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D. IRRIGATION SPECIFICATIONS: GENERAL

1. Summary:

- a. It is the intent of the specifications and drawings that the finished irrigation system is complete in every respect and shall be ready for operation satisfactory to the MCSD.
- b. The work shall include all materials, labor, services, transportation, and equipment necessary to perform the work as indicated on the drawings, in these specifications, and as necessary to complete the installation of the irrigation system.
- c. The Contractor shall secure the required licenses and permits including payments of charges and fees, give required notices to public authorities, and verify permits secured or arrangements made by others affecting the work of this section.
- d. The Contractor shall keep a full set of the most recent irrigation drawings on the project site at all times throughout the construction period.
- e. The Contractor shall obtain a copy of the most recent edition of the MCSD Landscape Standards Booklet prior to starting the work. The Contractor shall keep a copy of the Landscape Standards Booklet on the project site at all times throughout the construction period.

2. Construction Drawings:

- a. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.
- b. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications. When an item is shown on the plans but not shown on the specifications or vice versa, it shall be deemed to be as shown on both. The MCSD Representative shall have final authority for clarification.

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- c. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Such obstructions or differences should be brought to the attention of the MCSD Representative as soon as detected. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary.
3. Quality Assurance:
- a. Provide at least one English speaking person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the manufacturer's recommended methods of installation and who shall direct all work performed under this section.
 - b. Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturer of articles used in this contract furnish directions covering points not shown in the drawings and specifications.
 - c. All local, municipal, and state laws, rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.
 - d. All materials supplied for this project shall be new and free from any defects. All defective materials shall be replaced immediately at no additional cost to the Owner / Developer or the MCSD.
4. Submittals:
- a. Materials List:
 - i. After award of contract and before any irrigation system materials are ordered from suppliers or delivered to the job site, the Contractor shall submit to the MCSD a complete list of all irrigation system materials, or processes proposed to be furnished and installed as part of this contract.

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- ii. The submittals shall include the following information:
 - 1) A title sheet with the job name, the contractor's name, contractor's address, telephone number, fax number, submittal date and submittal number.
 - 2) An index sheet showing the item number (i.e. 1,2,3, etc.); an item description (i.e. sprinkler head); the manufacturer's name (i.e. Hunter Industries); the item model number (i.e. I-40-ADV/36V); and the page(s) in the submittal set that contain the catalog cuts.
 - 3) The catalog cuts shall be one or two pages from the most recent manufacturer's catalog that indicate the product submitted. Do not submit parts lists, exploded diagrams, price lists or other extra information.
 - 4) The catalog cuts shall clearly indicate the manufacturer's name and the item model number. The item model number, all specified options and specified sizes shall be circled on the catalog cuts.
 - 5) Submittals for equipment indicated on the legend without manufacturer names, or "as approved", shall contain the manufacturer, Class or Schedule, ASTM numbers and/or other certifications as indicated in these specifications.
- iii. Submittal format requirements:
 - 1) Submittals shall be provided as one complete package for the project. Multiple partial submittals will not be reviewed.
 - 2) Submittal package shall be stapled or bound in such a way as to allow for disassembly for review processing.
 - 3) Submittal package shall have all pages numbered in the lower right hand corner. Page numbers shall correspond with submittal index.
- iv. The MCSD representative will not review the submittal package unless provided in the format described above.
- v. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

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b. Shop Drawings:

After award of contract and before any irrigation system installation has begun, the Contractor shall submit to the MCSD detailed shop drawings for all irrigation assemblies not covered by detail drawings in the MCSD Landscape Standards Booklet or shown on the Drawings.

5. Substitutions:

- a. If the Contractor wishes to substitute equipment or materials for those equipment or materials listed on the Drawings and Specifications, he may submit a request for approval to the MCSD Representative that includes the following information.
 - i. Provide a written statement indicating the reason for making the substitution.
 - ii. Provide catalog cut sheets and technical data for each substitute item.
 - iii. Provide in writing the difference in installed price if the item is accepted.
- b. The MCSD Representative will allow no substitutions without prior written acceptance.
- c. The MCSD Representative shall have the final decision on whether to accept or reject the substitutions suggested by the Contractor. If a Contractor suggested substitution is rejected, the Contractor shall provide and install the equipment or materials as listed in the Drawings and Specifications.

6. Existing Conditions:

- a. The Contractor shall verify and be familiar with the locations, size and detail of points of connection provided as the source of water, electrical supply, and telephone line connection to the irrigation system.
- b. Irrigation design is based on the available static water pressure shown on the drawings. Contractor shall verify static water on the project prior to the start of construction. Should a discrepancy exist, notify the Landscape Architect and Owner's authorized representative prior to beginning construction.

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- c. Prior to cutting into the soil, the Contractor shall locate all cables, conduits, sewer septic tanks, and other utilities as are commonly encountered underground and he shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the Landscape Architect and Owner who will arrange for relocations. The Contractor will proceed in the same manner if a rock layer or any other such conditions are encountered.
 - d. The Contractor shall protect all existing utilities and features to remain on and adjacent to the project site during construction. Contractor shall repair, at his own cost; all damage resulting from his operations or negligence.
 - e. The Irrigation Contractor shall coordinate with the General Contractor for installation of required sleeving as shown on the plans.
7. Inspections:
- a. The Contractor shall permit the MCSD Representative to visit and inspect at all times any part of the work and shall provide safe access for such visits.
 - b. Where the specifications require work to be tested by the Contractor, it shall not be covered over until accepted by the MCSD Representative. Should any work be covered without testing or acceptance, it shall be, if so ordered, uncovered at the Contractor's expense.
 - c. The Contractor shall be solely responsible for notifying the MCSD Representative where and when the work is ready for testing. The Contractor shall notify the MCSD Representative seven calendar days in advance for pre-job conferences, pre-maintenance finals and pre-acceptance final inspections. The Contractor shall notify the MCSD Representative 48 hours in advance for system layout, mainline pressure testing, coverage testing, and final irrigation installation inspections.
 - d. Inspections will be required for the following at a minimum:
 - i. Pre-job conference
 - ii. System layout
 - iii. Pressure test of irrigation mainline (Two hours at 150 PSI)
 - iv. Coverage test of irrigation system (Prior to planting)
 - v. Final inspection prior to start of maintenance period
 - vi. Final acceptance

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- e. Work that fails testing and is not accepted will require retesting until said work passes the testing and is accepted.

8. As-Built Drawings:

- a. Record accurately on one set of black and white irrigation plans all changes in the work constituting departures from the original contract drawings and the actual final installed locations of all required components as shown below.
- b. Upon completion of each increment of work, transfer all such information and dimensions to the prints. Record changes and dimensions in a legible and professional manner. When the drawings are approved, transfer all information to a set of reproducible drawings supplied by the project landscape architect.
- c. Dimension from two permanent points of reference (buildings, monuments, sidewalks, curbs & pavement). Post information on as-built drawings day-to-day as the work is installed. All dimensions noted on drawings shall be 1/10 inch in size.
- d. Show dimensional locations and depths of the following:
 - i. P.O.C.
 - ii. Routing of irrigation pressure mainlines (dimension maximum 10 feet along routing and all directional changes).
 - iii. Shut-off valves.
 - iv. Irrigation control valves.
 - v. Quick coupling valves.
 - vi. Routing of control wires.
 - vii. Automatic Controllers.
 - viii. Other related equipment (as directed by the landscape architect and/or MCSD staff).
- e. Maintain as-built drawings on site at all times. These drawings are subject to inspection at any time.
- f. Make all changes to reproducible drawings in ink (no ballpoint pen). Make changes in a manner equal to the original drawings.
- g. Contractor must submit as-built drawings (mylar's and one set of blacklines) prior to MCSD inspecting the site for the start of the 90-day maintenance period.

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9. Controller Charts:

- a. The MCSD Representative shall approve as-built drawings before charts are prepared.
- b. Provide two controller charts for each controller supplied, showing the area covered by the automatic controller.
- c. The chart shall be a reproduction of the as built irrigation drawings. If the controller sequence is not legible when the drawing is reduced, enlarge it to a size that will be readable when reduced.
- d. Charts shall be blackline print with a different transparent color used to show area of coverage for each station.
- e. When completed and approved, hermetically seal the chart between two pieces of plastic, each piece being a minimum of 10 mils thick.
- f. Charts shall be completed and approved prior to final inspection of the irrigation system.
- g. Controller access:

The MCSD Representative reserves the right to have complete access to the controller clocks for monitoring and controlling system failures. The contractor shall provide the MCSD Representative with two sets of all keys necessary for access to the controller clocks within the design area. The keys will then become the property of the MCSD.

10. Operation and Maintenance Manuals:

- a. Prepare and deliver to the MCSD Representative, prior to the start of maintenance, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in four individually bound copies. 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:
 - i. Index sheet indicating the Contractor's name, address and telephone number, fax number and e-mail address.
 - ii. Duration of guarantee period with guarantee forms.
 - iii. List of equipment with names and addresses of manufacturer's local representatives.

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- iv. Complete operating and maintenance instructions on all major equipment.
 - b. In addition to the maintenance manuals, provide the maintenance personnel with instructions for major equipment and show written evidence to the MCSD Representative at the conclusion of the work that this service has been rendered.
- 11. Spare Parts and Equipment:
 - a. Prepare and deliver to the MCSD Representative, prior to the start of maintenance, all required spare parts, tools and equipment. Spare parts, tools and equipment shall include the following:
 - i. Two (2) wrenches for disassembly and adjustment of each type of sprinkler head used in the sprinkler system.
 - ii. Two (2) screwdrivers for adjustment of each type of sprinkler head used in the sprinkler system.
 - iii. Four quick coupler keys with 3/4-inch bronze hose swivels and three-coupler lid / hose bib keys.
 - iv. One valve box cover key or wrench.
 - v. One 5-foot tee wrench for operating 3" gate valves (if used).
 - vi. Six extra spray sprinkler head bodies and four nozzles of each radii and arc pattern used on the project.
 - vii. Four extra rotary sprinkler head bodies of size and type used on the project.
 - viii. Six extra drip emitters of each size and type used on the project.
 - ix. Three 30" valve keys for manual valves.
 - x. Radio remote operating devices for irrigation system (if specified).
 - xi. Two keys for each irrigation controller.
 - xii. Two keys for each controller enclosure.

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12. Guarantee:

- a. Submit written guarantee, in approved form, that all work showing defects in materials or workmanship will be repaired or replaced at no cost to the MCSD for a period of one (1) year from date of acceptance by the MCSD Representative.
- b. The guarantee form shall be retyped onto the contractor's letterhead and contain the information shown on Section A Exhibit 4

E. IRRIGATION SPECIFICATIONS: PRODUCTS

1. Summary:

Use only new materials of the manufacturer, size and type shown on the drawings and specifications. Materials or equipment installed or furnished that do not meet MCSD standards will be rejected and shall be removed from the site at no expense to the Owner / Developer or MCSD.

2. General Piping:

- a. The pressure mainline from point of connection (P.O.C.) through the master valve shall be brass pipe and brass fittings.
- b. Pressure mainlines 2 inches and smaller in size downstream of master valve shall be Schedule 40 solvent welded P.V.C. unless otherwise noted.
- c. Pressure mainlines 2 1/2 inches in size downstream of master valve shall be Class 315 solvent welded P.V.C. unless otherwise noted.
- d. Pressure mainlines 3 inches and larger downstream of master valve shall be Class 200 bell and gasket P.V.C. unless otherwise noted.
- e. Lateral lines (intermittent pressurized) 1 1/2 inches and smaller in size shall be Schedule 40 solvent welded P.V.C. unless otherwise noted. The minimum lateral line pipe size shall be 3/4 inch for spray type systems and 1/2 inch for drip systems except BluLock which shall be 3/4" min.
- f. Lateral lines (intermittent pressurized) 2 inches and larger shall be Class 315 solvent welded P.V.C. unless otherwise noted.
- g. Drinking fountain and bathroom mainlines (pressurized) 2 inches and smaller downstream of backflow preventer shall be Schedule 40 solvent welded P.V.C. unless otherwise noted on the plans.

