water. All valve boxes for reclaimed water shall be purple in color and bare the reclaimed water warnings as well as the International “Do Not Drink” symbol.
- F. All valve boxes shall receive 2 cubic feet of ¾” gravel per plan.
 - 1. Manufacturers: Carson, Brooks, or Owner approve equal.

2.19 GENERAL PIPING

- A. Pressure line from point of connection to backflow prevention device shall be brass or Type K copper.
- B. Pressure lines 2” and smaller after backflow prevention device shall be Schedule 40 solvent weld PVC.
- C. Pressure lines 2½” to 3” after backflow prevention device shall be Class 315 solvent weld PVC.
- D. Pressure lines 1½” and smaller after backflow prevention device shall be Schedule 40 solvent weld PVC.
- E. Pressure lines 4” and larger after backflow device shall be Class 20 bell and gasket PVC.
- F. Lateral lines 1½” and smaller shall be Class 200 solvent weld PVC.
- G. Lateral lines 2” and larger shall be Class 315 solvent weld PVC.
- H. All pipe and fittings shall bear the markings of the manufacturer’s name, nominal pipe size, pressure rating PSI, NSF, Schedule or Class and date of extrusion.

2.20 PLASTIC PIPE

- A. Solvent weld pipe shall conform to ASTM-D-1784 or D 2241 to meet the requirements of cell classification 124548 for pipe. Pipe shall be extruded of an improved PVC virgin pipe compound high impact strength. Compound shall have a hydrostatic design stress rating of 2,000 PSI.
 - 1. Manufacturer: Pacific Plastics or Owner approved equal.

- B. Rubber gasket PVC pipe shall conform to ASTM-D-1784 Type I, Grade I 2,000 PSI design stress. All pipes shall conform to commercial standards CS-256-64 and NSF testing laboratories. Rubber gaskets shall conform to ASTM 1869.

- 1. Manufacturer: Pacific Plastics or Owner approved equal.

- C. Reclaimed water pipe shall conform to ASTM-D-1784 or D 2241 to meet the requirements of cell classification 124548 for pipe. Pipe shall be extruded of an approved PVC virgin pipe compound high strength. Compound shall have a hydrostatic design street rating of 2,000 PSI. Reclaimed water pipe shall be purple in color and bare the words "CAUTION – RELCAIMED WATER" printed in black letters on 2 sides of all pipes.

- 1. Manufacturer: Pacific Plastics or Owner approved equal.

- D. Ultra Violet Resistant (UVR) pipe shall conform to ASTM-D-1784 or D 2241 to meet the requirements of cell classification 124548 for pipe. Pipe shall be extruded of an approved PVC virgin pipe compound high strength. Compound shall have a hydrostatic design street rating of 2,000 PSI. UVR pipe shall be manufactured using proven to resist corrosion by ultra-violet radiation. Pipe shall be brown in color.

- 1. Manufacturer: Pacific Plastics or Owner approved equal.

2.21 FITTINGS

- A. All pressure line fittings 3" and smaller shall be Schedule 80 solvent weld PVC. Fabricated pipe shall be from an NSF approved Type I, Grade I, PVC compound conforming to ASTM-D-1784.

- 1. Manufacturers: Dura, Lasco or Owner approved equal.

- B. All pressure line fittings 4" and larger shall be iron ductile deep bell type constructed of grade 65-45-12 and shall be in accordance with ASTM A536. Rubber for gaskets in fittings shall be in accordance with ASTM-477. All iron ductile fittings shall have stainless steel exterior lugs to secure a joint restraint system.

- 1. Manufacturer: Leemco or Owner approved equal.

- C. All lateral line fittings downstream control valve shall be Schedule 40 solvent weld PVC. Fabricated pipe shall be from an NSF approved Type I, Grade I, PVC compound to ATT M D1784.

- 1. Manufacturers: Dura, Lasco or Owner approved equal.

- D. Provide primer and solvent cement for PVC solvent weld pipe and fittings of specified type by manufacturers recommendations.

