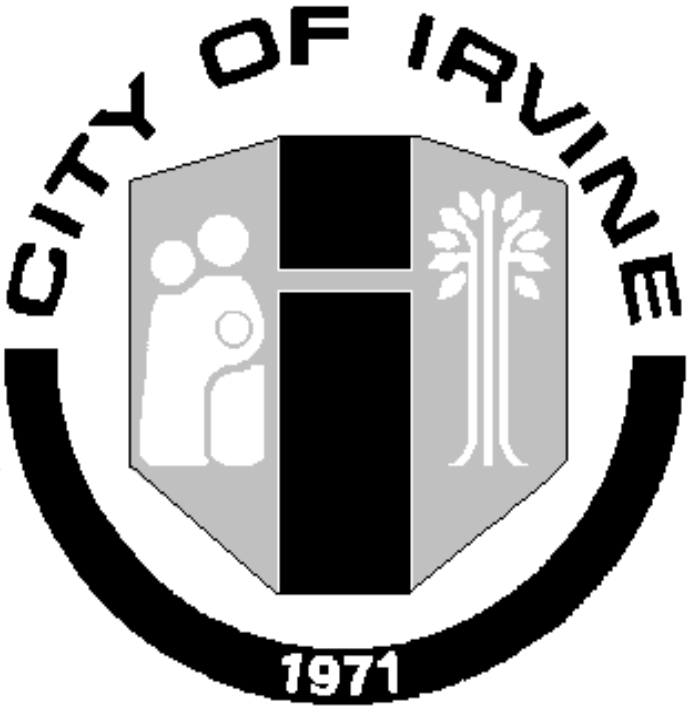

LANDSCAPE MANUAL

AND STANDARD PLANS

INTRODUCTION

The City of Irvine desires to have landscaped open spaces designed with the following goals in mind:

1. Landscaped open spaces should project a positive image and establish a permanent character for the City.

2. Landscaped open spaces should be aesthetic, functional and economical to maintain. They should be an asset, not a liability.

3. Landscaped open spaces should be able to be used for the enjoyment of those who live and/ or work in the City.

The Landscape Manual and Standard Plans were developed to provide policies, procedures, and standards to be used while designing projects to help achieve these goals. This manual is the result of the efforts and input from many groups and individuals. The Landscape task Force (a committee of citizens and professionals appointed by the City Council *"to develop a landscape policy for the City"*) has devoted many hours to the project. Also, representatives from the development community and design professionals have provided input, as well as contractors, maintenance personnel, manufacturers and others in the landscape industry. The valuable services and constructive input these people have provided is greatly appreciated and has been a great help in preparing this manual.

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SECTION I
PURPOSE OF DOCUMENT

A. STANDARD FOR DESIGN

All landscaping shall conform to the Sustainable Landscaping Guideline Manual and the Design Standards contained therein.

Plans for city maintained landscapes shall also conform to and shall be processed in accordance with all provisions of this Landscape Manual and Standard Plans.

Plans for privately owned landscapes shall be consistent with the design standards and processed according to the procedures contained herein. The specifications contained herein may be incorporated but are not a requirement for privately owned landscapes.

B. APPLICATION

Permits are required for all new construction projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check or design review.

Permits are required for rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet.

Any project with an aggregate landscape area of 2,500 square feet or less may comply with the performance requirements of this ordinance or conform to the prescriptive measures contained in Appendix F.

These requirements may be partially or wholly waived, at the discretion of the City for landscape rehabilitation projects that are limited to replacement plantings with equal or lower water needs and where the irrigation system is found to be designed, operable and programmed consistent with minimizing water waste.

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SECTION II
PLAN REVIEW PROCEDURES

A. GENERAL

1. Landscape planting and irrigation plans must be prepared in compliance with approved development cases and appropriate design standards.

2. All materials must be submitted in a complete and final form. Incomplete submittals shall not be accepted for plan check and will be returned to the applicant.

3. All plans shall be prepared and signed by a Registered Landscape Architect or any person authorized by California State Law.

B. SUBMITTAL REQUIREMENTS

1. The applicant shall submit all required items to the One Stop Permit Counter. At a minimum, the following items shall be submitted:

   a. Completed Engineering Permit Application

   b. Plan Check Fee

   c. One (1) copy of approved discretionary plans and signed Resolution with conditions of approval *(if applicable)*

   d ❑ Four (4) sets of plans

2. The submittal package will be reviewed and approved, or one (1) set of plans, support information and correction lists will be returned to the applicant. Each subsequent plan check review submittal shall include all redlined copies of the plans, correction lists and any other information requested from the previous submittal.

C. SUBMITTAL EXPIRATION

1. Applications for which no permit is issued within one hundred eighty days following the date of application shall expire. The applicant will be notified that the case has been closed and a new application will be required to renew the project. To extend the application, the applicant must submit a request to the City Engineer for approval.

D. APPROVAL

1. Approval of an application shall be indicated through the issuance of a construction permit. No planting and irrigation work shall commence prior to the issuance of a construction permit.

2. **City or Homeowner Association-maintained areas.**

The following shall be completed prior to the issuance of a construction permit:

a. The irrigation plans shall be approved by the Irvine Ranch Water District.

b. The City Engineer shall indicate approval of the plans by signing the original title sheet.

c. After the City Engineer has signed the original title sheet, the applicant shall submit a minimum of four(4) sets of plans. These plans will be wet-stamped by the plan checker.

d. The applicant shall submit an Inspection Fee (the amount will be determined during plan check).

3. **All Other Areas**

The following shall be completed prior to the issuance of a construction permit:

a. The irrigation plans shall be approved by the Irvine Ranch Water District.

b. The applicant shall submit a minimum of four (4) sets of plans which will be wet-stamped by the plan checker.

c. The applicant shall submit an Inspection Fee (the amount will be determined during plan check).

E. REVISIONS

1. Revisions to approved plans must be approved by the City Engineer, prior to implementation in the field. To apply for a revision, the applicant must submit a letter of explanation and one (1) copy of the approved plan showing the revision, in red, to the One Stop Permit Counter. This will be reviewed and the applicant will be advised to either make corrections or follow one of the procedures below.

    a. For City-maintained or Homeowner Association-maintained projects, the original title sheet shall be submitted to the City Engineer, and upon approval, will be returned to the applicant. A minimum of four (4) complete sets of plans, including the title sheet, shall then be submitted and wet stamped by the plan checker.

    b. For projects that do not include City-maintained or Homeowner Association-maintained areas, a minimum of four (4) sets of plans shall be submitted and wet stamped by the plan checker.

F. BOND EXONERATION/CERTIFICATES OF OCCUPANCY

1. Prior to release of improvement bonds or issuance of Certificates of Occupancy, the project must be completed to the satisfaction of the City Inspector and the items listed in Section VIII.D.1.e shall be submitted.

G. RELATED PERMITS

1. Certain types of improvements which may commonly be shown on landscape plans shall be covered by an appropriate permit, as required by the Uniform Building Code, Uniform Plumbing Code, Uniform Electrical Code, or the City of Irvine Grading Ordinance. It is the applicant's responsibility to make certain that such improvements are properly permitted, prior to implementation in the field. Such permits are required in addition to permits issued for landscape construction. Further information regarding submittal requirements for related permits is available at the One Stop Permit Counter.

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SECTION III
DESIGN STANDARDS

A. GENERAL

1. The following Design Standards must be considered during the design of all projects and incorporated into plans and specifications, where applicable.

2. City owned areas must also be in accordance with the Standard Specifications for Public Works Construction. Whenever special requirements conflict on any subject matter, the City Engineer or his representative shall determine which special requirement will govern.

