SECTION 02750 IRRIGATION

PART 1 - GENERAL

1.01 SCOPE:

A. Furnish design services and engineer plans, labor, material, equipment and services for design and installation of a new irrigation system in accordance with requirements of this specification, local and state codes, and equipment manufacturer's specifications. Design and install a complete automatic underground irrigation system capable of supplying 1 to 2 inches of water per week in a maximum run period of 8 hours per night. System Designer shall have a minimum 5 years experience in commercial irrigation design.

1.02 RELATED WORK BY OTHERS:

A. Control wire chase from floor level to building exterior (co-ordinate with electrical contractor). Provisions for electrical service to controller location (co-ordinate with electrical contractor).

1.03 QUALITY ASSURANCE:

A. Acceptable manufacturers: Rain Bird, Hunter, Toro, or approved equal.

B. Contractor shall be licensed and bonded as applicable, by State licensing board, and shall present proof if requested by Owner prior to commencement of construction.

C. Contractor shall have prior construction experience in irrigation projects of equal size. Contractor shall present references upon request of Owner.

D. Contractor shall employ at the site at all times during construction, a supervisor who is thoroughly experienced and competent in equipment, materials, and installation of commercial irrigation systems.

1.04 DESIGN CRITERIA

A. Submitted plan shall be at the same scale as the landscape plan and exhibit the following and shall be approved for construction upon verification of all criteria:

1. Irrigation system as designed and installed shall perform within the tolerances and specifications of the specified manufacturers.

2. The velocity through the water meter supplied to the system at full flow requirements shall not exceed the following maximum quantities:

Water Meter Size	Maximum Specified Gallonage
5/8"	14 GPM
3/4"	21 GPM
1"	35 GPM
1 1/2"	70 GPM
2"	112 GPM
3"	210 GPM

3. Valve sizing schedule:

Flow	Minimum specified valve size
0 -30 gpm	1"
30-50 gpm	1 1/2"
50-75 gpm	2"

4. The system shall apply 1 1/2 - 2" per week, with triangulated 'head-to-head' spacing at all locations, and be fully adjustable to fine tune system performance for specific spray zones. Indicate on drawing, water pressure and gallonage parameters at available water source. Low volume systems shall supply sufficient moisture as required by plant types and sizes, soil conditions, and topography.

5. Types: Sprinkler heads shall be of single type, nozzling and manufacturer in respective zones, or include low volume irrigation components as manufactured by Rain Bird or equal.

6. Sprinkler nozzling shall have matched precipitation rates throughout respective zones. Do not mix heads on a valve, or run valves together where heads have a precipitation rate that varies more than 10%. Do not mix non-compatible low volume irrigation components on the same zone.

7. Spacing:

Spray Heads - Use manufacturer's maximum triangular or square spacing, low angle trajectory, allowing for 8 MPH % of diameter of spray throw for wind, but do not exceed 55% of diameter for square spacing. triangular or 50 Low volume emitters - as required for plant type, size and soil conditions.

8. Irrigation system shall be designed so that planting bed and lawn zones are on separate control valves to facilitate the different water requirements of each area. Provide isolation valves throughout system to facilitate isolation of various sections of system. Provide quick coupling valves at point of connection and every 100 feet along system.

9. Zoning shall not mix sprinkler types on single control valve.

10. System shall be designed to supply manufacturer's specified minimum operating pressure to farthest head from water connection.

11Piping shall not exceed 5 ft. per second velocity. Demands of system design shall not exceed performance criteria of water meter, or point of connection components. Mainline shall be Schedule 40 or Class 315 PVC.

12System shall furnish components sized to allow operation within manufacturer's specified tolerances for optimum performance. Undersized components shall not be approved for installation.

13If water source is other than typical municipal water system, (i.e. recycled wastewater, or well) identify source, and submit engineer's report of operating criteria and/or respective components specified for relative water source. Protect the public at all times from non-potable water sources by industry standards or visual notification.

14The system shall be gravity drainable throughout and have components sufficient, and sized to facilitate hydraulic winterization. Label components utilized for winterization on record drawings.

15Include sleeve size and locations under paving or structures. Sleeving shall be sized at twice the bell diameter of later or mainline required in sleeve.

16Provide an extra black wire routed to farthest zone valve(s) in field. Loop at each valve along system and extend 24" at controller.

1.05 VERIFICATION OF DIMENSIONS:

A. Before proceeding with the installation of any section of the irrigation system, check and verify correlation between ground measurements and Drawings.