- 1. Manufacturer: Weld-On or Owner approved equal.

- E. All fittings shall have the manufacturer's name, trademark and size applicable NSF or IPS approval.

- F. All threaded fittings shall have 5" Teflon tape.

2.22 BRASS PIPE AND FITTINGS – *NOT USED*

2.23 GALVANIZED STEEL PIPE AND FITTINGS – *NOT USED*

2.24 IRRIGATION HEADS (GENERAL)

- A. All irrigation heads shall be the size, type, and provided the same rate of precipitation with the same radius of spray, pressure and discharge in GPM as listed on drawings.

- B. All spray head sprinklers shall have stainless steel screw adjustment for radius of spray.

- C. Riser and swing joint assemblies shall be as indicated on drawings.
- D. Where Owner requests, irrigation heads shall have a factory installed check valve or have an after-market check valve installed.
- E. All other requirements for non-pressure lateral line pipe to be as specified in fitting specification section.
- F. In no case shall the irrigation head spacing exceed the maximum manufacturer's recommendation.
- G. Irrigation heads along walks, curbs, paving, etc., shall be positioned 1½" above finish grade. Irrigation in turf areas shall be positioned 1½" above finish grade.
- H. All sprinkler heads shall be set perpendicular to finish grades.
- I. All sprinklers in turf areas shall have a minimum pop-up height of 6".
- J. All sprinklers in planter/slope areas shall have a minimum pop-up height of 12".
 - 1. Manufacturers: Rainbird, Hunter or Owner approved equal.

2.25 BUBBLERS

- A. Bubblers shall be constructed of heavy-duty plastic and be pressure compensation full circle. The bubbler shall have a screen to protect it from clogging.
- B. Bubblers shall be adjustable from .25 – 1.0 GPM and operated between 20-90 PSI.
 - 1. Manufacturer: Rainbird 1400 Series or Owner approved equal.

2.26 SPRINKLER HEADS

- A. The sprinkler body, nozzle, stem and screen shall be molded out of heavy-duty plastic.
- B. Pop-up height shall be as listed in drawings.
- C. The sprinkler shall have an adjustment screw used for regulating flow and radius with matched precipitation rate (MPR) nozzle.
- D. The sprinkler shall have a removable screen to protect it from clogging.
- E. The sprinkler shall have a stainless steel spring for proper pop-down.
- F. The sprinkler, where requested, shall be equipped with a factory installed check valve identified on the cap and capable of holding water up to 10' of elevation change.

2.27 ROTOR HEADS (MEDIUM RANGE)

- A. All pop-up rotors shall have a rubber cover and be constructed of heavy-duty plastic except for wiper seal, bearing spring and bearing washers. All rotors shall have a reinforced rib design with flange encasement.
- B. Pop-up height shall be as listed in drawings.
- C. The rotor shall have a diffuser pin for regulating flow and radius.
- D. The rotor shall have a screen to protect it from clogging and have a minimum inlet of ¾".
- E. The rotor shall be capable of covering 16-55' radius at 20-60 PSI with a rate of 3-15 GPM and be adjustable from 1-360°.

1. Manufacturer: Rainbird 7000 Plus series or Owner approved equal.

2.28 ROTOR HEADS (LARGE RANGE)

- A. All pop-up rotors shall have a rubber cover and be constructed of heavy-duty plastic except for wiper seal, bearing spring and bearing washers. The riser shall be constructed of plastic encased in a stainless steel sleeve. All rotors to have a reinforced rib design with flange encasement.
- B. Pop-up height shall be as listed in drawings.
- C. The rotor shall have a diffuser pin for regulating flow and radius.
- D. The rotor shall have a screen to protect it from clogging and have a minimum inlet of 1".
- E. The rotor shall be capable of covering 16-55' radius at 40-74 PSI with a rate of 3.8-27.5 GPM and be adjustable from 1-360°.