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3. Plastic Pipe and Fittings:

- a. Pipe and fittings shall be manufactured from virgin rigid P.V.C. (Polyvinyl Chloride) vinyl compounds with a Cell Class of 12454-B as identified in ASTM D-1784. Compound shall have a 2,000 P.S.I. hydrostatic design stress rating.
- b. P.V.C. Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D-1785.
- c. P.V.C. Class 315 (SDR 13.5) pipe shall be Iron Pipe Size (IPS) conforming to ASTM D-2241 for plain end pipe. P.V.C. Class 200 (SDR 21) pipe shall be Iron Pipe Size (IPS) conforming to ASTM 2672 for belled-end pipe.
- d. Primers used for the solvent cementing of P.V.C. pipe shall conform to ASTM F-656 and be purple in color. Solvent cement used for the joining of P.V.C. pipe shall conform to ASTM D-2564. Make solvent cement joints for plastic pipe and fittings as prescribed by the manufacturer and ASTM D-2855.
- e. Rubber gasket P.V.C. Class 200 (SDR 21) pipe shall be Iron Pipe Size (IPS) conforming to ASTM D-3139 with joint gaskets conforming to ASTM F-477.
- f. All P.V.C. pipe shall conform to commercial standards CS64 (pressure rated pipe). All P.V.C. pipe shall meet the requirements of NSF Standard #14, "Plastic Piping Components and Related Materials," and Standard #61, "Drinking Water System Components Health Effects." The pipe displays the NSF-PW listing mark signifying use in potable water applications.
- g. All pipe and fittings shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class or SDR number, pressure rating P.S.I., and date of extrusion.
- h. All P.V.C. fittings used on pressurized mainlines and all threaded P.V.C. nipples and unions shall be Schedule 80 P.V.C. All P.V.C. fittings used on lateral lines (intermittent pressurized) shall be Schedule 40 P.V.C.
- i. All Schedule 80 P.V.C. fittings shall conform to ASTM D-1784, ASTM D-2467, and ASTM D-2464. All Schedule 40 P.V.C. fittings shall conform to ASTM D-1784 and ASTM D-2466. All threaded P.V.C. fittings shall be injection molded, no cut P.V.C. threads shall be acceptable.

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- j. Rubber gasket fittings shall be ductile iron deep bell type. Fittings shall be constructed of grade 65-45-12 ductile iron in accordance with ASTM A-536. Fitting gaskets shall be rubber in accordance with ASTM F-477. All ductile iron fittings shall be manufactured with exterior lugs and shall be fitted with a joint restraint system as indicated on the installation detail drawings.
 - k. All threaded nipples shall be standard weight Schedule 80, with molded threads. Schedule 80 nipples shall conform to ASTM D-1784 and D-2464.
 - l. All threaded fittings shall be assembled using a non-hardening Teflon pipe sealant. No Teflon tape shall be allowed.
 - m. Reclaimed water pipe shall conform to all of the pipe specifications described above and be color-coded purple with the words "CAUTION - RECLAIMED WATER" printed in black letters on two sides of the pipe. Reclaimed water pipe shall use standard Schedule 80 P.V.C. or Schedule 40 fittings as described above.
 - n. Ultraviolet resistant (U.V.R.) P.V.C. pipe shall conform to all of the pipe specifications described above and shall be manufactured using a process and/or ingredients proven to resist weakening or corrosion by ultra-violet radiation. Pipe shall be color-coded light brown. U.V.R. water pipe shall use Schedule 40 Ultraviolet resistant P.V.C. fittings manufactured of the same material or process as the U.V.R. pipe on which they are used.
4. Brass Pipe and Fittings:
- a. Brass pipe shall be 85% red brass, American National Standard Institute (ANSI), Schedule 40 screwed pipe.
 - b. Fittings shall be medium brass, screwed, 125-pound class.
5. Galvanized Steel Pipe and Fittings:
- a. Galvanized steel pipe shall be hot dip galvanized Schedule 40 screwed pipe.
 - b. Fittings shall be hot dip galvanized Schedule 40, screwed.
 - c. All galvanized steel unions 2 inches and smaller shall be ground joint pattern. All galvanized steel unions larger than 2 inches shall be flanged unions packed with 1/16 inch thick rubber "o"-ring.

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6. Backflow Prevention Units:

- a. Backflow prevention units shall be approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.
- b. Backflow prevention units shall be the reduced pressure principle (R/P) type.
- c. Backflow prevention devices shall be installed at a minimum of 12 inches above finished grade and be equipped with approved test cocks.
- d. Backflow assemblies 2 inches in size and smaller shall be installed using brass ells, unions and nipples. The backflow prevention assembly shall include two ball valves for isolating the device.

Type: Irrigation systems: Wilkins or approved equal.
Non-irrigation: Wilkins or approved equal.

- e. Backflow assemblies 2 1/2 inches in size and larger shall be installed using an installation assembly provided by the same manufacturer. Installation assembly shall incorporate flanged 90 degree ells at the base of the assembly for connection to the irrigation mainlines. Backflow assembly shall use cast iron flanged spools between the device and the installation assembly. All cast iron materials installed below grade shall be wrapped with black plastic pipe wrap. The backflow prevention assembly shall include two resilient seat gate valves for isolating the device.
- f. Backflow device enclosure shall be constructed of stainless steel tubing and wire utilizing a smooth surface to prevent handling injury. All enclosure hardware shall be stainless steel. Enclosure shall have a hinge on one end that allows for removal of the enclosure, without tools, for backflow service. Enclosures for large size backflow devices shall be a two-piece "clam shell" type. The enclosure shall have a locking system that accepts a standard padlock. The application and size of the backflow device shall determine the backflow device enclosure style.
- g. All backflow devices shall be protected from freezing by a removable insulation device. The freeze protection device shall be constructed of radiant barrier foil, closed cell foam and a water repellant cover. The exterior cover shall carry a five year warrantee against loss of color or strength due to exposure to the elements. The insulating cover shall have brass grommets at the base of the unit to allow the installation of padlocks for theft prevention. Freeze protection covers shall have the MCSD logo located on the exterior of the insulated cover.

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7. Pressure Reducing Valves:

- a. Pressure reducing valves used on irrigation systems with backflow device sizes of 2 inches and smaller shall be of bronze and stainless steel construction and be adjustable from 25 P.S.I. to 125 P.S.I. Pressure regulators shall have threaded inlet and outlet and be installed as part of the backflow assembly.
- b. Pressure reducing valves used on irrigation systems with backflow device sizes of 2 1/2 inches and larger shall be of cast iron, bronze and stainless steel construction and be adjustable from 30 P.S.I. to 300 P.S.I. Pressure regulators shall have flanged inlet and outlet and be installed as in a valve box below grade.

8. Wye Strainers:

- a. Wye strainers shall be used on all potable water irrigation systems with a backflow device size of 2 inches and smaller. Wye strainer shall be of bronze element. Wye strainer shall have a standard filtration size of 80 mesh.
- b. Wye strainer shall be installed as part of the backflow assembly.

9. Basket Strainers:

- a. Basket strainers shall be used on all potable water irrigation systems with a backflow device size of 2 1/2 inches and larger. The strainer shall have a 30-mesh or finer screen. Strainers that have automatic backwash features will not normally be allowed unless it can be demonstrated to the local Water District that the backwash water will not cause runoff and is disposed of in a manner approved by the local Water District. The strainer drain shall operate with a recessed key slot. The basket strainer for potable water systems shall be installed in a valve box below grade.
- b. Basket strainers shall be used on all reclaimed water irrigation systems. The strainer shall have a 30-mesh or finer screen. The strainer drain shall operate with a recessed key slot. The basket strainer shall be installed below grade and located downstream of the water meter.

10. Shut off Valves:

- a. **Ball Valves:**
Ball valves 2 inches and smaller shall have a one-piece body constructed of 600-pound WOG bronze material conforming to ASTM B 584 alloy 844. Ball valve shall have a vented ball with a blowout proof system. Ball valves shall have a working pressure of not less than 150 P.S.I. and shall conform to AWWA standards.

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b. Gate Valve:

Gate valves 2 1/2 inches and larger shall have a body, wedge and bonnet constructed of ductile iron conforming to ASTM A 395. Gate valves shall have flanged connections and a 2 inch square AWWA operating nut. Gate valves shall have a working pressure of not less than 150 PSI and shall conform to AWWA standards.

- c. Shut off valves shall be installed below grade in plastic valve boxes. Only one valve per box will be allowed. Install valves in planting area and according to the construction details. Locate all valves within 12 inches of walks, curbs, header boards, or paved areas where applicable. Align valve boxes at right angles to adjacent hardscape whenever possible. Where several valve boxes are located in the same area, arrange them in a uniform and orderly fashion.

11. Quick Coupler Valves:

- a. Quick coupler valves used on potable water irrigation systems shall have a body constructed of red brass with a wall thickness guaranteed to withstand normal working pressure of 150 P.S.I. without leakage. The coupler shall have a 1 inch female threaded opening at the base. Quick coupler valve shall have a lockable, hinged cover constructed of red brass permanently bonded with a yellow vinyl outer cover. Quick couplers used with potable water shall use a single lug style quick coupler key.
- b. Quick coupler valves used on reclaimed water irrigation systems shall have a body constructed of red brass with a wall thickness guaranteed to withstand normal working pressure of 150 P.S.I. without leakage. The coupler shall have a 1 inch female threaded opening at the base. Quick coupler valve shall have a lockable, hinged cover constructed of red brass permanently bonded with a vinyl outer cover. Quick couplers used with 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. Quick couplers used with reclaimed water shall use an "acme" thread style quick coupler key.
- c. Quick coupler valve shall be operated only with a special connecting device known as a quick coupler key, designed for that purpose. Quick coupler key is inserted into the valve and a positive, watertight connection shall be made between coupler key and valve. Potable water and reclaimed water quick couplers shall use a coupler key designed to only fit the specific coupler used on those systems. All quick coupler keys shall be equipped with a bronze 90-degree hose swivel with a 3/4" hose connection on one end.

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- d. Quick coupler valve swing joint assembly shall be constructed of two brass street ells, one brass threaded ell and a 12 inch long threaded brass nipple. The swing joint assembly components shall be 1 inch size to match the inlet size of the quick coupler valve.
 - e. Quick coupler valves shall be staked in the ground using two 36 inch long #4 rebar stakes. The quick coupler shall be secured to the stakes using two stainless steel vandal proof clamps. Stakes and hose clamps shall be positioned as to not interfere with the operation of the quick coupler.
 - f. Quick coupler valves shall be installed below grade in a plastic valve box. Locate all quick coupler valves within 12 inches of walks, curbs, header boards, or paved areas where applicable. Locate quick coupler valves inside shrub and ground cover areas whenever possible. Quick coupling valves shall be installed such that valve top will be 3 inches below the lid of the valve box.
12. Remote Control Valves:
- a. Remote control valves shall be normally closed, 24 VAC solenoid actuated, globe pattern, spring-loaded diaphragm type. The body and bonnet of the valve shall be constructed of glass filled nylon with captive solenoid plunger and bonnet bolts. The bonnet bolts shall thread into matching brass body inserts. The valve shall be pressure rated to 200 P.S.I. The valve shall be equipped with a pressure regulator capable of accurately adjusting and regulating pressure between 20 to 100 P.S.I. without the use of tools or pressure gauges. Remote control valves used on reclaimed water systems shall have a color coded reclaimed water identification handle installed.
 - b. All remote control valves shall be installed isolated from the irrigation mainline by a ball valve. Where shown on the drawings or whenever possible remote control valves shall be installed in a manifold isolated by a single ball valve. The ball valve and manifold piping shall be sized to match the size of the largest remote control valve in the manifold.
 - c. Remote control valves and manifold isolation valves shall be installed below grade in plastic valve boxes. Only one valve per box will be allowed. Install valves in planting areas and according to the construction details. Locate all valves within 12 inches of walks, curbs, header boards, or paved areas where applicable. Align valve boxes at right angles to adjacent hardscape whenever possible. Where several valve boxes are located in the same area, arrange them in a uniform and orderly fashion.