B. Advise project superintendent of discrepancies before proceeding.

1.06 VERIFICATION OF WATER PRESSURE:

A. Verify water pressure at point of connection.

B. Submit pressure test results to project superintendent for approval prior to any work.

1.07 PROTECTION OF UNFINISHED WORK:

A. Protect work at all times.

B. Keep rock, dirt, gravel, debris and foreign materials from entering piping, valves and other irrigation equipment.

1.08 PROTECTION OF EXISTING TREES

A. Do not machine trench through root zone of existing trees to remain, hand dig as required.

1.09 ENVIRONMENTAL CONDITIONS:

A. No solvent welding of PVC pipe in freezing weather.

B. Solvent welding of PVC pipe under cover only during rainy weather.

1.10 UTILITIES:

A. Be responsible for location of underground utilities.

B. Protect active utilities. If encountered, notify persons owning same.

1.11 STORAGE:

A. Store on job site only as approved.

B. Be responsible for security and protection.

C. Store no PVC pipe nor fittings in direct sunlight.

1.12 EQUIPMENT FOR OPERATION:

A. Provide project superintendent with the following operation equipment.

B. Turn over to project superintendent at time of Final Inspection.

1. (2) lock cap key, weathermatic RLK-1.
2. (2) snap-lock unlocking tools-for valve box covers.
3. (2) quick coupling valve coupler.
4. (2) hose swivel.
5. (2) lock cap key, Rain Bird 2049.
6. (2) valve operating key, 30-inch handle length.

1.13 SYSTEM PROGRAMMING

A. Calculate three irrigation programs: Spring / Early Summer, Summer, Late Summer / Fall. System operation requirements shall be based on annual precipitation rates, plant material maturation requirements, solar exposure, topography and soil conditions.

B. Submit seasonal controller operation program with as-built record drawings and include laminated copy of program at controller location. Include total application quantities in inches per week for all zones, for establishment period and continual system operation.

1.14 SUBMITTALS

A. Within 14 days after award of contract, submit an (8) copies of the irrigation plan and (1) quality reproducible for review and approval to project superintendent/architect prior to commencement of work. The plan should follow the specifications and design criteria as outlined herein.

B. Upon completion of the irrigation system installation and as a condition of its acceptance, deliver to the project superintendent the following:

1. As-Built Record Drawings: Submit three prints and one reproducible (sepia) of as-built drawings. As-built drawings shall clearly show all changes documented in the Record Copy. Main lines, drain valves, valve boxes, wire splices, isolation valves, and valve markers shall be positively located by a minimum of two dimensions each from fixed reference points.

2. Controller Reference Chart: Submit one chart for each controller showing the area covered by each sprinkler zone, and seasonal operational programming. This chart shall be a reduced copy of the as-built drawings, color coded to differentiate zone areas, sized to fit the controller door, and hermetically sealed between 20 mil. plastic sheets.

3. Supplemental Equipment: Submit two each of keys to the following: quick coupling valves, quick coupling valve lids, valve markers, manual drain valves, valve boxes, and controller cabinets.

4. Maintenance Manual: Submit three copies of a bound, hard cover manual containing the following:

a. Catalog cuts of all irrigation materials installed.

b. Contractor's name, address and telephone number.

c. The duration of the guarantee period.

d. The name and address of the local manufacturer's representative.

e. List and description of routine maintenance procedures, including winterization, start-up, and recommended watering times for each zone.

f. Troubleshooting guide.

g. Copy of guarantee, warranties, or affidavits applicable to equipment or materials beyond contractor's One- Year guarantee period.

h. Static water pressure test results.

1.15 GUARANTEE:

A. Guarantee the irrigation system or any part thereof, against defective material or workmanship or one (1) year from the date of final acceptance.

B. Repair any settling of backfilled trenches occurring during a one (1) year period after final acceptance.

C. Include restoration of planting, paving or other improvements of any kind associated with corrections.

D. Make corrections without expense to Owner.

PART 2 - PRODUCTS

2.01 GENERAL:

A. New materials and equipment.

B. Brands and types as specified herein.

C. Substitutions or equals only by written approval of the project superintendent.

2.02 IRRIGATION HEADS:

A. Construction as specified by model number reference.

B. Manufacturer's catalog numbers indicated below.

C. Lawn heads - 4" pressure regulating pop up unless noted otherwise

1. Spray heads: Toro - 570 series, Rain Bird 1800 series, Hunter Pro Series and MP Rotator, plastic body and nozzle.

2. Gear driven rotary head: Hunter PG, SRM and I Series, Rain Bird 3500 and 5000 Series, plastic body and nozzle.

D. Shrub/groundcover heads - Pressure compensating 6" and 12" pop up where noted

1. Spray heads: Toro 570 series, Rain Bird 1800 series, Hunter Pro Series and MP Rotator, plastic body and nozzle.

2. Gear driven rotary head: Hunter PG, SRM and I Series, Rain Bird 3500 and 5000 Series, plastic body and nozzle.

3. Bubblers: Rain Bird 1400 and PCT Series with PA-80 adapter on 4" pop up, and Rain Bird RWS Series

E. Low Volume Emitters: Provide type and relative 'Xerigation' series components as manufactured by Rain Bird Sprinkler Mfg. Corp., or approved equal.