1. Manufacturers: Hunter1-25, Hunter 1-40, Rainbird 7005 or Owner approved equal.

2.29 TRENCHING AND BACKFILLING

- A. Contractor must contact One Stop prior to any trenching.
- B. No trenches are to be backfilled until approval from Owner's Representative has been acquired.
- C. Excavate trenches straight and support pipe continuously on the bottom of trench per payout indicated on drawings.
- D. Provide the minimum covers as listed below:
 1. Pressure lines 4" and larger 18"
 2. Pressure lines 3" and larger 18"
 3. Pressure lines 2½" and smaller 12"
 4. Lateral lines 12"
 5. Control wiring 12"
- E. Fine granular soil not larger than ½" shall be for initial backfill and compacted to a density equal to undisturbed soil. Clean backfill soil not greater than 1" for remaining backfill.
- F. No flooding shall be performed to compact trenches unless approved by the Owner's Representative.
- G. Sand backfill to a minimum of 3" shall be applied to all piping under paved areas.
- H. If any settlements occur and irrigation adjustments are required, the Contractor shall make these adjustments with no additional cost to the Owner.
- I. Contractor shall install concrete thrust blocks for all pressure lines 2" and larger. Thrust blocks shall be a minimum size of 1 cubic foot. For bell and gasket pipe, a joint restraint system shall be used instead of thrust blocks per manufacturer's specifications.
- J. Open trenches left unattended must be barricaded or cautioned off.

2.30 FLUSHING THE SYSTEM

- A. Open control valve after all piping and required assemblies have been completed to flush out the system.
- B. Irrigation heads are to be installed after completion of flushing the system satisfactory to the Owner's Representative.

2.31 ADJUSTING THE SYSTEM

- A. The Contractor shall flush and adjust all irrigation heads, control valves, pressure regulators, etc. for optimum performance.
- B. All heads must be adjusted to prevent over spray to buildings, walks, streets, etc.

2.32 SLEEVING

- A. All sleeving shall be 2 times the diameter of the pipe used. Sleeving for control wires shall be 2" in diameter minimum.
- B. All sleeving shall have a minimum cover of 12" under paving.
- C. All sleeving shall extend 36" past paving.
- D. All street sleeving must be installed per sleeving detail. Details and locations are to be coordinated by ODR and PSP.
- E. All trenches for sleeving must be compacted using manual or mechanical tamping device.
- F. Contractor shall be responsible for the installation of all sleeves required for the irrigation system not listed in the drawings

2.33 LAYOUT – *NOT USED*

2.34 ADDITIONAL MISCELLANEOUS ITEMS – *NOT USED*

2.35 WATER SUPPLY

- A. The irrigation system shall be connected to water supply as shown on drawings. Contractor shall notify the Owner immediately of any discrepancies.
- B. The Contractor shall be responsible for any minor changes due to actual site conditions.

2.36 ELECTRICAL SUPPLY

- A. Contractor to coordinate final location of controller with job site Superintendent and Owner's Representative.
- B. Prior to installation of controller, Contractor will verify that all required electrical equipment is accessible for complete installation.

2.37 GRADES

- A. Prior to commencing any work, the Contractor shall carefully check all grades and verify that after all irrigation work and soil preparations completed, all grades will be per specified depth as per the landscape Contractor's scope of work with a +/- 1/10.

2.38 MAINTENANCE

- A. Contractor shall have irrigation system under complete operation for a period of 2 business days prior to any planting or hydro-seeding.

2.39 CLEAN-UP

- A. Clean up shall take place on a daily basis, after each portion of work has been completed and as directed by the Owner's Representative. The Contractor shall remove from site any trash or material resulting from his scope of work.

- B. Contractor shall remove portable restroom facilities upon Final Acceptance.

2.40 FINAL ACCEPTANCE

- A. All irrigation shall be tested in its entirety by the Owner's Representative and approved in writing before commencement of planting and hydro-seeding except for tress as directed by the Owner's Representative.
- B. Contractor shall provide all charts, record drawings, turn over items, etc. as listed in "Irrigation (General)" section prior to final acceptance.

END OF SECTION 32 80 00