B. GRADING AND DRAINAGE

1. Parkway drainage and common area drainage will not be allowed to drain onto private property. Design must incorporate provisions to minimize drainage over sidewalks.. Concentrated flow shall not be allowed over curbs, sidewalks and property lines.

2. Subsurface drains shall connect into a storm drain system. A secondary drainage path must be provided where grate or dome inlet-type basins are used for drainage. Grate inlet-type basins shall not be used where leaves or other debris may clog the grates. Dome type grate covers shall be used in shrub/groundcover areas where leaves or other debris may clog the inlet. Steel drain lines shall not be used.

3. Turf areas shall have a minimum slope of 2% (except in athletic fields) and a maximum slope of 20%.

C. EROSION CONTROL

1. Cut slopes 2:1 and steeper, 5 feet or more in height and fill slopes 2:1 and steeper, 3 feet or more in height, shall require special design provisions to control erosion and runoff.

D. SIDEWALKS

1. Street sidewalks shall be constructed with a 4-foot minimum width, if parkway is between curb and sidewalk, or a 4 ½ -foot minimum width when adjacent to curbs. If cars are to overhang a sidewalk when parked, the walk shall have a 6-foot minimum width.

2. Sidewalks adjacent to the curb shall have a cross slope of ¼ inch per foot. It will be necessary to provide grades and alignments on concrete sidewalks within parkways, in accordance with the design features desired.

3. Sidewalks shall be constructed in accordance with City Standard Plan No. 201.

4. Special paving shall not be allowed in street sidewalks without prior approval of the City Engineer.

5. Handicap ramps shall be provided, as required, at street intersections and at other locations where sidewalks terminate at full height curbs, and shall comply with City Standards, Title 24 and ADA.

E. BIKE TRAILS

1. Bike trails shall be designed in accordance with the *"Guidelines for Bicycle Facilities in Irvine."*

2. Structural sections and pavement types shall be as recommended in the soils report. Expansive soil conditions shall be considered in the design.

3. All asphalt concrete shall have a maximum aggregate size of ½ inch and shall be a minimum of Type III.

4. All asphalt concrete type surfaces shall receive an asphalt type seal coat, prior to acceptance by the City.

F. VEHICULAR SIGHT REQUIREMENT

1. Landscape areas at street intersections or driveways shall be designed in accordance with City Standard Plan No. 403.

G. MEDIANS AND PARKWAYS

1. Turf areas of parkways shall be a minimum of 6 feet wide. Shrub or groundcover areas in medians shall be a minimum of 3 feet wide.

2. Medians shall have a cross slope of 2% and shall be graded to prevent concentrated flows over curbs.

3. High water use plants, characterized by a plant factor of 0.7 to 1.0, are prohibited in street medians.

4. The use of turf in medians is not allowed. Synthetic turf requires approval of the City Engineer.

H. IRRIGATION

1. All irrigation systems shall be designed to meet or exceed the water budget requirements contained within California Assembly Bill 1881 *(Model Water Efficient Landscape Ordinance)*. Water budget calculations shall be submitted with each landscape plan in accordance with Appendix E.

2. All irrigation systems shall be designed to minimize vandalism (with special consideration in parks).

3. Water velocity in system shall not exceed 5 feet per second.

4. All irrigation systems shall have the design capability of delivering 1 ½ inches of water in a four (4)day period. Watering time per day shall be no greater than eight (8) hours.

5. If two or more controllers are supplied by a single water meter, the irrigation system shall be designed so the performance standards herein can be met with the combined maximum flow of all controllers operating concurrently.

6. City-maintained irrigation systems shall be designed to connect to the *Rain Bird Maxicom* Central Computer Controller by a non-dedicated phone line and shall include flow sensing capabilities,, or shall be a smart controller with flow sensing capabilities as approved by the City

7. Non-City maintained irrigation systems shall use Weather based irrigation controllers, soil moisture based or other self adjusting irrigation controllers. Irrigation systems shall be designed to apply water at a rate which does not exceed the infiltration rate of the soil, prevents ponding, runoff, low head drainage, oversrpray, or other similar conditions where irrigation water flows onto non-targeted areas.

8. Irrigation systems shall be designed to meet the peak moisture demand of all plant materials used within the design area. Individual station run time shall meet peak evapotranspiration (E.T.) rate.

   Hydrozone remote control valves based on high medium and low water use, slope, exposure and precipitation rates

9. On all slopes or mounded areas requiring irrigation, lateral lines shall be installed parallel, with contours. Provide separate remote control valves for sprinkler lines

operating systems at the top, toe and intermediate areas of slopes. Precipitation rates on slopes greater than 25% shall not exceed 0.75 inches per hour.

10. Irrigation systems shall be designed to ensure the dynamic pressure at each emission devise is within the manufacturers recommended pressure range for optimal performance.

11. Irrigation systems shall be designed to provide uniform coverage throughout each system.

12. System design pressure shall not be greater than lowest available pressure during the previous two-year period in accordance with IRWD records.

13. Sprinkler heads:

    a. All sprinkler heads shall be spaced to not exceed 50% of the manufacturer's recommended spray diameter (head to head coverage).

    b. In large turf areas and any area exposed to consistent winds, sprinkler heads shall be spaced to not exceed 45% of the spray diameter.

    c. Sprinkler head spacing shall not exceed the width of the landscape area.

    d. Large turf sprinklers with different patterns or different precipitation rates shall be operated by separate remote control valves.

    e. Sprinkler heads used in turf play areas shall be equipped with protective covers.

    f. Sprinkler heads adjacent to hardscape elements shall be installed on swing joints or other riser protection device and be pop-up types.

    g. All sprinkler heads (except for on-grade systems) for City and Homeowner Association Projects shall be pop-up type.

14. Master valves shall be provided for City and Homeowner Association Projects.

15. Manual shut-off valves shall be provided to isolate various sections of the system independent of the entire system, and on the supply side of a line beneath a street.

16. Backflow prevention:

    a. All backflow prevention devices shall comply with requirements of Title 17 of the California Administrative Code, Orange County Health Department,

IRWD, and City of Irvine.

b. System design shall prevent any back siphonage after system valves are closed.

c. Backflow prevention devices are not permitted on irrigation systems using reclaimed water.

18. Remote control valves:

    a. The following criteria shall be used for locating remote control valves:

        1) Locate valves in groundcover or shrub areas, when possible.

        2) Locate valves outside of designated athletic play areas.

        3) Locate valves adjacent to paving, to facilitate access.

        4) For slopes, locate valves at the toe of slope whenever possible, otherwise, locate valves at the top of slope.

19. Quick coupling valves:

    a. Provide quick couplers a minimum of 100 feet on center in recreational areas and 200 feet on center in general landscaped areas. Provide one (1) quick coupler within 12 inches of paved end sections of landscape medians, and at the end of main line runs 200 feet and longer. Quick coupler valves shall be installed in green, round plastic gate valve boxes.

    b. Quick couplers shall be located outside of designated athletic play areas and within an area of 12 to 18 inches from hardscape where possible.

    c. Provide two (2) quick coupling valves at each baseball field. Valves to be located at first base and third base adjacent to fence or dugout.

20. Stub-out requirements for future systems extending beyond the limits of the current project for City projects shall be determined by the City Engineer.

21. Low volume irrigation systems shall include pressure regulation and straining equipment, in accordance with the manufacturer's recommendations.

22. Check valves or anti-drain valves) shall be installed on all irrigation systems. For City and Homeowner Association projects, in line anti-drain valves shall be installed in approved valve boxes.

23. Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.

24. Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.

25. Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system. A project applicant shall refer to the applicable local agency code (i.e., public health) for additional backflow prevention requirements.