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- d. When grouped together, allow a minimum of 12 inches between valves. The valves shall be installed in valve boxes that will have enough room on all sides of the valves to allow repair personnel to completely reconstruct the valves without removing the valve box.
13. Master Control Valves:
- a. Master control valves shall be normally closed, 24 VAC solenoid actuated, globe pattern, spring-loaded diaphragm type. The body and bonnet of the valve shall be constructed of glass filled nylon with captive solenoid plunger and bonnet bolts. The bonnet bolts shall thread into matching brass body inserts. The valve shall be pressure rated to 200 P.S.I. Master control valves used on reclaimed water systems shall have a color coded reclaimed water identification handle installed.
 - b. Install valves in planting areas and according to the construction details. Align valve boxes at right angles to adjacent hardscape whenever possible.
 - c. When equipment is grouped together, allow a minimum of 12 inches between valve boxes. The valves shall be installed in valve boxes that will have enough room on all sides of the valves to allow repair personnel to completely reconstruct the valves without removing the valve box.
14. Pressure Relief Valves
- a. Pressure relief valves shall be constructed of bronze body with threaded inlet and outlet. Pressure relief valves shall be of the manufacturer, size and type specified on the Drawings. Pressure relief shall be installed when specified on the Drawings. Set the pressure discharge setting as indicated on the Drawings.
 - b. Install pressure relief valves with a 3/4 inch ball type shut off valve upstream of the valve.
 - c. Pressure relief valves shall be installed below grade in a plastic valve box. Install valves in planting areas and according to the construction details. Locate all valves within 12 inches of walks, curbs, header boards, or paved areas where applicable. Align valve boxes at right angles to adjacent hardscape whenever possible. Where several valve boxes are located in the same area, arrange them in a uniform and orderly fashion.
15. Automatic Controllers
- a. The automatic controller shall be one of the two manufacturers' approved by the MCSD for use within its jurisdiction. One of these manufacturers, Calsense, supply central control satellites for use with the central control computers utilized by the MCSD. The second controller is a solar powered unit

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for use where it is not cost effective to route electrical power for a controller. The MCSD shall determine which controller type is acceptable for each project. The Drawings shall indicate the approved controllers to be used on the project.

b. Calsense Satellite Controller and Related Equipment:

- i. The satellite controller shall be a microprocessor based controller capable of automatic, semi-automatic and manual operation. The satellite controller shall be available in 8, 12, 16, 24, 32 or 40 station sizes. The satellite controller shall be fully compatible with the Calsense Command 1 central control computer software currently utilized by the MCSD. The controller input and output shall be protected against severe electrical surge.
- ii. Calsense satellite controllers shall communicate to the central control computer via "Local Radio". Satellite controllers shall be equipped with a radio ("LR" option) or a device ("ML" option) that allows the satellite to be connected via communication cable to a satellite with a radio that is capable of sharing with other satellites ("MLR" option). Each radio equipped satellite shall include an antenna specifically designed for use with the "local Radio". Different radio antennas are to be used depending on the signal strength and distance from a "Local Radio" hub (receiver / transmitter). The model of the antenna used shall be as indicated on the Drawings and or as determined by the MCSD.
- iii. The satellite shall be pre-assembled by the manufacturer in a top entry Strongbox stainless steel, weatherproof, vandal resistant, lockable enclosure with a flush mounted handle as manufactured by V.I.T. Products, Inc. The assembly shall consist of the satellite, the enclosure, a stainless steel removable back board, terminal interface board with radio remote receptacle, key operated on / off switch, a ground fault interrupter duplex receptacle, ground rod, ground wire and ground wire clamp. All optional equipment as indicated on the drawings by model number shall also be included in the satellite assembly including AC line protection and transient protection. Satellites installed inside of buildings shall be installed inside of a front entry, wall mounted controller enclosure.
- iv. Satellite assemblies shall include a flow sensor with all required equipment to provide communication with the satellite and central control computer system. Flow sensors used on systems with backflow devices or basket strainers sized 2 inches or smaller

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shall be installed above grade as part of the assembly. Flow sensors used on systems with backflow devices or basket strainers sized 2 1/2 inches or larger shall be installed below grade in a valve box. All flow sensor installation shall maintain the manufacturer recommended upstream and downstream clear pipe distance to insure proper operation of the flow sensor. Where one or two additional sensors (for a total of three) are required the satellite controller shall have an interface board installed on the controller to read the additional sensors.

- v. Communication cable for the interconnect between satellites shall be a double jacketed, four conductor (two pairs) cable with conductors tin coated, soft annealed, solid copper with 3/32 of an inch thick P.V.C. insulation. The four insulated conductors shall be laid in parallel and encased in polyethylene having a minimum wall thickness of 0.45 inches. The four conductors shall be color coded with one conductor each being red, black, blue and orange. Where communication cable is required to be installed underground, the cable shall be installed inside a Schedule 40 P.V.C. electrical conduit with a minimum size of 1 1/2 inches.
- vi. The flow sensor communication cable shall be a two conductor of ICEA class B, 16 AWG 7 strand, conforming to ASTM B-3 and B-8, aluminum shield with drain wire and shall have a jacket of 0.50 sunlight and moisture resistant P.V.C. Where flow sensor communication cable is required to be installed underground, the cable shall be installed inside a Schedule 40 P.V.C. electrical conduit with a minimum size of 1 inch.
- vii. When and where determined to be necessary and required by the MCSD a Calsense "Local Radio Hub" shall be installed. The "Local Radio Hub" is used to communicate between the satellites and the central control computer. All communication between the "Local Radio Hub" and the MCSD central control computer shall be made through standard telephone communications. The "Local Radio Hub" shall be installed in accordance with the manufacturer's recommendations and specifications.
- viii. All satellite controllers shall be inspected and certified by the manufacturer after installation and prior to final acceptance by the MCSD. The contractor shall provide the MCSD a written certification from the manufacturer indicating that the satellite and all associated equipment and wiring have been installed correctly and is completely operational. Certification includes satellite operation, radio operation, communication with the central computer, flow sensor operation, satellite grounding and any other applicable operations.

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- d. Light Powered Controller and Related Equipment:
 - i. When and where determined to be necessary and required by the MCSD a light powered controller shall be installed. The light powered controller shall be a microprocessor based controller capable of automatic, semi-automatic and manual operation without the need for an AC power connection. The light powered controller shall be available in 4, 6, 8, 10, 12, 16, 20, 24, or 28 station sizes. The light powered controller shall operate solely on ambient light and does not require installation in full sunlight. The controller shall be programmed and operated through the use of a special key powered by a 9 volt battery.
 - ii. The light powered irrigation controller shall be installed on a 35 inch tall steel mounting column designed specifically for the mounting of the controller. The mounting column shall be powder coated to match the finished surface of the light powered controller.
 - iii. The light powered controller shall be installed with a stainless steel enclosure that surrounds the controller while allowing ambient light to reach the controller. The enclosure shall mount to the mounting column immediately below the controller. The enclosure shall have a high security disc-lock included from the manufacturer to insure only authorized access to the controller.
 - iv. The master control and remote control valves used with the light powered controller shall be the same units described in these specifications. The valves shall have the provided solenoids replaced with micropower actuators. The actuators are low voltage DC latching solenoids designed for use with the light powered controller. The actuators shall be the model and type designed for use with the specified automatic control valve.
- 16. Satellite Controller Enclosures:
 - a. Outdoor Enclosure:
 - i. All satellite controllers installed outside of a building shall be mounted within a vandal resistant, pedestal type controller enclosure.
 - ii. The controller enclosure shall be a "top entry" unit of appropriate size to adequately house the specified controller, made of weather resistant and collision resistant 304 grade stainless steel. The top entry lid shall be assisted by two gas springs for easy access. The lid shall have a three point locking mechanism with provisions for the use of a padlock.

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- iii. The controller enclosure shall have one circuit with full time 120 VAC power to a GFCI type outlet and 120 VAC to the controller with an on/off switch.
 - iv. Control wires to be routed to control valves from controller through a 3 inch P.V.C. electrical conduit and sweep through the enclosure mounting pad. Additional wiring shall be routed into the enclosure using P.V.C. electrical conduit and sweeps as shown in the controller installation detail.
 - v. Controller shall be grounded per the uniform building codes and the controller installation detail.
- b. Indoor Automatic Controller Enclosure:
- i. All satellite controllers installed inside of a building shall be mounted within a vandal resistant, wall mounted controller enclosure.
 - ii. The controller enclosure shall be a “front entry” unit of appropriate size to adequately house the specified controller, made of weather resistant and collision resistant 304 grade stainless steel. The front entry door shall have a continuous stainless steel piano hinge on one side and a two point locking mechanism with provisions for the use of a padlock.
 - iii. The controller enclosure shall have one circuit with full time 120 VAC power to a GFCI type outlet and 120 VAC to the controller with an on/off switch.
 - iv. Control wires to be routed to control valves from controller through a 3 inch P.V.C. electrical conduit and sweep through the floor or wall of the building. Additional wiring shall be routed into the building and enclosure using P.V.C. Electrical conduit and sweeps as shown in the controller installation detail.
 - v. Controller shall be grounded per the uniform building codes and the controller installation detail.
17. Controller Accessories:
- a. The electrical power for the irrigation controller shall be provided by the Owner / Developer. The electrical meter for the irrigation system, when located outside of a building shall be installed inside a stainless steel enclosure. Landscape contractor is responsible for final hook-up of the controller.
 - b. When and where determined to be necessary and required by the MCSD a radio remote is to be provided. The Contractor shall provide the radio transmitter and the receiver to the MCSD with the final turn over equipment. All satellite controllers shall be wired at the terminal strip with a 30 inch long permanent wiring harness for the use of a radio remote with the controller.

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- c. The radio remote device shall allow for the operation of all controller stations from a distance of up to one mile from the controller. The radio remote device shall be furnished inside a plastic carrying case with battery charger.

18. Low Voltage Control Wiring:

- a. Connections between the controller and remote control valves shall be made with direct burial AWG-UF type wire, installed in accordance with valve manufacturer's wire chart and specifications. Sizing of wire shall be in accordance with irrigation drawings and manufacturer's recommendations; in no case shall the gauge of the wire be less than #14.
- b. Wiring shall be installed adjacent to the mainline whenever possible and shall never be installed above or below the pipe.
- c. Where more than one wires are placed in a trench, the wiring shall be taped together using black electrical tape at intervals of 10 feet.
- d. All wire splices shall be made using sealed waterproof connectors. Connectors shall consist of a wire nut and a polypropylene locking tube pre-filled with waterproof electrical gel. The wire connector shall accommodate up to three #14 control wires.
- e. A 36 inch long expansion loop of wire shall be provided at each wire splice, valve wire connection, and at all directional changes of the wire path. Expansion curls shall be sufficient length at each wire splice that the wire connectors may be completely removed from the splice / pull box. Expansion curls shall be sufficient length at each electric control valve, so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wires. Control wires shall be laid loosely in the trench without stress or stretching of control wire conductors. A 36 inch long expansion loop shall be located every 100 feet on continuous wire runs and on both sides of any sleeve crossings.
- f. Use continuous wire between controller and remote control valves. Under no circumstances shall splices exist without prior MCSD approval. Any splices allowed shall be installed in a splice / pull box.
- g. All control wires shall be black in color. When more than one controller is installed use a unique color wire for each controller. The colors used by the contractor for control wires shall not conflict with the colors designated for spare control and common wires described in these specifications.
- h. All common wires and only common wires shall be white in color. When more than one controller is installed, use white colored wire with a color stripe matching the color of the control wire used for the controller.