F. Landscape Dripline: Pressure compensating in-line emitters, Rain Bird XFS Series and LDQ Series with associated components.

2.03 PIPE AND FITTINGS:

A. PVC Pipe:

1. Mainline Supply: PVC pipe, polyvinyl Chloride Plastic; PVC 1120, Schedule 40, Type 1, normal impact, I.P.S., NSF approved plain and/or bell end; meeting requirements ASTM D2241 and D1784.
2. Lateral line: PVC pipe, Polyvinyl Chloride Plastic; PVC 1120, Class 200, Type 1, normal impact, I.P.S., NSF approved plain and/or bell end; meeting requirements ASTM D2241 and D1784.
3. Recycled Water Pipe: Purple Polyvinyl Chloride Plastic (PVC) pipe, ; Schedule 40, Class 315, Class 200, conforming to ASTM D1784, Type 1, Grade 1 PVC-1120, Cell Class 12454 B.
4. UVR-PVC Pipe: Solar Proof Ultraviolet Resistant Polyvinyl Chloride Plastic (PVC) pipe, ; Schedule 40, conforming to ASTM D1785, ASTM D1784, Cell Class 12454 B.

B. PVC Pipe Fittings:

1. PVC Schedule 40, Type I, normal impact, I.P.S., NSF approved; meeting requirements of ASTM D 2466-74.
2. PVC Schedule 80, Type I, cell classification, 12454-B, NSF approved; meeting requirements of ASTM D 2464 and ASTM D 2467.

C. Galvanized Pipe and Fittings: Standard weight pipe, hot dipped galvanized and threaded. Threaded cast iron or galvanized malleable fittings.

D. PVC Riser: PVC 1120, Type I, normal impact I.P.S., NSF approved Schedule 80 PVC, conform to PS 21-70. Cut to required lengths threaded both ends, color dark grey.

2.04 PVC SOLVENT CEMENT:

A. NSF approved solvent for PVC to 4" pipe size.

B. Meeting requirements of ASTM D 2564-73a, #705.

2.05 PVC PRIMER AND CLEANER: Weld-on P-70 or approved.

2.06 ISOLATION GATE VALVE: Full port, brass or bronze with stainless steel ball and Teflon seat. Size same as mainline. Manufacturer: Nibco, Watts or equal.

2.07 MANUAL DRAIN VALVE: Brass globe valve, 1/2" size with cross-type wheel.

2.08 QUICK-COUPLING VALVE:

A. One piece, double slot, 3/4" inlet with vinyl cover and lock top.

B. Rain Bird Model or Toro.

2.09 QUICK-COUPLING VALVE COUPLER: Rain Bird, Toro or equal.

2.10 LOCK CAP KEY: Rain Bird or Toro.

2.11 HOSE SWIVEL: Rain Bird or Toro.

2.12 LOCKING LID AND KEY:

A. Rain Bird, Toro or equal.

2.13 VALVE BOX: "Ametek" Economy, Standard and Jumbo sized boxes, extensions and locking covers where applicable.

2.14 DRAINAGE ROCK: 1-1/2 inch minus clean, washed round rock.

2.15 BACKFLOW DEVICE:

A. As approved by local jurisdiction. If acceptable, use double check valve backflow preventer.

B. If required by code to use above ground installation, provide LeMeur Backflow Enclosure, LBF Series, size as required, as Manufactured by LeMeur Welding and Manufacturing; 6161 Sierra Ave., Fontana, CA 92336; (Voice phone (909)-822-5100; Fax (909)-822-9317) Provide for enclosure lock and keys (2)

2.16 MASTER CONTROL VALVE:

A. Superior 3000 & 3200 Series-bronze, Rain Bird PEB & PESB Series-plastic, Hunter IBV & ICV, normally closed, 24 volt electric valve.
B. Sizes as required.

2.17 FLOW SENSOR:

A. Rain Bird FS Series, Creative Sensor Technology FSI Series, Hunter "FLOW-SYNC".
B. Sizes as required.

2.18 REMOTE CONTROL VALVE:

A. Conventional: Rain Bird PEB Series, Hunter PGV Series, 24 volt electric valve.

B. Drip: Rain Bird XCZ-PRB Series, Hunter ICZ Series, 24 volt electric Drip Control Zone.

C. Sizes as required.

2.19 AUTOMATIC CONTROLLER:

A. Hunter I-CORE Modular Electronic Controller

B. Rain Bird ESP-LX Modular Series Electronic Controller

C. Number of circuits as determined by planting types and planter layout.

2.20 WEATHER SENSOR:

A. Hunter SOLAR SYNC

B. Rain Bird:
1. ET Manager
2. RSD Rain Sensor

2.21 CONTROL WIRE: Type UF bearing U/L label for direct underground burial, NEC Class. II circuits. AWG sizes, #14 minimum.