26. Flow sensors that detect high flow conditions created by system damage or malfunction are required for all on non-residential landscapes and residential landscapes of 5000 sq. ft. or larger.

27. Master shut-off valves are required on all projects except landscapes that make use of technologies that allow for the individual control of sprinklers that are individually pressurized in a system equipped with low pressure shut down features.

28. In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.

29. Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to hardscapes or in high traffic areas of turf grass.

30. (S) Check valves or anti-drain valves are required on all sprinkler heads where low point drainage could occur.

31. Areas less than ten (10) feet in width in any direction shall be irrigated with subsurface irrigation or other means that produces no runoff or overspray.

32. Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if the landscape area is adjacent to permeable surfacing and no runoff occurs.

33. Slopes greater than 25% shall not be irrigated with an irrigation system with a application rate exceeding 0.75 inches per hour

34. A separate electric meter for irrigation components only shall be installed on all City-maintained landscapes.

I. PLANTING

1. All plant material shall be in accordance with the appropriate ordinances, resolutions and specification established by the City.

2. All plant material shall be in conformance with Master Streetscape Plan where applicable. The City retains the right to prohibit any plant material generally known to require excessive maintenance because of factors such as, but not limited to, disease, pest control, troublesome root development, ultimate size, and difficult growth habits.

3. Planting shall adhere to the City of Irvine Sustainability in Landscaping Ordinance, and Guideline Manual

4. Parkways adjacent to industrial, commercial and institutional areas shall be maintained by the property owner.

5. No trees shall be planted within the right-of-way in industrial area parkways, unless otherwise approved by the City Engineer.

6. In addition to minimum setback requirements for certain species as shown on the Tree List, the following minimum distances shall be required:

    a. Three (3) feet from any City maintenance limit line.

    b. Four (4) feet from any utility, including but not limited to storm drains, sewers, gas, water lines, meter vaults, and catch basins.

    c. Four (4) feet from fire hydrants.

    d. Twenty (20) feet from street lights, unless otherwise approved by the City Engineer.

    e. Tree limbs must have a clearance of 14.5 feet over streets, 8 feet over bicycle trails, and 7 feet over pedestrian-traveled ways.

7. Minimum sizes of trees shall be fifteen (15) gallons or as approved by the City Engineer.

8. The use of invasive or noxious plant species is discouraged.

9. Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape

J. LIGHTING

1. All accent lighting shall be located on private property unless otherwise approved by the City Engineer.

2. All street, park, trail, and paseo lighting shall be vandal-resistant, and have high pressure sodium vapor lamps in accordance with City of Irvine Community Services Department requirements.

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SECTION IV
FINAL WORKING DRAWING PREPARATION

A. GENERAL

1. The following minimum base information shall be required on all plans:

    a. Location Map showing the following:

        1) Street configuration within or adjacent to the tract or project.

        2) Street names.

        3) North arrow.

        4) Match lines, *if applicable*.

        5) Project limits.

        6) Tract or parcel boundaries.

        7) Scale.

    b. Index of sheets.

    c. Location of existing and proposed street curbs, driveways, parking lots, buildings, walls, light fixtures, utilities, sidewalks and water features.

    d. Right-of-way lines, property lines and easements.

    e. Street names and adjacent properties identified by address and/or tract or parcel number.

    f. Identification of maintenance responsibility.

    g. Reference to City permit numbers for all existing and proposed improvements within and adjacent to the project boundary. Reference shall include the type of improvements and the responsible party for the improvements.

2. The following minimum drafting standards shall apply to all projects:

    a. Plans shall not exceed 30 inches x 42 inches.

    b. All sheets shall be numbered consecutively, and the total number of sheets shall be indicated on each sheet (i.e., 4 of 8).

c. Plan scale shall be a minimum of 1 inch = 20 feet, plan scales of 1 inch = 30 feet may be used only with prior approval.
d. North arrows and graphic scales shall be clearly displayed on each sheet.

e. Letter spacing and weight shall be such as to insure legible reproduction from microfilm.

f. Graphic key maps and/or appropriately labeled match lines shall be provided on each sheet to adequately reference and identify the relationship to other sheets.

3. Projects which include City-maintained and/or Homeowner Association-maintained areas shall be on 30 inches x 42 inches size sheets and shall use the City of Irvine Standard Title Sheet or equal containing the following information:

a. Vicinity Map showing nearest arterial intersection, street names, north arrow and project location.

b. Location Map.

c. Index of Sheets.

d. Standard General Notes.

e. Completed Title Block.

f. Summary of Maintenance Responsibilities.

	City-Maintained	Association-Maintained	Other-Maintained	Total
Turf				
Groundcover				
Hardscape				
Other				
Other				
Other				
Total				

4. Plans that include both city maintained and non-city maintained areas shall have non-city maintained areas screened to highlight city areas.

B. IRRIGATION PLAN

1. The following shall be included on all irrigation plans:

    a. A comprehensive legend showing all pertinent data for materials used in the system with reference to corresponding construction details.

        Legend shall include symbols for all materials used in the system and shall be cross-referenced on all irrigation sheets.

    b. A description and location of the electrical service which shall include:

        1) Point of connection to electrical service.

        2) High voltage line to the electric meter.

        3) Electric meter type, location, and address.

        4) Installation requirements and responsible parties.

    c. A description and location of the water service which shall include:

        1) Domestic vs. reclaimed service.

        2) Water meter size and address.

        3) Installation requirements and responsibilities of IRWD and the contractor.

        4) Available water pressure based on a two-year period, pursuant to IRWD records.

        5) Design pressure.

        6) Peak flow through meter (GPM).

        7) Total area served through the water meter in acres or square feet.

        8) Yearly water demand in acres/feet.

    d. Flow and precipitation rate at each remote control valve.

    e. Pressure loss calculations for each point of connection. Calculations shall show pressure loss for system with the highest pressure requirements.

f. Location of all existing and proposed surface structures.

g. Reference to City plan numbers for all existing and proposed improvements. Show and note depth of any utility line that may interfere with proposed construction. References shall include the type of improvement and responsible party for the improvement.

h. Location of existing trees and requirements for performing work around them.

i. Tract or parcel numbers of adjacent properties.

j. Exterior drinking fountains, picnic benches and tables must be shown and identified on the reclaimed water irrigation plans. If no exterior drinking fountains are present in the design area, it must be specifically stated on the plans that none exist.

k. A description and location of all irrigation control system components.

2. Name, address and telephone number of supplier of computerized irrigation components providing five-year warranty.

3. Water budget calculations including maximum applied water allowance and estimated total water use in accordance with Appendix E.

4. Irrigation scheduling parameters and/or irrigation schedules necessary to program the specified controller(s), and demonstrate compliance with the water budget and watering windows.

C. PLANTING PLAN

1. The following shall be included on all Planting Plans:

    a. Edge of buildings on all adjacent properties.

    b. Plant material species, container size and quantity or spacing.

    c. Standards for tree caliper, height and spread.

    d. Location of all existing and proposed surface structures.

    e. All existing easements and utilities shall be shown and labeled.

    f. Tract or parcel map number of adjacent properties.

    g. Reference to Precise Grading Plan and/or Improvement Plans.

    h. Vehicular sight lines at all intersections and driveways onto streets in accordance with City Standard Plan No. 403.

    i. Specification for mulch.

    j. Delineate and label each hydrozone as low, moderate, high water or mixed water use.