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- i. For each leg of the mainline there shall be one spare control wire routed for each five (5) remote control valves, or part thereof, on the mainline leg. A minimum of one spare control wires shall be routed for each mainline leg if less than five (5) valves are present. A single spare common wire shall be routed to the end of each mainline leg. All spare wires shall be looped up and into the remote control valve boxes and any splice pull boxes along the entire path of the mainline leg. Spare control wires shall be solid orange in color. Spare common wires shall be white in color with an orange stripe.
- j. All wire sleeves shall have a pull rope remaining along with the wires carried. Mark each sleeve for future use with a score mark on the adjacent concrete curb. All wire sleeves shall extend at least 24 inch past the edge of the paving. All wire sleeve ends shall be sealed using aqua-seal wrap. All wire sleeves shall be Sch. 40 P.V.C. sized at twice the diameter of the wire bundle carried or 2 inch minimum. A 36 inch long expansion loop shall be located on both sides of the sleeve crossing.
- k. Flow sensor communication cable between the flow sensor and the controller shall be installed inside a 1 inch Sch. 40 P.V.C. conduit.
- l. Master valve control and common wires between the master valve and the controller shall be installed inside a 1 inch Sch. 40 P.V.C. conduit. Master valve wires shall be blue with a white stripe and white with a blue stripe. Master valve wires shall be consistent with the common and control wires described in these specifications.

19. Valve Boxes:

- a. Round valve boxes shall be 10 inches in diameter x 10 1/4 inches high constructed of rigid polyolefin, chemically inert plastic, with 6 inch Class 160 P.V.C. extension sleeves where required. Valve boxes shall have bolt down plastic covers. Valve box covers shall be secured using stainless steel bolts, washers and nuts. Heat brand box lid with the appropriate identification letters.
- b. Rectangular valve boxes shall be 11 3/4 inches wide x 17 inches long x 12 inches high constructed of rigid polyolefin, chemically inert plastic, with valve box extensions where required. Valve boxes shall have bolt down plastic covers. Valve box covers shall be secured using stainless steel bolts, washers and nuts. Heat brand box lid with the appropriate identification letters and/or numbers.
- c. Identification letters or numbers shall be 2 inch high and heat branded onto the box cover. Identification symbols shall be as shown in the installation details.
- d. Heat branding shall be accomplished using branding irons specifically designed for this purpose. Heat branding shall not weaken or in any way puncture the valve box cover.

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- e. Valve box covers shall be green in color unless directed to be purple in color for use with reclaimed water. Reclaimed water Valve boxes shall have appropriate reclaimed water warnings embossed onto the cover in English and Spanish, as well as the international "Do Not Drink" symbol.
- f. Valve boxes used for irrigation equipment shall be as follows:
 - i. Round valve boxes shall be used for gate valves, butterfly valves, quick coupler valves, and any other equipment as shown in the installation details.
 - ii. Rectangular valve boxes shall be used for remote control valves, master control valves, drip control valves, pressure regulators, ball valves, pull boxes, and any other equipment as shown in the installation details.

20. Sprinkler Heads

a. Spray Type Sprinkler Heads:

Full circle, part circle and variable arc spray sprinkler heads with built-in pressure regulation and check valves:

- i. The sprinkler body, stem nozzle and screen shall be constructed of heavy-duty plastic.
- ii. The sealing device shall create no more that one (1) PSI pressure drop at maximum rated pressure and flow.
- iii. The sprinkler shall have a strong stainless steel retract spring for positive pop down. Pop up height shall be as indicated on the Drawings and no less than 6 inches.
- iv. The sprinkler shall have a screen under the nozzle to protect it from clogging and for easy removal for cleaning and flushing system.
- v. Pop-up sprinklers shall be equipped with a built in pressure regulating device designed to deliver a consistent water pressure to the base of the nozzle. The pressure regulator equipped pop-up sprinkler shall be identified on the cap as being so equipped.
- vi. Pop-up sprinklers shall be equipped with a built in anti-drain valve capable of holding water within the sprinkler head from up to 10 feet of elevation change. The check valve equipped pop-up sprinkler shall be identified on the cap as being so equipped.

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- vii. Sprinklers used on reclaimed water systems shall have a color coded purple body cap installed with reclaimed water warnings embossed onto the plastic cap. The reclaimed water cap shall completely replace the existing black colored cap of the standard sprinkler head.
- viii. The sprinkler shall have a matched precipitation rate (MPR) plastic nozzle with an adjusting screw capable of regulating the radius and flow. The MPRotator nozzles shall have female threaded base configuration that attached to the male threaded riser stem.
- ix. Bubbler nozzles: The plastic stream bubbler nozzles shall have multiple stream outlets with an adjusting screw capable of regulating the radius and flow. Plastic flood bubbler nozzles shall be pressure compensating units with fixed discharge rates of 0.25, 0.5, 1.0 and 2.0 gallons per minute (GPM). The bubbler nozzles shall have female threaded base configuration that attached to the male threaded riser stem
- b. Medium Range Rotor Type Sprinkler Heads: Full circle or adjustable arc pop-up sprinkler heads with built-in check valves:
 - i. The pop-up stream rotor sprinkler shall be a single nozzle, gear drive, capable of covering 18 to 47 feet radius at 30 to 70 PSI with a discharge rate of between 0.9 and 8.2 gallons per minute (GPM). The sprinkler head shall be available in full circle (360 degree) units as well as adjustable arc units. The adjustable arc sprinkler shall have an infinitely adjustable arc of coverage from 1 degree to 360 degrees. Adjustable arc units shall not be used where a full circle coverage sprinkler is indicated on the Drawings.
 - ii. The sprinkler case and internal assembly, except for the bearing spring, wiper seal and bearing washers, shall be constructed of durable plastic and stainless steel. All pop-up sprinkler heads shall have an integral rubber cover. All pop-up heads installed in turf areas shall have a stainless steel riser.
 - iii. The sprinkler shall have an adjustable diffuser pin for distance and distribution control.
 - iv. The sprinkler shall have a strong stainless steel retract spring for positive pop down. Pop up height shall be as indicated on the Drawings and no less than 4 inches.

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- v. The sprinkler shall have a minimum 3/4-inch bottom inlet with a plastic screen to protect nozzle from clogging. The case shall have a sturdy, reinforced rib design with flange.
 - vi. Pop-up sprinklers shall be equipped with a built in anti-drain valve capable of holding water within the sprinkler head from up to 10 feet of elevation change.
 - vii. The sprinkler head shall have interchangeable plastic nozzles that vary the discharge rate of the sprinkler as well as the radius of throw. The nozzles installed in the heads shall be as indicated on the Drawings.
 - viii. Sprinklers used on reclaimed water systems shall have a factory installed, color coded purple body cap with reclaimed water warnings embossed onto the cap.
- c. Large Range Rotor Type Sprinkler Heads: Full circle or adjustable arc pop-up sprinkler heads with built-in check valves:
- i. The pop-up stream rotor sprinkler shall be a single nozzle, gear drive, capable of covering 37 to 74 feet radius at 40 to 100 PSI with a discharge rate of between 3.8 and 31.5 gallons per minute (GPM). The sprinkler head shall be available in full circle (360 degree) units as well as adjustable arc units. The adjustable arc sprinkler shall have an infinitely adjustable arc of coverage from 1 degree to 360 degrees. Adjustable arc units shall not be used where a full circle coverage sprinkler is indicated on the Drawings.
 - ii. The sprinkler case and internal assembly, except for the bearing spring, wiper seal and bearing washers, shall be constructed of durable plastic and stainless steel. All pop-up sprinkler heads shall have an integral rubber cover and a stainless steel riser.
 - iii. The sprinkler shall have an adjustable diffuser pin for distance and distribution control.
 - iv. The sprinkler shall have a strong stainless steel retract spring for positive pop down. Pop up height shall be as indicated on the Drawings and no less than 4 inches.
 - v. The sprinkler shall have a minimum 1 inch bottom inlet with a plastic screen to protect nozzle from clogging. The case shall have a sturdy, reinforced rib design with flange.

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- vi. Pop-up sprinklers shall be equipped with a built in anti-drain valve capable of holding water within the sprinkler head from up to 10 feet of elevation change.
- vii. The sprinkler head shall have interchangeable plastic nozzles that vary the discharge rate of the sprinkler as well as the radius of throw. The nozzles installed in the heads shall be as indicated on the Drawings.
- viii. Sprinklers used on reclaimed water systems shall have a factory installed, color coded purple body cap with reclaimed water warnings embossed onto the cap.

21. Drip Irrigation:

a. Drip Emitters:

- i. Drip emitters shall be constructed of heavy-duty plastic, with a barbed fitting. Drip emitters shall be pressure compensating units that flow throughout a pressure range of 5 to 45 PSI. Drip emitter shall be a unit delivering a discharge rate of 2 gallons per hour (GPH).
- ii. Drip emitters shall be installed on the HDPE pipe per details.
- iii. The HDPE pipe shall be staked to grade using Jute netting staples as indicated on the installation detail drawings.
- iv. Subsurface drip irrigation shall be installed in the 2' area adjacent to hardscape per manufacturer's specifications and details.

b. Wye Filters: Drip system wye filters shall be constructed of heavy duty, heat resistant plastic. Wye filters shall have a removable plastic disk type filter. Drip system wye filters shall have an equivalent filtration level of 80 mesh. Wye filters shall have FIPT inlet and outlet. Wye filters shall be sized equivalent to the drip control valve as indicated on the drawings.

c. Pressure Regulators: Drip system pressure regulators shall be constructed of heavy-duty, heat resistant plastic and stainless steel internal parts. Pressure regulators shall reduce inlet water pressure in the range 35-70 PSI to a preset 30 PSI. Pressure regulators shall have 3/4 inch FIPT inlet and outlet.

d. Flush Valve: Drip system 1/2 inch Auto-drain valves shall have 1/2"-14 NPT threads on the inlet portion of the valve.

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22. Check Valves:

- a. Provide check valves, in addition to any built-in sprinkler head check valves, as may be required by the MCSD Representative to prevent drainage of irrigation water from sprinkler system due to changes in elevation.
- b. Swing Check Valve: Where water source is below the elevation of the sprinkler heads (i.e. at the bottom of a slope) swing check valves are to be used. Swing check valves shall be constructed of heavy-duty plastic and stainless steel internal parts. Swing check valve shall permit water to flow up slope not down. Install swing check valves in line as designated on the irrigation drawings. As all sizes may not be available from the manufacturer, use Schedule 40 P.V.C. reducing bushings to adapt check valve to the line size as long as P.V.C. swing check valve is larger than the line size.
- c. Spring Check Valve (adjustable): Where water source is above the elevation of the sprinkler heads (i.e. at the top of a slope) adjustable spring check valves are to be used. Spring check valves shall be constructed of heavy-duty plastic and stainless steel internal parts. Spring check valve shall be adjustable between 5 - 15 lbs. Install swing check valves in line and/or on sprinkler heads designated on the irrigation drawings. As all sizes may not be available from the manufacturer, use Schedule 40 P.V.C. reducing bushings to adapt check valve to the line size as long as P.V.C. swing check valve is larger than the line size.

23. Sensors:

- a. Flow sensor:
 - i. Flow sensor shall be a solid-state unit constructed of a brass body or tee fitting, an o-ring sealed epoxy fused sensor housing, and nylon impeller.
 - ii. Flow sensor shall be an insertion type with a nonmagnetic, spinning impeller (paddle wheel) as the only moving part. The sensor sleeve will be brass (or 316 stainless steel) with the impeller and sensor housing being glass-filled PPS. A pennlon bearing shall be inserted through the impeller and the shaft material shall be tungsten carbide. The sensor electronics will be potted in an epoxy compound designed for prolonged immersion. The sensor shall operate in line pressures up to 400 PSI and liquid temperatures up to 220° F, and operate in flow of 1 foot per second up to 30 feet per second. Flow sensor shall be matched to the central control system specified and as indicated on the drawings. Flow sensors shall not be required with systems using light

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powered irrigation controllers.