2.22 ELECTRIC CONNECTORS: 3M DB Series Direct Bury Wire Connectors

PART 3 - EXECUTION

3.01 GENERAL:

A. Install materials and equipment in strict accordance with manufacturer's written specification and recommendations.

B. Comply with local and state codes.

C. Maintain job premises clean and free from accumulations of debris or disorder at all times. Remove equipment and surplus materials from each area of work as completed.

D. Leave no work in condition that would jeopardize other persons or property.

E. Test all lines for one hour minimum at pressure of water source. Receive approval of test prior to back filling work.

3.02 CONNECTION TO WATER SOURCES:

A. Municipal Sources:

Verify location of water source and capped tee. Make arrangements for water shutoff if necessary. Notify Owner of water service interruption 24 hrs. prior to shut-off.

3.03 TRENCH EXCAVATION:

A. Straight or "snaked" slightly.

B. Slope bottoms uniformly, 1/2% minimum grade to drain.

C. Trench depth 12 inches minimum for laterals, below frost-line per local BMP for mainlines, bottoms free from sharp rock or objects that may damage pipe.

D. Trench width sufficient to allow proper tamping of backfill around pipe.

E. Keep topsoil separate from subsoils replace in order of removal.

3.04 TRENCH BACKFILL:

A. Do no backfilling until approval of pressure test.

B. Use excavated soil or specified backfill bedding materials.

C. Material free from rock and/or debris that may damage pipe or prevent proper compaction.

D. Place 6-inch maximum lifts and compact thoroughly.

E. Place mainline backfill only when pipe is filled with water; 25 PSI pressure minimum.

3.05 INSTALLATION OF PIPE:

A. Sizes, type as specified.

1. Lay with support beneath entire lengths.
2. Slope all pipe to gravity drain.
3. Snake PVC piping to allow for expansion and contraction.
4. Combine runs in common trench where feasible with 3-inch minimum separation.
5. Flush lines prior to installation of valves and irrigating heads.

B. Cutting and Joining:

1. Cut pipe square, debur and remove all surface contaminants or moisture.
2. Chamfer all cut ends.
3. Apply primer and solvent cement in accordance with manufacturers recommendations.
4. Make threaded joints leak resistant, with freedom of movement.
5. Use Teflon thread sealant for threaded joints.
6. Clean out threads and use tape or compound joint sealants for all galvanized pipe connections. Leave no more than two (2) threads showing at joints.

3.06 SLEEVING

A. Install sleeving under all asphalt, concrete or other hard surface pavement areas as required.

B. Size as required for pipe and control valve wiring.

C. Coordinate for placement prior to asphalt / concrete work.

3.07 INSTALLATION OF VALVES:

A. Types as specified.

1. Install in accordance with manufacturer's recommendations.
2. Install manual drain valves at locations to completely drain all pipe lines.

3.08 INSTALLATION OF IRRIGATION HEADS:

A. Types as specified. Install in accordance with manufacturer's recommendations.

B. Adjust and balance:

1. Adjust and balance each system zone.
2. Achieve uniform area coverage by all head types.

3.09 INSTALLATION OF IRRIGATION CONTROLLER:

A. Type as specified.

1. Install wall mounted unit as approved.
2. Enclose all control wiring in conduit.
3. Verify exact placement of controller with project superintendent.

B. Work by other trades include:

1. Control wire chase from floor level to building exterior, co-ordinate with electrical contractor.
2. Provisions for electrical service to controller location, co-ordinate with electrical contractor.

3.10 INSTALLATION OF CONTROL WIRE:

A. For wire sizes, refer to wire sizing chart published by manufacturer of control valves led.

B. Use specified electrical connectors at all splices. Place all splices in valve boxes, and note locations on as-built record drawings.

C. Bundle wire together with electrical tape at 10-foot intervals. Provide 12- inch expansion coils every 100 feet where runs exceed this length.

D. Place wire at bottom of pipe runs to provide protection.

E. Provide one extra control wire from controller to each valve. Color must be different and labeled as "extra wire" at controller.

END OF SECTION

REGISTERED LANDSCAPE ARCHITECT
BRIAN D. LIND
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2-3-16

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IRRIGATION SPECIFICATIONS

DATE
8/28/2015

REVISED DATE
1 9/22/2015

SHEET
A1.5