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SECTION V
IRRIGATION SPECIFICATIONS

A. GENERAL

1. Scope of Work

The Contractor shall furnish all labor, materials, equipment and services necessary to install the irrigation system as indicated on the approved plans and specified herein and shall perform all other incidental work necessary to meet the intent of this Specification and the approved plans including the following:

a. Furnish and install all pipelines and fittings.

b. Furnish and install automatic controller, all electrical connections and control wiring.

c. Furnish, assemble and install material described in this specification and as indicated on the drawings.

d. Excavate and backfill trenches.

e. Test and adjust system.

f. Ninety-day maintenance.

g. One-year guarantee. (Refer to Appendix "A" for Guarantee form.)

2. Prior to Start of Work

a. The Contractor shall carefully check all grades and existing utilities to determine that work can safely proceed, keeping within the specific material depths with respect to finish grade and drainage.

b. The Contractor shall verify that irrigation systems can be installed in strict accordance with all pertinent codes and regulations, the original design, standards and manufacturer's recommendations.

c. The Contractor shall inspect the installed work of all other trades and verify that all such work is complete to the point where the irrigation system installation may properly commence.

3. Water Service

The Contractor shall coordinate with Irvine Ranch Water District for connections to the water supply and/or installation of water meters at the locations shown on the approved plans. Minor changes caused by actual site conditions shall be made at no

additional cost to the City. All changes to the plans shall be approved by the City Engineer.

4. Electrical Service

   The Contractor shall coordinate with Southern California Edison for connections to electrical service and/or installations of conduit, electrical wiring and meter pedestal at the locations shown on the approved plans. Minor changes caused by actual site conditions shall be made at no cost to the City. All changes to the plans shall be approved by the City Engineer.

5. Physical Layout

   a. The irrigation plans are diagrammatic. All scaled measurements are approximate. 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.

   b. Prior to installation, the Contractor shall layout all pressure supply lines, routing and location of sprinkler heads, making minor adjustments required due to differences between the site and approved plans. Irrigation head spacing as shown on the approved plans shall not be exceeded. Where piping is shown on drawings under paved areas but running parallel and adjacent to planted areas, install the piping in planted areas. All layouts shall be certified by the irrigation system designer and approved by the City Inspector prior to installation.

   c. The Contractor shall coordinate the installation of all irrigation material with the planting plans to avoid interfering with existing or new plants.

6. Substitutions

   a. Specific reference to manufacturers' names and products specified in this Section are used as standards. This implies no right to substitute other materials or methods without written approval of the City Engineer. Any proposed substitution of a product shall be submitted to the City Engineer or his designated representative for approval prior to installation.

   b. Installation and warranty of an approved substitution shall be Contractor's responsibility. Any changes required for installation of an approved substitution must be made to the satisfaction of the City without additional cost to the City. Approval by the City of substituted equipment and/or dimension drawings does not waive these requirements.

7. Record Drawings

a. The Contractor shall maintain record drawings on the job site at all times. He shall record accurately on one set of record drawings all changes in the work constituting departures from the original approved drawings. The changes and dimensions shall be recorded in a legible and workmanlike manner to the satisfaction of the City Inspector. Dimensions shall be from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavements, etc.). Data to be shown on record drawings shall be recorded day to day as the project is being installed. All lettering on drawings shall be minimum 1/10-inch in size.

The record drawings shall show the location and depths of the following items:

1) Points of connection.

2) Routing of pressure lines (dimension at least every 100 feet along routing).

3) Gate valves.

4) Remote control valves.

5) Quick coupling valves.

6) Routing of control wires.

7) Pressure reducing valve/strainer assembly.

8) Water and electric meters.

9) Controllers.

10) Irrigation interconnect.

11) Cluster control units.

12) Sleeves.

13) Central control field components.

14) Pump.

8. Submittals.

   a. The following items shall be submitted to the City Inspector prior to performing any work:

      1) Materials List

         Complete materials list that shall include the manufacturer, model number and description of all materials and equipment to be used and shall use the following format *(double-space between each item)*.

Item No.	Description	Manufacturer	Model
	Pressure supply line	Lasco	Schedule 40
	Turf head	Rainbird	1800
	Etc.	Etc.	Etc.

      2) Notarized Certificates

         Notarized certificates from plastic pipe and fittings manufacturer indicating that material complies with the specifications unless material has been previously approved.

9. Protection of Work and Materials

   a. Contractor shall protect his work and the work of others for the duration of the contract. He shall protect pipes and fittings from direct sunlight and avoid undue bending and any concentrated external loading. Beds on which pipe is stored shall be full length of pipe. Pipe or fittings that have been damaged shall not be used.

   b. Contractor shall exercise extreme care in excavating and working near existing utilities. Damage to utilities which are caused by Contractor's operation shall be the Contractor's responsibility.

   c. Contractor shall take necessary precautions to protect site conditions and plant material that is to remain. Should damage be incurred, Contractor shall repair damage to its original condition or furnish and install equal replacements.

   d. All existing irrigation systems shall be kept in operation at all times. If the existing system is damaged by Contractor, he shall be responsible for immediate repair of such damage. After each repair, all heads of the repaired

system shall be removed so that the lines can be cleared of all dirt and foreign matter.

10. Correction of Work

    a. Any and all discrepancies or unsatisfactory work shall be corrected by Contractor at no additional expense to City. The correction of work shall be finished within a reasonable period mutually agreed upon between the City and Contractor.

11. Clean-Up

    a. Clean-up shall be made by Contractor as each portion of work progresses. Refuse, extraneous material and excess dirt shall be removed from the site, all walks and paving shall be swept clean , and any damage to the work of others shall be repaired to original condition at no cost to the City.

    b. Upon completion of the work, Contractor shall smooth all ground surfaces; remove excess materials, rubbish, debris, etc., sweep adjacent streets, curbs, gutters, walkways and trails; and remove construction equipment from the premises.

B. PRODUCTS AND INSTALLATION

1. Materials and Equipment

    a. Materials and equipment installed or furnished shall be new. Any materials or equipment that do not meet the City standards shall be rejected and shall be removed from the site at no expense to the City.

2. Pipe (General)

    a. Pressure supply line from point of connection through backflow prevention unit for domestic water systems, and through the strainer/pressure regulator assembly on reclaimed water systems shall be brass, copper or other materials approved by the City.

    b. All PVC pipe and fittings shall comply with the Irvine Ranch Water District's specifications.

    c. All threaded pipe shall be threaded by the manufacturer of the pipe.

3. PVC Pipe and Fittings

a. Pressure supply lines and fittings 1 ½ inch diameter and smaller, downstream of backflow prevention unit on domestic water systems or strainer/pressure regulator assembly on reclaimed water systems shall be Schedule 40 PVC connected with primer and solvent cement pursuant to manufacturer's specifications. Fittings shall be manufactured by *Dura* or approved equal with gusseted 90's and tees.

PVC pipe 2 inch, 2 ½ inch and 3 inch in diameter shall be Class 315, connected with primer and solvent cement pursuant to manufacturer's specifications. Fittings shall be manufactured by *Dura* or approved equal with gusseted 90's and tees.

PVC pipe 4 inch and larger in diameter shall be Class 200, connected with rubber gasketted bell and spigot connections. The insertion mark shall be visible to show proper depths into spigot. Thrust blocks shall be provided at each angle and shall be installed in accordance with the manufacturer's recommendations.

b. Non-pressure lines shall be Schedule 40 PVC.

c. Above-ground pipe and fittings shall be Ultra-Violet Resistant (UVR-PVC) installed in accordance with Standard Plans 502, 503 and 504.

d. Plastic pipe shall bear the following markings:

1) Manufacturer's name

2) Nominal pipe size

3) Schedule or class

4) Type of material

5) Pressure rating *(in psi)*

6) NSF seal of approval

7) Date of extrusion

e. PVC solvent weld fittings shall be Schedule 40.

f. Threaded nipples shall be standard weight Schedule 80 with molded threads.

g. Separate primer and solvent cement applications shall be required for all plastic pipe joints in accordance with manufacturer's recommendations.

h. Sprinkler head swing assemblies shall be triple swing units with Schedule 80 threaded nipples, Schedule 40 street ells with Male Iron Pipe Thread (MIPT) Inlet and Outlet. Lay length shall be 6 inches minimum. No marlex fittings are allowed.