- b. Rain Sensor shall be a catch container type constructed of heavy duty plastic with epoxy sealed electronics. Sensor shall be installed inside a 1/8 inch thick steel vandal resistant enclosure. Rain sensor shall be wired directly to the irrigation satellite when installed with Calsense controllers. Install rain sensor on the side of the controller enclosure and route all wires through enclosure walls inside a 1/2" steel conduit. When controllers are installed inside buildings mount rain sensor on the building roof and route wires to controller inside 1/2" steel conduit painted to match exterior building color. Install rain sensor as recommended by the manufacturer.
- c. When and where determined to be necessary and required by the MCSD an evapotranspiration (ET) rate sensor is to be provided. The ET sensor shall be a solid-state design using the depletion of distilled water from an enclosed reservoir to determine the evaporation rate. The ET sensor shall be installed inside a stainless steel enclosure and wired to the nearest satellite controller. The satellite controller must be equipped with an ET gage interface board to properly read the data from the sensor. The ET sensor shall only be used with Calsense central control systems.
- d. When and where determined to be necessary and required by the MCSD a tipping rain bucket sensor is to be provided. The rain bucket consists of a tipping mechanism that measures every 0.01 inches of rainfall. The rain bucket shall be mounted on a pole and wired to the nearest satellite controller. The satellite controller must be equipped with a rain bucket interface board to properly read the data from the sensor. The tipping rain bucket shall only be used with Calsense central control systems.

24. Booster Pump:

- a. Booster pumps shall be a pre-assembled unit provided by a pump supply company routinely building booster pump systems for use with irrigation systems.
- b. Booster pump shall deliver the system water pressure at the specified irrigation volume indicated on the irrigation drawings.
- c. Electrical requirements for the booster pump shall be as indicated on the irrigation drawings. Electrical power shall be provided by the Owner / Developer. The Contractor is responsible for final hook-up to booster assembly and low voltage connection, if required, to irrigation controller.

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- d. Booster pump shall be grounded as per the manufacturer's specifications.

25. Miscellaneous Equipment:

- a. Landscape Fabric: Landscape fabric for valve box assemblies shall be 5 ounce weight woven polypropylene weed barrier. Landscape fabric shall have a burst strength of 225 PSI, a puncture strength of 60 lbs. and capable of water flow of 12 gallons per minute per square foot.
- b. Thrust Blocks: Thrust blocking shall be used on all irrigation mainlines 2 1/2 inches in diameter with solvent welded fittings. Thrust blocks shall be minimum 1 cubic foot of 470-C-2000 concrete. All P.V.C. mainline fittings shall be wrapped with black plastic tape prior to the installation of concrete thrust blocks. The thrust block concrete must be poured in such a way that the concrete is directly in contact with the pipe fitting and the compacted soil adjacent to the thrust block. A pipe restraint system shall be used in lieu of thrust blocks for all bell and gasket mainline.

c. Gravel:

- i. All gravel used in valve boxes shall be washed, crushed rock of approximately 3/4 inch average size. No pea gravel shall be used in valve boxes.
- ii. Gravel used for the installation of enclosure mounting pads shall be washed pea gravel.

Type: Submit a sample of gravel for approval by MCSD.

- d. Pipe Stabilizers: All pipe installed on grade shall be secured to the ground surface using a manufactured pipe stabilizer. Pipe stabilizers shall be manufactured from an 18 inch long #4 rebar stake to which two 5/16 inch hot rolled steel "J" hooks have been welded. The "J" hooks shall have a protective vinyl tubing cover factory installed. Pipe stabilizers are to be installed a minimum of 10 feet on center and as indicated on the installation detail drawings.
- e. Rebar Stakes: All assemblies requiring stabilization shall be equipped with #4 x 30 inch rebar stakes. Quantity and installation of the rebar stakes shall be as indicated on the installation detail drawings.

Type: Submit for approval by MCSD.

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- f. All assemblies requiring rebar stakes shall be equipped with stainless steel vandal-proof clamps installed with a tool specifically for this purpose. Clamps shall be one time only use type and not be removable with screwdrivers or wrenches. Quantity of clamps shall be as indicated on the installation detail drawings.

Type: Submit for approval by MCSD.

- g. Identification tags with numbers are required on all valves. Remote control valve tags shall have a yellow background with black lettering for potable water and shall have a purple background with black lettering for reclaimed water. Reclaimed water ID tags shall also have reclaimed water warnings listed on one side of the tag.

- h. Swing Joint Assemblies:

- i. All sprinkler heads shall be installed with a swing joint. The swing joint shall consist of a Blu-Lock swing joint assembly or of two Marlex street ells, a Schedule 40 P.V.C. threaded ell, and two Schedule 80 P.V.C. threaded nipples. One threaded nipple shall be the lay pipe and the second shall be a riser between the swing joint and the sprinkler head inlet. The lay pipe for 4 inch and 6 inch pop-up heads shall be a minimum of 8 inches in length. The lay pipe for 12 inch pop-up heads shall be a minimum of 12 inches in length. All sprinkler swing joints shall be sized per the inlet of the sprinkler on which they are used.
- ii. All quick coupler valves, mainline flush valves and other components as required shall be installed with a swing joint. The swing joint shall consist of two brass street ells, a brass threaded ell, and two brass threaded nipples. One threaded nipple shall be the lay pipe and the second shall be a riser between the swing joint and the component inlet. The lay pipe shall be a minimum of 12 inches in length. All swing joints shall be sized per the inlet of the component on which they are used.

F. IRRIGATION SPECIFICATIONS: EXECUTION

- 1. Site Conditions

- a. Inspections:

- i. Prior to all work of this section, the 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. Before starting work on irrigation system,

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determine that work may proceed without disruption of activities of other trades.

- ii. The Contractor shall verify that 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.
- iii. The Contractor is responsible for taking all reasonable investigative actions and precautions, when working around any utility system.
- iv. The Contractor shall be responsible for verification of site conditions and minor revisions as approved by the Landscape Architect and MCSD Representative to insure 100% irrigation coverage in all areas.

b. Discrepancies:

- i. In the event of any discrepancy between the Drawings and the actual field conditions or in the event of any other discrepancy found on the Drawings, immediately notify the MCSD Representative.
- ii. Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.

c. Grades:

- i. Before starting work, the Contractor shall carefully check all grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.
- ii. The final grades shall be accepted by the Engineer and the MCSD before work on this section will be allowed to begin.

d. Field Measurements:

- i. The Contractor shall make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. The Contractor shall coordinate the installation of all irrigation materials with all other work.
- ii. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions prior to proceeding with work under this section.

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- iii. The Contractor shall exercise extreme care in excavating and working near existing utilities. The Contractor shall be responsible for damages to utilities, which are caused by his operations or neglect.

e. Diagrammatic Intent:

The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale where possible. The Contractor shall provide offsets in piping and changes in equipment locations as necessary to conform with structures and to avoid obstructions or conflicts with other work at no additional expense to the Owner / Developer or the MCSD.

f. Layout:

- i. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads, valves, backflow prevention devices, and automatic controller.
- ii. Layout irrigation system and make minor adjustments required due to differences between site and drawings. Any such deviations in layout shall be within the intent of the original drawings and approved by the Landscape Architect and MCSD Representative.
- iii. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.
- iv. The lay out all irrigation equipment, accept large radius rotary sprinkler heads, using an approved staking method, and maintain the staking of approved layout.
- v. All layouts shall be approved by the MCSD Representative prior to equipment installation.

2. Water Supply:

- a. Connections to the existing water meter shall be at the approximate locations shown on the drawings. Minor changes caused by actual site conditions shall be made without additional cost to the Owner/Developer or MCSD.
- b. Utilize water meter and provide connections to backflow prevention device per the irrigation drawings and details.

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- c. The backflow prevention unit shall be tested by a certified backflow prevention technician and its operation certified in writing. Contractor shall arrange and pay for all testing and certification fees. The original written certification of the backflow prevention device shall be submitted to the MCSD Representative.

3. Electrical Service:

- a. Connections to the electrical supply shall be at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made at no additional expense to the Owner/Developer or MCSD.
- b. Contractor shall make electrical connections to the irrigation controllers and booster pumps. Electrical power supply shall be provided by the Owner/Developer.
- c. The electrical supply, and all associated electrical equipment, shall be installed in conformance with the national uniform electrical codes.

4. Assemblies:

- a. Do not install multiple assemblies on plastic lines. Provide each assembly with it's own outlet.
- b. Install all assemblies specified herein according to the respective installation detail drawings or specifications, using the best standard practices with prior approval.
- c. Assemble brass pipe and fittings and plastic threaded fittings, using a non-hardening Teflon pipe sealant applied to the male threads only.
- d. Install concrete thrust blocking at all changes of direction 45 degrees or greater on all mainline, 2 1/2 inch diameter in size. Install thrust blocks per details. Pipe restraint system shall be used in lieu of thrust blocks on bell and gasket pipe.

5. Line Clearance:

- a. All lines shall have a minimum lateral clearance of 6 inches from each other and 24 inches from lines of other trades.
- b. Do not install parallel lines directly over one another.

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6. Trenching:
 - a. Dig trenches and support pipe continuously on bottom of trench. Lay pipe to an even grade. Pipe shall be snaked from side to side to allow for expansion and contraction. Trenching excavation shall follow layout indicated and as noted. Where lines occur under paved area, these dimensions shall be considered below subgrade.
 - b. Provide the following minimum covers:
 - i. Pressure mainlines 2 inches size or greater: 24 inches
 - ii. Pressure mainlines less than 2 inches: 18 inches
 - iii. Non-pressure lateral lines 3 inches and greater: 18 inches
 - iv. Non-pressure lateral lines less than 3 inches: 12 inches
 - v. Control wiring (Under mainlines) 18 inches
7. Backfilling:
 - a. Initial backfill on all lines shall be of a fine granular material, not larger than 1/2-inch diameter.
 - b. Compact backfill to dry density equal to the adjacent undisturbed soil, conforming to adjacent grades without dips, sunken areas, humps, or other irregularities.
 - c. In appropriate types of soil, the Architect may authorize the use of flooding in lieu of tamping.
 - d. Under no circumstances shall vehicle wheels be used for compacting soil.
 - e. Provide sand backfill a minimum of 4 inches over and under all piping under paved areas, and a minimum of 2 inches on all other piping.
 - f. If settlement occurs and subsequent adjustments in pipe, valves, irrigation heads, turf or other plantings, or other construction are necessary, the contractor shall make all required adjustments without cost to the Owner/Developer or MCSD.
8. Flushing the System:

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- a. After all irrigation pipe lines and risers are in place and connected, and prior to installation of irrigation heads, the control valves shall be opened and full head of water used to flush out the system.
 - b. Sprinkler heads shall be installed only after flushing of the system has been accomplished to the complete satisfaction of the MCSD Representative.
9. Under Existing and/or Proposed Pavement:
- a. Trenches located under areas where paving, asphalt or concrete will be installed shall be backfilled with sand and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in flush with the adjoining grade. The Contractor shall set in place, cap and pressure test all piping under paving prior to paving work.
 - b. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. However, no hydraulic driving will be permitted under asphalt paving.
 - c. Provide a minimum cover of 36 inches between the top of the pipe and the bottom of the aggregate base for all pressure piping (mainlines) and 24 inches for all non-pressure piping (laterals) installed under asphalt or concrete paving.
 - d. Sleeves shall be two times the diameter of lateral line, mainline, and wire bundle size, and a minimum of 2 inch in size. Install separate sleeves for each lateral, mainline and wire bundle.
 - e. Under public roads, all mainlines, lateral piping and wire sleeves must have a minimum cover of 36 inches from the top of the pipe to the bottom of aggregate base.
 - f. Secure permission from the MCSD Representative before cutting or breaking existing pavement. All necessary repairs and replacements shall be approved by the MCSD Representative and made at no additional cost to the Owner/Developer or MCSD.
10. Controller:
- a. The contractor shall install a new controller as specified on the irrigation drawings.

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- b. Controller shall be installed in the locations indicated on the irrigation drawings and approved by the MCSD Representative.
- c. Contractor shall install separate wire conduits and sweeps into the controller enclosure for the control wiring, master valve wiring, flow sensor wiring, communication cable, ground wire and electrical power wiring as indicated on the installation detail drawings.
- d. Install one extra 1 inch size P.V.C. conduit and sweep into the controller enclosure for future use.