4. Copper Pipe and Fittings

a. Copper pipe shall be Type "K," hard tempered ASTM B 88 and fittings shall be wrought solder joint type in accordance with ANSI B16.22. Joints shall be soldered with silver solder, conforming to ASTM B 206.

5. Brass Pipe and Fittings

a. Brass pipe shall be 85% red brass, ANSI, Schedule 40 screwed pipe. Fittings shall be medium brass, screwed 125-pound class.

6. Galvanized Steel Pipe and Fittings

a. Galvanized steel pipe and fittings are not allowed unless prior approval is given by City Engineer. Underground installations will not be allowed under any circumstances.

7. Asbestos-Cement Pipe (ACP) and Fittings

a. Asbestos-cement pipe and fittings are not allowed unless prior approval is given by the City Engineer.

8. Trenching

a.. Mechanical trenching machines shall be of an approved type to cut trenches with straight sides. Pipes shall be supported continuously on the bottom of the trench and shall be laid to an even grade. Trenching excavation shall follow layout approved by the City Inspector and as indicated on the approved plans. Trenches shall be in accordance with Standard Plan No. 500 and 501.

b. Where it is necessary to excavate adjacent to existing trees, the Contractor shall avoid injury to trees and roots. Excavation in areas where 2 inches and larger roots occur shall be done by hand. All roots 2 inches and larger in diameter shall be tunneled under and shall be heavily wrapped with burlap to

prevent scarring or excessive drying. Where a ditching machine is run close to trees having roots smaller than 2 inches in diameter, a wall of the trench adjacent to the tree shall be hand-trimmed, making clean cuts through roots. Roots 1 inch and larger in diameter shall be painted with two coats of *Tree Seal* or equal. Trenches adjacent to trees should be closed within 24 hours; where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.

9. Pipe Installation

    a. Carefully inspect all pipes and fittings before installation, remove all dirt, scale, burrs and reaming. Install pipe with all markings facing up for visual inspection and verification.

    b. Contractor shall install concrete thrust blocking using AWWA standards for location and installation criteria.

    c. All lines shall have a minimum clearance of 4 inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.

    d. Allow solvent welds at least 15 minutes set-up time before moving or handling and 24 hours curing time before backfilling.

    e. 360° applicators shall be used to apply primer and solvent on sizes 2 ½ inches and larger in diameter.

    f. Centerload all PVC pipe prior to pressure testing to resist displacement.

    g. All threaded PVC to PVC connections shall be assembled using teflon tape or approved equal.

    h. Threaded PVC female fittings shall not be used with brass or copper. Use a non-hardening pipe dope on all threaded plastic-to-metal connections, except where noted otherwise.

10. Backfilling

    a. Trenches shall not be backfilled prior to approval of all required tests unless specifically directed by City Inspector for trenches that represent an unsafe situation. *Refer to Section C. Adjustments and Testing herein for required testing procedures.*

b. Excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand, or other approved materials shall be free from clods of earth or stones larger than 1 inch in diameter, shall be tamped in 4 inch layers under the pipe and uniformly on both sides extending the full width of the trench and the full length of the pipe. Materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be mechanically compacted to a dry density equal to adjacent, undisturbed soil in landscaped areas and shall conform to adjacent grades. Under no circumstances shall truck wheels by used to compact soil.

c. Initial backfill on all lines shall be of fine granular material with no foreign matter larger than ½ inch diameter .

d. Jetting is an acceptable method of compacting trenches when recommended in the approved soils report.

11. Pipe Installation beneath Paved Areas

a. Pipe under pavement shall be installed in accordance with City Standard Plan No. 223 and 501. Sleeves shall extend a minimum of 6 feet beyond such pavement. In-line fittings, including couplings, shall not be permitted under paved surfaces except where the length of the line under paving is 20 feet or greater. The ends of sleeves shall be capped hand-tight until piping is laid.

b. Sleeves under existing pavement may be installed by jacking, boring or hydraulic driving. No hydraulic driving is permitted under asphalt concrete pavement at depths less than 36 inches.

12. Backflow Prevention Unit

a. Reduced pressure type backflow preventor shall be as manufactured by *Neptune, Cla-val, Febco* or approved equal. Unit shall be equipped with ball valves.

13. Basket Strainer

a. Basket strainer shall be a *Watts Model #316SS* or a Watts Model 97FB FSSIB with flanged stainless steel body and 20 mesh stainless steel screen; basket shall have 1/10 perforations. Basket strainers shall be installed in accordance with Standard Plan No. 505.

14. Pressure Regulation Valve with Master Valve

a. Pressure reducing valve shall be *Cla-val Model 93-01G/BCHSY-KC with pressure reducing solenoid Model Number ASCO#8320G132 24v AC,*

normally open energize to close master valve with 30-300 psi pressure adjusting range or approved equal. . Spring range and pressure setting shall be as noted on irrigation drawings. Pressure reducing valves shall be installed in accordance with Standard Plan No. 505.

15. Remote Control Valve

a. Remote control valves shall be epoxy-coated *Griswold 2000 Series* or approved equal and shall be installed in accordance with Standard Plan No. 510.

16. Gate Valve

a Gate valves, 2 inch diameter or smaller, shall have bronze bodies, rising stems and brass cross handles. Gate valves shall be *Nibco Class 125, T-111,* threaded or approved equal installed in accordance with Standard Plan No. 506.

b. Gate valves, 2 ½ inch diameter and larger, shall be AWWA approved and have flanged connections, a 2-inch square operating nut, epoxy coated cast iron bodies resilient wedge gate and stainless steel fasteners and have an arrow cast in metal indicating the direction of water flow. Unit shall have stainless steel bolts, nuts and washers and full face gaskets for connecting flanges Gate valves shall be *Nibco F-619, Stockham G-612, Kennedy 561X,* or approved equal installed in accordance with Standard Plan No. 507.

c. *Class 312* stainless steel nuts and bolts with full face gaskets shall be used to connect all flanged connections.

17. Quick Coupler Valve

a For use on domestic water systems, quick coupler valves shall be Rainbird 44LRC or approved equal.

b. For use on reclaimed water systems, quick coupler valves shall be in accordance with IRWD standards, with a purple hinged cover. Quick coupling valves shall be *Nelson 7645,* or approved equal.

c. Quick coupler valves shall be installed in accordance with Standard Plan 508.

18. Check Valve

a. Spring-loaded check valves shall be of plastic construction with soft composition discs. Spring tension shall be adjustable from 4 psi to 15 psi.

They shall be located in the swing assembly or shall be integral with sprinkler body. Check valves shall be *Valcon ADV, Rainbird SAM, Hunter* or approved equal.

19. Valve Box

a. Valve boxes shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical action of soils. They shall be green in color. The cover shall be secured with a stainless steel bolt down mechanism. The cover shall be capable of sustaining a load of 1,500 psi. Valve box extensions shall be by the same manufacturer as the valve box. All valve boxes shall be as manufactured by *Ametek, Carson*, or an approved equal. Covers shall be heat branded with 2 inch high letters in accordance with the appropriate Standard Plan.

b. Valve boxes for the basket strainer/pressure regulating valve assembly shall be sized to fit the assembly including sufficient working space to repair or remove the unit installed in accordance with Standard Plan 505. Strainer/pressure regulating/master valve assemblies 3-inch and largershall require a concrete vault with a spring assisted galvanized steel cover as manufactured by Jensen Precast W-3048 series.