11. Irrigation Heads:

- a. Install irrigation heads as indicated on the Drawings and the installation detail drawings.
- b. Spacing of heads shall not exceed the maximum indicated. In no case shall the spacing exceed the maximum recommended by the manufacturer.
- c. Sprinkler heads in turf areas shall be temporarily elevated to a minimum of 4 inches above grade during installation. Heads along curbs, walks, paving, etc., shall be placed 1/2 inch above finish grade. The elevated irrigation heads shall be lowered to the final installation height within ten days after notification by the MCSD Representative.
- d. Final sprinkler head heights shall be as indicated on the installation detail drawings. All sprinkler heads installed adjacent to hardscape features shall be located 24" from the edge of the hardscape feature as shown on the installation detail drawings.
- e. All irrigation heads shall be set perpendicular to finish grades unless otherwise indicated on the plans. All sprinkler heads installed on flat ground shall be installed plumb and checked with a sprinkler head bubble level.

12. Adjusting the System:

- a. The contractor shall flush and adjust all irrigation heads and valves for optimum performance and to prevent over spray onto walks, roadways, buildings, walls and other structures as much as possible.
- b. If it is determined that adjustments in the irrigation equipment or nozzle changes will provide proper and more adequate coverage, make all such changes or make arrangements with the manufacturer to have adjustments made, prior to any planting. All necessary

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adjustments shall be approved by the MCSD Representative and made at no additional cost to the Owner/Developer or MCSD.

13. Tests and Inspections:

a. The Contractor is responsible for notifying the MCSD Representative in advance for the irrigation system inspections as indicated elsewhere in these Specifications.

b. Pre-job Conference:

i. Prior to the start of the landscape installation the Contractor shall meet with the MCSD Representative and the Owner/Developer Representative to review the project site, the Drawings, the MCSD installation detail drawings, the specifications, the as-built requirements and the inspection schedule.

c. System Layout Inspection:

Prior to the installation of any irrigation equipment the MCSD Representative shall inspect the lay out of the irrigation system. The installation of the irrigation system shall not commence without approval of the MCSD Representative.

d. Pressure Testing:

i. All irrigation mainlines shall be tested under a hydrostatic pressure of 150 PSI for a period of two (2) hours, and approved watertight, prior to the backfilling of the trenches.

ii. All piping under paved areas shall be tested under a hydrostatic pressure of 150 PSI for a period of two (2) hours, and approved watertight, prior to the paving operation.

iii. Make hydrostatic tests only in the presence of the MCSD Representative. No pipe shall be backfilled until it has been inspected, tested, and approved in writing by the MCSD Representative.

iv. The Contractor shall furnish a force pump and all other necessary equipment for the pressure test.

v. All testing shall be approved prior to the installation of remote control valves, quick couplers, or other valve assemblies.

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- vi. The piping to be tested shall be completely disconnected from the force pump and water source prior to the start of the pressure test.
 - vii. No air pressure testing of lines shall be allowed.
 - viii. The collection of the data for the mainline installation as-built drawings shall take place on the same day as the mainline pressure test.
- e. Coverage Test:
- i. When the irrigation system installation is complete, and prior to any planting operations, the Contractor shall perform a coverage test in the presence of the MCSD Representative to determine if the water coverage for the landscaped areas is complete and adequate. Sprinkler coverage must be 100% or "head to head" in order to be accepted by the MCSD Representative.
 - ii. The Contractor shall furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from the plans or where the system has been willfully installed as indicated in the drawings; when it is obviously inadequate or inappropriate, without bringing this to the attention of the MCSD Representative.
 - iii. When performing the irrigation coverage test, the contractor shall be responsible for having a two-way communication system or sufficient personnel, so that the directions from the inspection area to the controller of the system can be readily accomplished.
 - iv. The coverage test shall be accomplished before any plant material is installed (excluding trees). The entire irrigation system shall be under full automatic operation for a period of seven days prior to any planting or hydroseeding.
 - v. The collection of the data for the final as-built drawings shall take place within three (3) days of MCSD Representative approval of the coverage test.
- f. Pre-Maintenance Inspection:
- i. Prior to the start of the maintenance period the MCSD Representative shall inspect the installation of the irrigation system. The irrigation system installation shall be 100%

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complete and the system completely operational prior to the inspection. The maintenance period shall not commence without written approval of the MCSD Representative.

- ii. The MCSD Representative shall prepare a punch list of required corrections or repairs necessary for completion prior to the approved start of the maintenance period. The maintenance period shall not commence without correction of the punch list items, re-inspection and written approval of the MCSD Representative.
- iii. The MCSD Representative shall prepare a punch list of required corrections or repairs necessary for completion during the maintenance period. The punch list items shall be corrected prior to the final acceptance inspection by the MCSD Representative.

g. Final Acceptance Inspection:

- i. **AS-BUILT DRAWINGS MUST BE SUBMITTED PRIOR TO FINAL SITE INSPECTION; THE FINAL INSPECTION WILL NOT COMMENCE WITHOUT AS BUILT DRAWING APPROVAL.** In the event the contractor calls for a final inspection without as-built drawings, without completing previously noted corrections, or without preparing the system for inspection, he shall be responsible for reimbursing the MCSD for the cost of the inspection per the current rate established by the MCSD. No further inspections will be scheduled until this charge has been paid.
- ii. Prior to final acceptance the MCSD Representative shall inspect the installation of the irrigation system. The irrigation system installation shall be 100% complete and the system completely operational prior to the inspection. All previously prepared punch list items shall be corrected prior to the final acceptance inspection. The final acceptance shall not take place without written approval of the MCSD Representative.
- iii. The MCSD Representative shall prepare a punch list of required corrections or repairs necessary for completion prior to the final acceptance of the project. The project shall not receive final acceptance without correction of the punch list items, reinspection and written approval of the MCSD Representative.

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14. Maintenance:

- a. The Contractor shall maintain the irrigation system for a minimum of 90 days or until final acceptance by the MCSD.
- b. During the maintenance period the Contractor shall adjust and maintain the irrigation system in a fully operational condition providing complete irrigation coverage to all intended plantings.

15. Completion Cleaning:

- a. Clean-up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed, and any damage sustained on the work of others shall be repaired to original conditions.
- b. Upon completion of the work, make ground surface level, remove excess materials, rubbish, debris, etc., and remove construction and installation equipment from the premises.

END OF SECTION

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**SECTION C
STANDARD PLANTING PLANS**

CONTENTS:

- A. PLAN REQUIREMENTS: MINIMUM STANDARDS**
- B. APPROVED PLANT MATERIALS**
- C. PLANTING SPECIFICATIONS: GENERAL**
- D. PLANTING SPECIFICATIONS: PRODUCTS**
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- H. STANDARD PLANTING DETAILS**
- I. HYDROSEEDING: PRODUCTS**
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A. PLAN REQUIREMENTS: MINIMUM STANDARDS

1. Elements to consider when designing the landscape:

- a. The use of native plants and appropriate drought tolerant plants in site planting should be considered, to bring down the water demands over general ornamental plants. Based on the total square footage of the site, 60% of the trees, shrubs and ground cover will be California native and/or drought tolerant plant materials.
- a. Plants shall be grouped by water use to provide a consistent water requirement for entire areas. Use of the Water Use Classification of Landscape Species (WUCOLS) and The Landscape Coefficient Method is encouraged. The publication "A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California" is available free of charge from:

Department of Water Resources
Bulletins and Reports
P.O. Box 942836
Sacramento, California 94236-0001
(916) 653-1097

- b. The use of drought tolerant plants strategically placed on upper slope positions of irrigated slope belts or fuel modification zones is advised. Landscape Architects should be cautioned that because a plant is drought tolerant does not necessarily mean that it is fire retardant. Developers will need to contact Murrieta Fire Department, at (909) 304-FIRE) for a list of fire retardant plant material.
- c. Apply the information already required of the development, (i.e., soils report, engineers report, grading plans, etc.) to review subsoils, in determining potential subsoil water flows and percolation rates so that plant material types can be strategically placed to maximize water conservation.

2. Tree and Shrub spacing and quantities:

It is the intent of the MCSD to allow the Landscape Architect to determine the spacing and quantities of trees and shrubs as applicable to the following requirements, and as deemed appropriate by the MCSD.

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- a. Trees for slopes, parks and parkways shall be planted at the minimum rate of one (1) tree per 800 square feet of landscaped area and the maximum rate of one (1) tree per 540 square feet of landscaped area.
- b. Trees planted on 2:1 slopes shall be limited to the middle third of the slope. Do not install trees in the top 15 feet of the slope or in the bottom 20 feet of the slope.
- c. Trees on slope areas shall be planted as near to property lines as possible to avoid blocking of views.
- d. Street trees shall be planted forty (40) feet on center and at least twenty (20) feet away from all street light standards.
- e. 60% of the total number of trees planted on the project shall have a minimum container size of five (5) gallons. The remaining 40% of the total number of trees planted on the project shall have a minimum container size of fifteen (15) gallons. All street trees shall have a minimum container size of 24" box.
- f. Shrubs for slopes, parks and parkways shall be of a type selected, and planted at such spacing, to provide for dense fill-in within 24 months from the date of planting. Do not install shrubs in the top five (5) feet of the slope or in the bottom ten (10) feet of the slope.
- g. 70% of the total number of shrubs planted on the project shall have a minimum container size of one (1) gallon. The remaining 30% of the total number of shrubs planted on the project shall have a minimum container size of five (5) gallons.
- h. Ground covers for slopes, parks and parkways shall be of a type selected, and planted at such spacing, to provide for 80% fill-in within 12 months from the date of planting. The approximate spacing for ground covers shall be determined by the plant size @ maturity.
- i. Groundcovers shall have a minimum container size of one (1) gallon.
- j. Perennial plants shall be planted at an approximate spacing determined by the plant size at maturity. 70% of the total number of perennials planted on the project shall have a minimum container size of one (1) gallon. The remaining 30% of the total number of shrubs planted on the project shall have a minimum container size

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of five (5) gallons.

- k. Monument corners and focal points shall be planted to provide 80% fill-in. Trees planted in monument corners and focal points shall have a minimum box size of twenty four (24) inches.
 - l. All planted areas, excluding turf areas, shall receive four (4) inches of approved wood chip mulch.
 - m. The MCSD Representative shall determine the standards for “80% fill-in” for each project. Planting plans must be reviewed and approved by the MCSD Representative.
 - n. Drip irrigation systems are required. The actual plant spacing shall be determined by the installation of the drip system. The irrigation system layout shall be determined by the approximate plant spacing. The irrigation system shall be installed and the number and location of plants shall be adjusted to match the drip emitters. Irrigation plans must be reviewed and approved by the MCSD Representative. The drip irrigation installation shall be reviewed and approved by the MCSD Representative prior to the start of any planting.
1. The placement of turf shall be reserved for Parks only:
- a. Turf irrigation shall be included in all site calculation relating to the site water consumption rate if the project does not fall into one of the two categories.
4. The following formal information shall be required on all planting plans:
- a. Plant Legend: As a minimum standard, all plans will have plant materials listed within a standard legend. The plant legend will incorporate the following:
 - i. Abbreviation and/or plant symbol
 - ii. Botanical name
 - iii. Common Name
 - iv. Quantity
 - v. Size

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vi. Notes

- b. The MCSD standard planting detail drawings for all referenced material used on the plans.
- c. Hold Harmless and Indemnification Clause to Appear on Each Sheet:

Contractor agrees to assume sole responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours, and that the Contractor shall defend, indemnify, and hold the Owner / Developer, the MCSD, County of local jurisdiction, and the Landscape Architect harmless from any and all liability real or alleged, in connection with the performance of work on this project, excepting for liability arising from the sole negligence of the Owner / Developer, the MCSD, county of local jurisdiction, or the Landscape Architect.

- d. The MCSD approval signature block shall appear on each sheet of the Drawings.
- e. Take Precedence Clause

- 5. Streetscapes: Refer to City of Murrieta "Streetscape Improvements".
- 6. Medians: Refer to City of Murrieta Public Works Department
- 7. Root Barrier Requirements: Any tree planted within 10 feet of a hardscape element shall require installation of an approved root barrier installed per the installation detail drawings and the manufacturer's recommendations.