20. Equipment Enclosure

a. All equipment enclosures for pumps, backflow preventors and controllers shall be vandal-resistant of stainless steel construction. Enclosures shall be manufactured by *Strong Box, V.I.T. Sales*, or approved equal.

b. Automatic controller enclosures shall have louvered vents covered by a brass or stainless steel screen mounted inside the enclosure.

21. Automatic Controller

a. Automatic controllers for City-maintained irrigation systems shall be *Rainbird ESP-SAT* installed in accordance with the appropriate standard plan or approved equal.

b. All controllers shall be pedestal-mounted type for exterior installation or wall-mounted type for interior installations only.

c. Controllers shall have a 120-volt pump starter relay integral to the controller whenever pumps are required.

d. All controller components shall be fused and have a chassis ground.

e. All controllers shall be equipped with a permanently mounted remote control receiver outlet plug on the exterior of the cabinet. Contacts shall be gold-plated, compatible with *Rainmaster* units. The number of outlet plugs shall be sufficient to operate all stations on the controller. Wiring shall be done in such a manner to allow remote control electric control valve operation and flow sensor override.

f. All controllers shall be equipped with a 4 inch x 4 inch electrical junction box with an on/off switch, and a grounded receptacle mounted inside the enclosure.

g. Ground rod shall be placed 3 feet from the controller enclosure.

h. Controllers shall be located behind shrubs and/or adjacent to hardscape. Overspray onto controllers shall not be accepted. Unobstructed maintenance access shall be provided to the controller.

i. The location of the controllers shall be as shown on the approved plans and shall be approved by the City Inspector before installation. The electrical service shall be coordinated with this location.

j. City-maintained controllers shall have the irrigation interconnect terminating inside the controller enclosure. All conduits and wiring shall enter the enclosure from the bottom.

22. Electrical Meter Pedestal

a. Electrical meter pedestals shall be fully enclosed. The pedestal shall be *Type O* and be constructed of stainless steel. Where possible, the electrical meter and irrigation controller shall be combined in one enclosure, as manufactured by *Strong Box, V.I.T. Sales* or approved equal. Stand-alone electrical meter pedestals shall be manufactured by *Pacific Utility Products* or approved equal.

b. The electrical meter enclosure shall have the meter address placed on the outside of the enclosure visible from the street. The address shall be engraved on black, U.V.-resistant acrylic with 1" engraved white letters and numbers.

23. Electrical High Voltage

a. All electrical equipment shall be *NEMA Type 3*, water-proofed for exterior installations.

24. Control Wire

a. Control wires shall be direct burial, 600 volt, 14 gauge minimum. Control wires shall be a different color wire for each remote control valve within each

automatic controller. Common wires shall be white with a different color stripe for each automatic controller. Each controller shall have an independent common wire.

b. Connections shall be grease-type connectors, *3M DBY Direct Bury Splice Kit PN-09053* or approved equal. Use one kit per connection.

c. Four (4) continuous spare control wires, blue in color and one (1) white common wire, shall be installed with all mainline from the controller enclosure to the ends of the mainline.

d. Control wires shall be installed in accordance with the approved plans appropriate Standard Plans.

e. Control wiring located beneath paved areas shall be installed in a separate schedule 40 PVC sleeve in accordance with Standard Plan No. 501.

f. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible. Lay to the side of pipeline. Control wires shall be laid loosely in the trench without stress or stretching to allow for contraction of wires. Where more than one (1) wire is placed in a trench, the wiring shall be taped together at intervals of ten (10) feet.

g. Field splices between the automatic controller and electrical control valves shall not be allowed without prior approval of the City Inspector. Splices shall be vaulted in accordance with Standard Plan 517 and noted on record drawings. An expansion curl of 24 inches shall be provided at each field splice.

25. Large Turf and Groundcover Sprinkler Heads (40 foot – 65 foot Radius)

a. Sprinkler heads for large turf and groundcover areas shall be gear-driven, rotary-type pop-up. The body shall be constructed with 1 inch N.P.T. bottom inlet. Piston shafts shall be stainless steel. Sprinkler nozzle shall pop up a minimum of 5 inches with positive spring retraction. Sprinkler heads shall be, *Rainbird 7005* or approved equal installed in accordance with Standard Plan No. 522.

26. Medium Turf and Groundcover Sprinkler Heads (16 foot – 39 foot Radius)

a. Sprinkler heads for medium turf and groundcover areas shall be gear-driven, rotary-type pop-up. The body shall be constructed with ¾ inch N.P.T. bottom inlet. Sprinkler nozzle shall pop up a minimum of 5inch with positive spring retraction. Piston shafts shall be stainless steel. Sprinkler heads shall be,

Rainbird 5000 or approved equal installed in accordance with Standard Plan No. 521 or 522.

27. Small Turf and Groundcover Sprinkler Heads (3 foot – 15 foot Radius)

a. Sprinkler heads for small turf and groundcover areas shall be *Rainbird 1800 SAM-PRS-1800 Series* or approved equal installed in accordance with Standard Plan No. 522. U-Series nozzles shall be used in turf areas.

b. All heads shall be a minimum 6-inch pop-up for turf areas, 12-inch pop-up for groundcover areas.

28. Sprinkler Heads for on-Grade Systems

a. Sprinkler heads for on-grade systems shall be the shrub head type of those sprinkler described above installed in accordance with Standard Plan No. 520. Impact drive heads shall not be allowed.

29. Low-Volume Irrigation, use approved by City Engineer

a. Control valves shall be epoxy coated Griswold 2000 series or *Hardie Ultra Series* or approved equal. Inline plastic drip pressure regulator shall be Senninger Model PMR-30MF or approved equal. Flow and PSI rating shall be as specified on the plans.

b. Strainer shall be *PVC WYE* type with 150 mesh stainless steel screen with integral ball flush and down stream pressure gauge as manufactured by *Salco Products, Inc.* or approved equal. Flush out assembly shall be Spears Model 2622-005 with ball valve assembly or approved equal.

c. Emitters shall be Salco Model PCC-05 with flow and pressure ratings as specified on the plans

d. Above ground distribution pipe shall be UV rated polyethylene (PE) piping with purple stripe as manufactured by Irritrol “Dra-pol” Model #EHP2057-050-d or approved equal.

30. Pumps

a. The contractor shall submit full data on all pumps for approval prior to

installation.

b. All pump motors shall be three-phase and activated by by Data Industrial Series 200 insertion flow sensor and Data Industrial Series 1500 digital flow monitor

c. All pumps shall be protected with the following:

1) Low suction pressure shutdown.

2) Low system pressure shutdown.

3) High suction pressure shutdown.

4) No flow shutdown shall activate a vandal-resistant warning light on the exterior of the enclosure. Deactivation of the warning light shall be performed by a reset switch.

d) Pump volute and impeller shall be of a bronze construction.

e) All pipe and fittings within the pump assembly shall be of stainless steel, brass, bronze or copper material.

f) All flanges shall be slip-joint type connected with stainless steel nuts and bolts.

g) All enclosures shall be constructed of stainless steel material. In pump locations adjacent to residential units, sound attenuation measures shall be taken.

h) Pump assemblies located next to a wall or structure shall be installed to provide clearance for servicing the unit.

i) The pumping system shall be simplex water pressure booster system as designed and fabricated by Barrett Engineered Pumps or approved equal. The system shall be a completely prefabricated system with pump, piping, electrical and structural elements.

j) The services of a factory representative or trained service professional shall be made available on the job site to check installation and perform the startup and instruct operating personnel. A startup report containing voltage and amperage readings, suction and discharge pressure readings, estimated flow conditions, and general operating characteristics shall be submitted to the owner's

representative prior to project acceptance.

C. ADJUSTMENTS AND TESTING

1. Main Lines

   a. Pressure Test

      1) All hydrostatic tests shall be made in the presence of the City Inspector. No pressure line shall be backfilled until it has been inspected, tested and approved by the City Inspector.

      2) All gate valves shall be fully open for testing. Remote control valves must not be installed. All pressure lines shall be tested under a hydrostatic pressure of 150 psi for a period of not less than two hours. If leaks develop, joints shall be replaced and the test repeated until entire system is proven watertight.

   b. Flushing

      Mains shall be flushed and trenches dried after the pressure test to the satisfaction of the City Inspector before installation of remote control valves, quick-coupler valves, or pressure-relief valves and before backfilling trenches. All pipes shall be center-loaded.

2. Lateral Lines

   a. Prior to installation of sprinkler heads and after all lateral lines and risers are connected, the valves shall be opened and a full head of water used to flush the lines and risers. Flushing shall be performed in the presence of the City Inspector until flow is clean and free of all foreign material.

3. Adjustment of the System

   a. The Contractor shall adjust all irrigation components in accordance with manufacturer's specifications, approved plans, and appropriate Standard Plans to achieve optimum performance and to prevent overspray onto walks, roadways, buildings and equipment as much as possible.

   b. All sprinkler heads and valve boxes shall be set perpendicular to finished grades unless otherwise designated on the plans.

4. Coverage Test

    a. A coverage test shall be performed in the presence of the City Inspector after the Contractor has made all adjustments to the irrigation system. No hydroseeding or planting shall occur until the City Inspector has determined the water coverage for planting areas is complete and adequate. Refer to Appendix B for a Pre-Planting Irrigation Coverage Checklist.

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SECTION VI
COMPUTERIZED IRRIGATION CONTROL SYSTEM SPECIFICATIONS

A. GENERAL

1. All materials furnished and installed shall be new and shall conform to the Standard Specification for Public Works Construction, current edition, as adopted by the City.

2. All control equipment shall be pre-assembled and pre-wired by the equipment supplier/warrantor.
3. All materials, except interconnect conductors, shall have a five (5) year warranty. The Contractor shall submit proof of warranty to the City Inspector prior to the start of the maintenance period. It is the Contractor's responsibility to obtain the necessary warranty inspections from the equipment supplier. No installations will be accepted without proof of warranty.

4. All existing computerized irrigation control systems and all new computerized irrigation control system components shown on the plans shall be fully operational at final acceptance

5. All incidental parts which are not shown on the plans or specified herein but are necessary to complete or modify the existing systems shall be furnished and installed as though such parts were shown on plans or specified. All systems shall be in satisfactory operation at the time of completion.

6. Existing interconnect systems shall be maintained in effective operation by the contractor for the duration of the work. The Contractor shall notify the City Inspector 48 hours prior to performing any work on an existing system.

7. The Contractor shall coordinate with AT&T for connections to the telephone service and/or installations of conduit, telephone conductors, jacks and modems at the locations shown on the drawings. Minor changes caused by actual site conditions shall be made at no cost to the City. All changes to the plans shall be approved by the City Engineer.

B. PRODUCTS AND INSTALLATION

1. Irrigation Interconnect Conduit

    a. All irrigation interconnect conduit and conduit fittings shall be U.L. listed PVC Schedule 40, 2 inch diameter in size, unless otherwise noted.

    b. The conduit shall be located within the public right-of-way whenever possible. If the conduit is installed outside of the public right-of-way, an easement shall be provided to the City prior to City acceptance of the improvements.

c. Conduit runs shall be installed as shown in the approved plans. All changes shall be approved by the City Engineer prior to installation.

d. The ends of all conduits, whether shop or field cut, shall be reamed to remove burrs and rough edges. Cuts shall be made square and true. Slip joints on running threads shall not be permitted for coupling conduit.

e. The ends of the conduit shall be capped until the pulling of wiring is started. When caps are removed, the threaded ends of the conduit and conduit fittings shall be provided with conduit bushings.

f. Conduit bends, except factory bends, shall have radii of not less than 6 times the inside diameter of the conduit. Conduits that are crimped or flattened shall be rejected. Bending shall be done by methods recommended by the conduit manufacturer.

g. Conduit shall be laid to a depth of not less than 30 inches below finished grade in the landscaped areas and in paved areas. The conduit shall be a minimum of 6 inches below the bottom of pavement sections and shall have a minimum 6 inch clearance from other pipes or conduits. Conduit shall have a minimum 36 inch clearance from high voltage electrical utilities.

h. Prior to placement of conduit, a bed of clean sand, a minimum of 2 inches thick, shall be placed in the trench. A minimum of 4 inches thick layer of clean sand shall be placed over the conduit prior to backfill with additional material.

i. Existing underground conduit to be incorporated into a new system shall be cleaned with a mandrel or cylindrical wire brush and blown with compressed air.

j. A nylon or polypropylene pull rope with a minimum tensile strength of 500 pounds shall be installed in all conduits which are to receive future interconnect cable. At least 2 feet of pull wire shall be extended beyond each end of the conduit run and secured.

2. Irrigation Interconnect Conductors for Rainbird Maxicom

a. A two-wire path for the irrigation interconnect as required from each Cluster Control Unit (CCU) encoder to the satellite units shall be a twisted, shielded, 6-pair, No. 19 manufactured by *General Cable Company*, or it shall be double-jacketed, two-conductor cable with conductors tin coated, soft annealed, solid copper with 4/64 inch-thick PVC insulation. The two insulated conductors

shall be laid in parallel and encased in polyethylene having minimum wall thickness of 0.45 inch. The two conductors shall be color-coded with one conductor red and the other black. Wire shall be manufactured by *Paige Electric Corporation of Union, New Jersey* or approved equal.

b. Each controller, CCU, and sensor encoder shall be grounded by means that conform to the requirements of the National Electrical Code, current edition, as adopted by the City, and the manufacturer's specifications. No solder connections will be allowed. Resistance to ground shall be no greater than 5 ohms.

c. Flow meter wiring shall be Part #9516-2SP manufactured by Arizona Electric Fabricators (AEF) shielded 2 conductor stranded copper SWG 16 with AWG 16 drain wire provided for connection to display or analog transmitter unit. Rated to 105°C. May be extended to a maximum of 2000 feet. Wire shall be installed in a ¾ inch UL. PVC SCH 40 conduit.

d. All two wire path conductors shall be the same type and shall be of the sizes shown on the drawings as required for proper operation of the systems.

e. All conductors shall be placed in a 2 inch U.L. PVC Sch. 40 conduit with gray pull boxes every 200 feet.

f. All irrigation interconnect conductors shall be pulled by hand. Winches or other power-actuated pulling equipment shall not be used.

g. A total of two (2) feet of slack shall be left at each field satellite and within each pull box. Sufficient slack shall be left to allow the wire to extend 18 inches above the top of the pull box grade.

h. Small, permanent, identification bands shall be marked "*irrigation interconnect"* or as specified and securely attached to irrigation interconnect wires in each pull box near the termination of each wire. Permanent identification bands shall be embossed 6-mil oil resistant PVC tape with pressure-sensitive backing.

i. The irrigation interconnect wire shall be continuous from controller to controller. All splices shall occur within the controller enclosures unless specifically authorized by the City Engineer. All splices shall be made using approved connectors only. All splices shall be capable of satisfactory operation under continuous submersion in water. All splices shall be *3M* DBY connector packs or approved equal.