B. APPROVED PLANT MATERIALS

- 1. All plant materials shall be selected using the following criteria:
 - a. All plant materials shall be selected using the approved Water Use Classification of Landscape Species (WUCOLS) "A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California" guidelines.
 - b. All other plant materials shall be WUCOLS rated low water use or better, unless otherwise approved.

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- c. Street trees shall be selected from the latest editions of the booklet entitled: "Select Trees Recommended for Southern California", published by Street Tree Seminar, Inc.
 - d. No Eucalyptus trees shall be planted on any MCSD maintained project.
- 2. The publications listed above shall be used as a guide, however, the project Landscape Architect shall be held responsible for knowing and selecting the proper plant material that is compatible with the site constraints (e.g., solar exposures, soil, climate and wind characteristic, etc.).
- 3. The project landscape architect will need to note when choosing plant material that total site water consumption shall not exceed 55.5 inches per year for the entire site. This amount is inclusive of twelve (12) inches of natural rainfall per year (43.5 inches automatic irrigation plus twelve inches natural rainfall equals 55.5 inches, water application rate, per year).
- 4. The above irrigation requirement is based on cool season turf grass.

C. PLANTING SPECIFICATIONS: GENERAL

- 1. Summary:
 - a. It is the intent of the specifications and drawings that the finished planting installation is complete in every respect and plants have become established to a point satisfactory to the MCSD.
 - b. The work shall include all materials, labor, services, transportation, and equipment necessary to perform the work as indicated on the drawings, in these specifications, and as necessary to complete the installation of the plant materials.
 - c. The Contractor shall secure the required licenses and permits including payments of charges and fees, give required notices to public authorities, and verify permits secured or arrangements made by others affecting the work of this section.
 - d. The Contractor shall keep a full set of the most recent planting drawings on the project site at all times throughout the construction period.
 - e. The Contractor shall obtain a copy of the most recent edition of the MCSD Landscape Standards Booklet prior to starting the work.

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The Contractor shall keep a copy of the Landscape Standards Booklet on the project site at all times throughout the construction period.

2. Construction Drawings:

- a. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between planting, and architectural features.
- b. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications. When an item is shown on the plans but not shown on the specifications or vice versa, it shall be deemed to be as shown on both. The MCSD Representative shall have final authority for clarification.
- c. The Contractor shall not willfully install plant materials as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in the design. Such obstructions or differences should be brought to the attention of the MCSD Representative as soon as detected. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary.

3. Quality Assurance:

- a. Provide at least one English speaking person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the manufacturer's recommended methods of installation and who shall direct all work performed under this section.
- b. Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturer of articles used in this contract furnish directions covering points not shown in the drawings and specifications.
- c. All local, municipal, and state laws, rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations of the same. However, when these specifications and drawings call for or describe materials,

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workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.

- d. All materials supplied for this project shall be new and free from any defects, disease or damage. All defective materials shall be replaced immediately at no additional cost to the Owner / Developer or the MCSD.

4. Submittals:

a. Materials List:

- i. After award of contract and before any materials are ordered from suppliers or delivered to the job site, the Contractor shall submit to the MCSD a complete list of all plant materials, products, or processes proposed to be furnished and installed as part of this contract.
- ii. The submittals shall include the following information:
 - 1) A title sheet with the job name, the contractors name, contractor's address and telephone number, submittal date and submittal number.
 - 2) An index sheet showing the item number (i.e. 1,2,3, etc.); an item description (i.e. pelletized gypsum); the manufacturer's name (i.e. Best); the item model number or product (i.e. Soil Buster); and the page(s) in the submittal set that contain the catalog cuts.
 - 3) The catalog cuts shall be one or two pages from the most recent manufacturer's catalog that indicate the product submitted.
 - 4) The catalog cuts shall clearly indicate the manufacturer's name and the item model number or name.
 - 5) Submittals for plant materials shall include the name of the supplying nursery; the telephone number of the nursery; and the names, quantity and sizes of the plants to be provided from the nursery.

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- iii. Submittal format requirements:
 - 1) Submittals shall be provided as one complete package for the project. Multiple partial submittals will not be reviewed.
 - 2) Submittal package shall be stapled or bound in such a way as to allow for disassembly for review processing.
 - 3) Submittal package shall have all pages numbered in the lower right hand corner. Page numbers shall correspond with submittal index.
- iv. The MCSD representative will not review the submittal package unless provided in the format described above.
- v. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

5. Substitutions:

- a. If the Contractor wishes to substitute equipment or materials for those equipment or materials listed on the Drawings and Specifications, he may submit a request for approval to the MCSD Representative that includes the following information.
 - i. Provide a written statement indicating the reason for making the substitution.
 - ii. Provide catalog cut sheets and technical data for each substitute item.
 - iii. Provide in writing the difference in installed price if the item is accepted.
- b. The MCSD Representative will allow no substitutions without prior written acceptance.
- c. The MCSD Representative shall have the final decision on whether to accept or reject the substitutions suggested by the Contractor. If a Contractor suggested substitution is rejected, the Contractor shall provide and install the equipment or materials as listed in the

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Drawings and Specifications.

6. Existing Conditions:
 - a. Prior to cutting into the soil, the Contractor shall locate all cables, conduits, sewer septic tanks, and other utilities as are commonly encountered underground and he shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the Landscape Architect and Owner who will arrange for relocations. The Contractor will proceed in the same manner if a rock layer or any other such conditions are encountered.
 - b. The Contractor shall protect all existing utilities and features to remain on and adjacent to the project site during construction. Contractor shall repair, at his own cost; all damage resulting from his operations or negligence.
7. Inspections:
 - a. The Contractor shall permit the MCSD Representative to visit and inspect at all times any part of the work and shall provide safe access for such visits.
 - b. The Contractor shall be solely responsible for notifying the MCSD Representative where and when the work is ready for inspection. The Contractor shall notify the MCSD Representative seven calendar days in advance for pre-job conferences, pre-maintenance finals and pre-acceptance final inspections. The Contractor shall notify the MCSD Representative 48 hours in advance for plant material inspections and pre-hydroseed inspections.
 - c. Inspections will be required for the following at a minimum:
 - i. Pre-job conference
 - ii. Plant material inspection
 - iii. Pre-hydroseed inspection
 - iv. Final inspection prior to start of maintenance period
 - v. Final acceptance
 - d. All inspections for this work shall be made by the MCSD Representative. The Contractor shall be on the site when

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inspections are made. If the work is not ready for inspection when the inspector arrives, contractor shall pay for the MCSD Representative's visit at the current MCSD rate.

8. As Built Drawings:

- a. Record accurately on one set of drawings all changes in the work constituting departures from the original contract drawings and the actual final installed locations of all required components including trees, lights, benches, drinking fountains, play structures, and other items as may be required.

D. PLANTING SPECIFICATIONS: PRODUCTS

1. Summary:

Use only new materials of the manufacturer, size and type shown on the drawings and specifications. Materials or equipment installed or furnished that do not meet MCSD standards will be rejected and shall be removed from the site at no expense to the Owner / Developer or MCSD.

2. Materials:

a. Topsoil:

- i. Existing soil on the site shall be used as topsoil for planting purposes when possible, but shall be free of debris, oil, weeds, or other foreign matter. Contaminated soil shall be removed and replaced with acceptable existing soil or imported soil.
- ii. Imported soil shall be sandy textured. Silt plus clay content of this soil shall be not greater than 15% by weight. The boron content of this soil shall be not greater than 1 part per million as measured on the saturation extract. The sodium absorption ratio (SAR) shall not exceed 3.0 milliohms per centimeter at 25 degrees C.
- iii. In order to ensure conformance, samples of the imported soil shall be submitted to an agronomic soils testing laboratory, approved by the MCSD Representative for analysis prior to use. Results of testing shall be delivered to the MCSD Representative for approval. Soil test to include analysis and recommendations.

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- b. Fertilizers and soil conditioners:
 - i. Organic amendment shall be wood shavings. It shall be fine textured, having actual minimum 100% passing #4 screen. Salinity shall not be higher than 3.5 milliohms per centimeter at 25 degrees C. as measured by saturation extract conductivity.
 - ii. Commercial fertilizer shall have a minimum of 16% nitrogen, 6% phosphoric acid, and 8% potash. Deliver mixed fertilizer in standard bags, marked with weight, analysis and name of manufacturer. Keep fertilizer in dry storage. Use 15-15-15 fertilizer and ammonium nitrate fertilizer during cool season planting. Fertilizer shall be commercial grade.
 - iii. Plant tablets shall be 21-gram size.
 - iv. Soil Conditioner shall be pelletized gypsum.
- c. Plant materials:
 - i. All plant materials shall be healthy, well developed representatives of their species or varieties, free from disfigurement with well-developed branch and root systems, and certification of nursery inspection that plants are free from all plant diseases and insect infestation.
 - ii. Tag plant materials with name and size in accordance with standards of practice recommended by American Association of Nurserymen.
 - iii. Size of tree and shrub containers shall be as stated on the planting plan. Container stock shall have grown in containers for at least six (6) months, but not over two (2) years. Samples shall be shown to prove that no root bound conditions prevail. No container plants that have cracked or broken balls of earth, when taken from containers shall be planted, except upon specific approval.
 - iv. Do not prune, prior to delivery, except by specific approval.
 - v. Plants shall be subject to inspection for size, variety, condition, latent defects and injuries, at place of growth and at the project site at any time before or during progress of work. Remove rejected plants from the project site immediately and replace it with acceptable material.

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- vi. Protect all plants from damage by sun, wind or rain at all times before planting.
- vii. Substitutions will not be permitted; except, when proof is submitted that any plant specified is not obtainable. In this case, a proposal will be considered for use of the nearest equivalent in size or variety with an equitable adjustment of contract price. All substitutions will be subject to the MCSD Representative's approval.
- viii. Plants shall have grown under climatic conditions comparable to those of the project site, unless otherwise specifically approved by the MCSD Representative.
- d. Ground Cover:
 - i. Ground covers will be hand planted in the areas indicated on the planting plans.
 - ii. Ground cover plants shall be grown in 1 gallon containers as indicated on the plant list. The soil in the container shall contain sufficient moisture so that it will not fall apart when lifting the plants.
 - iii. Ground covers shall be planted in a triangular pattern evenly spaced unless otherwise noted on the plan. Plant ground covers in the areas designated on the planting plans.
 - iv. Each plant shall be planted with its proportionate amount of soil from the container, in a manner that will ensure minimum disturbance of the root system. Hand smooth planting area after planting to provide an even, smooth, final finish grade. To avoid drying out, plantings shall be immediately watered after planting until the entire area is soaked to the full depth of each hole unless otherwise noted on the drawing.
- e. Turf Grass:
 - i. Turf grass for landscaped areas shall be a turf type tall fescue variety well suited for the local climate.
 - ii. Turf grass for all ball fields and active turf areas shall be hybrid Bermuda suited for the local climate.
- f. Shredded Mulch: Mulch used on top of finished grade in planting areas shall be made from shredded wood products with an

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approximate size of 1 inch to 3 inches. Shredded mulch shall be free of paper, plastic, metal or other waste material.

- g. Tree ties: Use pre-manufactured rubber tree ties. Secure tree to stake in two places minimum and as indicated in the installation detail drawings.
- f. Tree stakes: Tree stakes shall be 2" diameter x 10' long lodge poles made from treated pine wood and pointed at one end. Use two (2) tree stakes (double stake) for all five gallon, fifteen gallon and 24" box trees. Use three (3) tree stakes (triple stake) for all trees 30" box size and larger or having multiple trunks. As directed by MCSD representative.
- g. Root Barriers: Where trees are planted within ten (10) feet of curbs, sidewalks or pavement, a subsurface panel barrier will be installed to maintain the twenty (20) foot separation.
- h. Turf areas shall be separated from shrub and ground cover areas by a 6 inch wide x 6 inch deep concrete mow strip as indicated on the installation detail drawings.

E. PLANTING SPECIFICATIONS: EXECUTION

1. Installation

- a. Site clearance: Clean up and remove from the planting areas weeds and grasses, including roots, and any minor accumulated debris and rubbish before commencing work.
- b. Finish grading of planting areas. Grading shall be done as indicated on the grading plans and as follows.
 - i. Do not work on the soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form or clods will not readily break up.
 - ii. Remove and dispose of all soil in planting areas that contains any deleterious substance such as oil, plaster, concrete, gasoline, paint, solvents, etc., removing the soil to a minimum depth of six (6) inches or to the level of dryness in the affected areas. The affected soil shall be replaced with native or imported soil as required. The contractor shall be responsible for any damage to installed plants caused by such substances.

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- iii. If an area to be landscaped is not acceptable to the contractor, the contractor shall notify the MCSD Representative, in writing.
- iv. Prior to start of finish grading, loosen all turf grass planting areas to a depth of six (6) inches. Finish grades shall allow for addition of soil conditioners.
- v. Make minor grade adjustments as directed by the MCSD Representative.
- vi. Where designated drainage meets an obstruction, warp grades so that no water collects.
- vii. Use water trucks and sprinklers as required to control all airborne dust caused by grading operations.
- viii. Finish grading all planting areas to a smooth and even condition, making certain that no water pockets or irregularities remain. Remove and dispose of all foreign materials, clods and rocks over 1 inch in diameter within 3 inches of surface.
- ix. Provide a grade, which after conditioning and planting, is 1 inch below the tops of curbs and walks in lawn areas and 2" below for shrub areas sloping to drain to adjacent roadway, drain swale or catch basin.

2. Soil Conditioning:

- a. Amend all turf grass planting areas with a grade of 4:1 or less. Incorporate evenly into the top 6" of existing soil (with a rototiller or approved piece of equipment) the following per each 1,000 square feet of planting area.
 - i. 4 cubic yards of soil amendment.
 - ii. 25 lbs. of commercial fertilizer or approved equal.
- b. The above soil conditioning quantities shall be used for bidding purposes only; soil conditions may change drastically from the time these specifications were developed until the actual soil conditioning takes place. Therefore, the contractor shall obtain soil samples at a rate of one per every 25,000 square feet of planted area in the presence of the MCSD Representative. The contractor shall submit the plant list with the soil samples to the soil and plant lab. These soil tests shall be conducted by an agronomic soil

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testing laboratory approved by the MCSD Representative. Copies of the soil test shall be provided during the pre-site meeting and verified by the MCSD Representative. The contractor shall add amendments per soils report recommendations for individual planting areas and as approved by the MCSD Representative.

- c. All rocks or unbroken soil clods over 1 inch in diameter brought to the surface shall be removed from the project site.
3. Weed control program:
- a. Upon completion of the soil amendment installation and fine grading work perform weed control measures as follows:
 - i. Irrigate all turf grass areas designated to be planted for seven days at a schedule required to germinate all weed seed possible.
 - ii. Apply weed killer per manufacturer's recommendation and the MCSD Representative's approval and allow sufficient time for complete kill of all germinated weeds.
 - iii. Repeat step "i" above.
 - iv. Repeat step "ii" above.
4. Planting shall be completed as follows:
- a. Determine location of the trees and shrubs by scaling from the planting plan.
 - b. Spot containers or stake or flag, and obtain approval from the MCSD Representative prior to excavating planting pits.
 - c. Excavate planting pits with vertical sides for all plants. Shrub pits shall be three times the diameter and 1 times the depth of the root ball. Tree pits shall be three times the diameter and 1 times the depth of the root ball.
 - d. If planting pits are cut with power auger, vertical sides of pit shall be additionally broken with balling bar or spade to interrupt continuous curve influence on root development.
 - e. Plant material shall be planted in such a way that after settling, the crown of the plant bears the same relation to finish grade that it did to the surface in the container.

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- f. Backfill tree and shrub planting pits with a prepared mix as follows:
 - i. 5 parts native on site soil.
 - ii. 3 parts soil amendment.
 - iii. 5 lbs. commercial fertilizer per cubic yard of mix or approved equal.
 - iv. 5 lbs. gypsum per cubic yard of mix.
 - g. Form shallow basin around the edge of planting pits.
 - h. Plant Tablets - 21 gram plant tablets. Provide tablets in the following ratios:
 - i. 1 tablets per 1 gallon plant.
 - ii. 2 tablets per 5 gallon plant.
 - iii. 3 tablets per 15 gallon plant.
 - iv. 4 tablets per 24" box plant.
 - v. 5 tablets per 30" box tree.
 - vi. 6 tablets per 36" box tree.
 - vii. 8 tablets per 48" box tree.
 - i. Grade area around plants to finish grades and dispose of excess soil.
 - j. Location for street trees adjacent to any light standards or utility equipment shall be adjusted to maintain a twenty (20) foot clearance. The MCSD Representative shall approve adjusted street tree location prior to planting.
 - k. Install sump drains for all trees as required by the Landscape Architect or MCSD representative.
5. Turf:

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- a. After turf is installed, irrigate thoroughly to provide good moisture penetration.
- b. Maintain turf edges adjacent to walks with a mechanical edger in a neat condition until the acceptance of the work.
- c. Take sufficient measures to ensure the turf against damage resulting from pedestrian traffic. If any type of barrier is used, it shall meet with the approval of the MCSD Representative. Repairs to all damaged turf will be necessary before acceptance will be made.
- d. Irrigate areas to be sodded prior to installation. Soil shall be moist to a depth of two (2) inches.
- e. Lay sod within twenty four (24) hours after it is delivered. Protect rolls from drying out as necessary.
- f. Unroll sod carefully and place in staggered rows. Tamp each roll against the adjacent strips to eliminate joints and edges.
- g. Trim sod to conform to turf shapes designated on the planting plans.
- h. Roll all sod areas with an approved sod roller no later than twenty-four (24) hours after installation. Sod shall be flush with the finish grade of existing walk, curbs, etc. Additional rolling may be required to meet this requirement and MCSD Representative approval.
- i. Mow turf type tall fescue when it reaches 3 inches in height, to not less than 2 inches. During the maintenance period do not allow the turf to exceed 3 1/4 inches in height. Collect and remove all grass clippings from the site as approved by the MCSD Representative. Mow Hybrid Bermuda when it reaches 1-1/4" in height, to not less than 1".
- j. Acceptance of turf areas will not be made until turf has received the second mowing and all bare spots have been re-sodded. Contractor shall be responsible for the maintenance of the turf areas until acceptance. This maintenance is separate from the maintenance period of the project. Maintenance period may be extended by the MCSD Representative as required.

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6. Pruning:
 - a. Prune minimum necessary to remove injured twigs, branches, dead wood, sprouts and suckers.
 - b. Prune plants according to standard horticultural practices, by qualified personnel.
 - c. No topping of any trees will be permitted. Trees that have been topped will be replaced at the contractor's expense.
7. Clean-up:
 - a. During the course of the work, refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed, any damage sustained on the work of others shall be repaired to original conditions, and leave premises in a neat and clean condition.
 - b. Prior to acceptance of the project for maintenance, clean up and remove all remaining debris and surplus materials upon completion of work, leaving the premises neat and clean.
 - c. Remove all tags, labels, nursery stakes and ties from all plant material only after the approval of the MCSD Representative.

F. PLANTING SPECIFICATIONS: MAINTENANCE

1. Continuously maintain all areas included in the contract during the progress of the work, the maintenance period and until the final acceptance of the work.
2. After all the work indicated on the drawings or herein specified has been completed and inspected and approved by the MCSD Representative on a thirty (30) calendar day schedule; maintain all areas within the project boundary for a period of ninety (90) calendar days.
3. Tree and Shrub Care:
 - a. Watering: Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering, use a wand to break the water force.

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b. Tree Pruning:

- i. Prune trees to select and develop permanent scaffold branches that are smaller in diameter to the trunk or branch of which they are attached, which have vertical spacing of from 18 to 48 inches and radial orientation so as not to overlay one another; to eliminate narrow V-shaped branch forks that lack thinning out crowns; to maintain growth within space balance crown with roots.
- ii. Under no circumstances will stripping of lower branches or "raising up" of young trees be permitted. Retain lower branches in a "tipped back" or pinched condition with as much foliage as possible to promote trunk growth (tapered trunk). Lower branches may be removed only after the tree is able to stand erect without staking or other support.
- iii. Thin out and shape evergreen trees when necessary to prevent wind and storm damage. Perform primary pruning to deciduous trees during the dormant season. Prune damaged trees or those that constitute health or safety hazards at any time of the year as directed by the MCSD Representative.
- iv. Topping of trees is not allowed.

c. Shrub Pruning:

- i. The objectives of shrub pruning are the same as for trees. Do not clip shrubs into balled or boxed forms unless such is required by the design and designated on the planting plans.
- ii. Make all pruning cuts of lateral branches or buds, as directed by the MCSD Representative.
- iii. Topping of shrubs is not allowed.

d. Staking:

Remove tree stakes as soon as they are no longer needed and after approval of the MCSD Representative. Inspect stakes and tree ties to prevent girdling of trunks or branches, and to prevent rubbing that causes bark wounds. The Contractor cut the tree stakes so they are not protruding into the canopy.

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e. Weed control:

- i. Keep basins and areas between plants free of weeds. Apply pre-emergent herbicides recommended by a licensed pest control advisor to all non-seeded landscape areas only. Avoid frequent soil cultivation that destroys shallow roots or disturbs pre-emergent herbicide application.
- ii. Eradicate all noxious weeds from site (i.e. nutgrass, Bermuda grass, kikuyu grass, crab grass etc.).

f. Insect and disease control: Maintain control with approved materials.

g. Fertilization:

Make three applications of commercial fertilizer at the rate of 5-6 lbs. per 1,000 square feet at the following periods: (Maintenance progress inspections are required for verification of fertilizer applications)

- i. Thirty (30) calendar days after the maintenance period has begun.
- ii. Sixty (60) calendar days after the maintenance period has begun.
- iii. Just prior to the end of the ninety (90) calendar day maintenance period.

Note: Application should be per manufacturer's recommendation per site and MCSD Representative approval.

h. Replacement of plants:

Remove dead and dying plants, as approved by the MCSD Representative, and replace with plants of equal size and variety of original planting plan at no additional cost to the Owner / Developer or MCSD.

i. Groundcover Care:

Apply a pre-emergent herbicide having a life no less than six (6) months to all ground cover and shrub areas. Herbicide shall be

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registered for use on the species of plant material specified in planting plans and approved by a licensed pest control advisor.

4. Turf care: (Depends on variety of turf)
 - a. Mowing and edging:

Mow all Bermuda turf areas to a minimum height of 3/4 inch and a maximum of 1 inch. Mow all turf type tall fescue to a minimum height of 2" and a maximum of 3". The MCSD Representative shall determine the mowing height. Mow at least once every seven (7) days during spring and fall seasons and as needed during other seasons.
 - b. Trim edges at least once a week or as needed with a power edger for a neat appearance. Vacuum or blow clippings off walks.
 - c. Watering: Water turf areas at such frequency as weather conditions require to replenish soil moisture in the root zone. Irrigation shall be scheduled between 10 p.m. and 6 a.m. following turf establishment.
5. General Maintenance:
 - a. Remove trash weekly and as needed.
 - b. Edge ground cover to keep in bounds and trim top growth as necessary to achieve an overall even appearance.
 - c. Exterminate vertebrate pests, gophers, moles, etc.; and repair damage as required.
 - d. Test irrigation system weekly and submit reports to MCSD Representative.
 - e. The site temporary fence shall be maintained to ensure security to the site.

G. PLANTING SPECIFICATIONS: GUARANTEE

1. All trees (5 gallon and larger) shall be guaranteed for a period of one year. All shrubs and plant materials shall be guaranteed for a period of 120 calendar days. All guarantee periods commence from the time of final acceptance by the MCSD Representative at the completion of the ninety (90) calendar day maintenance period.

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2. Replace, as soon as weather permits or as directed by the MCSD Representative, all dead plants and all plants not in vigorous condition as noted during the inspections and maintenance period.
3. Plants used for replacements shall be the same kind and size as originally planted. Replacement plants shall be approved by the MCSD Representative and shall be furnished, planted, fertilized as specified and guaranteed the same as the original plant materials.

END OF SECTION