3. CCU-Encoder

a. The number and location of all CCU encoders shall be as shown on the drawings and shall be as manufactured by *Rainbird Sprinkler Manufacturing Corporation.*

b. CCU Communication to Field Satellites

1. Two Wire Path: .Each CCU encoder shall have a separate two-wire path to the controllers under its control. This two-wire communication link shall be of the wire type, installed and tested as herein specified.

c. CCU Communication to Central Control Computer

1. Land Line: The CCU encoder shall connect directly to the telephone company lines via standard connector *Model RJ11C*, in full compliance *with Part 68, FCC docket 19528*, or *AT&T* SNI connector. Telephone service shall be provided by SBC.

2. Non Land Line Communications shall not be allowed with Rainbird Maxicom

d. The CCU encoder shall be housed in "Strongbox" stainless steel, weather-proof, vandal-resistant lockable enclosure with flush-mounted handles as manufactured by *Ted Sales, Inc*., or approved equal.

4. Pull Boxes

a. Pull boxes for the irrigation interconnect conduit and flow sensor wiring shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical action of soils. They shall be gray in color. The cover shall be secured with a stainless steel, bolt-down mechanism. The cover shall be capable of sustaining a load of 1500 psi. Pull box extensions shall be by the same manufacturer as the pull box. Pull boxes shall be *Ametek* with dimensions of 10 ¾ inches x 16 inches x 12 inches or approved equal. The cover shall be heat branded with two inch letters: "*IRR-COM"* for irrigation interconnect conduit and "FLOW-SEN" for flow sensor wiring. Boxes to be placed at intervals not to exceed 200 feet.

b. In paved areas, the pull box shall be *Brooks 3TL* concrete box with cast-iron traffic lid. The cover shall be marked with the letters "*IRR-COM" two (*2) inches high. Markings shall be applied to the cover prior to galvanizing.

c. Pull boxes shall be installed at intervals not to exceed 200 feet, at each location the installation of the conduit shall be phased and at each point where the conduit crosses a roadway, bridge, or railroad track.

d. Pull boxes shall be installed in areas to be landscaped, whenever possible.

e. Pull boxes shall be installed in accordance with City Standard Plan No. 518.

5. Satellite Controller

a. Satellite controllers shall be as manufactured by *Rainbird Sprinkler Manufacturer Corp or approved equal.* Each satellite controller shall be connected, via communication cable to a CCU for Rainbird Maxicom if specified in the irrigation plans. Each satellite controller shall be equipped with a radio remote interface and all necessary components pre-wired by the equipment supplier.

6. Flow Sensor

a. Flow sensor shall be *Series IR-200* as manufactured by *Data Industrial* and installed as recommended by the manufacturer. Flow sensor shall be capable of sensing programmed water flows during the operation of the irrigation system. Flow sensor shall be able to communicate to the central control system.

C. INSPECTION

1. Interconnect Circuitry

a. The contractor shall cause the following warranty tests to be performed by the equipment supplier on all electrical circuits, and shall submit a written approval from the equipment supplier to the City Inspector prior to the start of the maintenance period. All tests shall be made to the satisfaction of the City Electrical Inspector.

a. *Continuity* - Each two-wire communication circuit shall be tested for continuity.

b. *Ground* - Each two-wire communication circuit shall be tested for leaks to ground with an ohm meter after each interconnect circuit has been installed and connections have been made. No circuit checking lower than 1 megohm will be acceptable. Any underground splices must be buried in the soil and be water settled prior to this test. After the test is

completed, splices shall be removed from the soil and left exposed in the pull box for future access.
XIII.

c. *Functional* - A functional test performed by the equipment supplier shall be made to demonstrate that each and every part of the system functions as specified or intended. The test may commence only with the approval of the City Electrical Inspector.

The functional test for each new or modified electrical system shall consist of not less than five (5) days of continuous, satisfactory operation. Hard copies of the functional test schedule and site log showing satellite channel numbers will be provided at the beginning of the system test. If unsatisfactory performance of the system develops, the condition shall be corrected and the test shall be repeated until the five (5) days of continuous satisfactory operation are obtained.

Starting of functional tests and turn-ons shall not be made on a Friday, or on the day preceding a legal city holiday. Shutdown caused by factors beyond the contractor's control shall not constitute discontinuity of the functional test.

d. *Faults* - Any material revealed by these tests to be faulty in part of the installation shall be replaced or corrected by the contractor at his expense in a manner permitted by the City Engineer, and the same test shall be repeated until no fault is evident.

e. Results of circuitry tests shall be recorded and submitted to the City Inspector prior to acceptance of the work.

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SECTION VII
PLANTING SPECIFICATIONS

A. GENERAL

1. Scope of Work

   a. Contractor shall furnish all labor, material, equipment, and services necessary to install all landscape planting as indicated on the approved plans and as specified herein, and shall perform all other incidental work necessary to accomplish the intent of this specification and the approved plans including the following:

      1) Fine grading, soil preparation, planting of trees, shrubs, vines, ground covers and lawn, guying and staking trees, and weed abatement.

      2) Ninety (90) day maintenance.

      3) One (1) Year guarantee.

   b. All irrigation work must be approved by the City prior to performing any work in this section.

2. Agronomic Soils Report

   a. After completion of rough grading and prior to soil preparation, the Contractor shall provide the testing of planting soils and composted organic humus materials by an independent agronomic soils testing laboratory that is a member of the California Association of Agricultural Labs. Representative soil samples shall be taken in the field and a written report shall be prepared by the soil scientist that shall include recommendations for soil amendments, pre-plant fertilization, hydromulch slurry, and post-maintenance fertilization program.

   b. Soil preparation specifications shall be prepared based on the test results and recommendations and must be approved by the City prior to soil preparation.

   c. Soil tests shall be performed after soil preparation to confirm that soil preparation was performed in compliance with preplant soils report and specifications. Compliance of Contractor's work with soil preparation specifications shall be determined solely by the City.

3. Protection of Existing Trees and Plants to Remain

   a. The Contractor shall not store materials or equipment, permit burning, operate or park equipment under the branches of any existing plant to remain.

b. The Contractor shall provide barricades, fences or other barriers, as determined by the City, to protect existing plants from damage during construction.

c. The Contractor shall notify the City Inspector in any case where the Contractor feels grading or other construction activities specified by the plans may damage existing plants.

d. If existing plants to remain are damaged during construction, the Contractor shall replace such plants of the same species and size as those damaged at no cost to the City. Determination of extent of the damage and the value of damaged plants shall rest solely with the City. Value loss will be calculated using the method established by the International Society of Arboriculture. Determination of whether to accept compensation through plant replacement or monetary settlement shall rest solely with the City.

4. Substitutions

a. Specific reference to manufacturer's names and products specified in this Section are used as standards. There is no implied right to substitute other materials or methods without written approval of the City Engineer. The Contractor shall direct written requests for substitution to the City Engineer.

b. Installation and warranty of any approved substitution shall be the Contractor's responsibility. Any changes required for installation of any approved substitution must be made to the satisfaction of the City without additional cost to the City. Approval by the City of a substitution does not waive these requirements.

5. Submittals

a. Prior to installation, the Contractor shall submit to the City Inspector one (1) copy of the manufacturer's literature, and laboratory analytical data for the following items:

1) Organic amendments (batch reports)
2) Import soil
3) Commercial fertilizer
4) Mulch
5) Plant material as to specie and variety

b. At the time of hydroseeding, the Contractor shall submit a one ounce sample of the certified seed mix and bill of lading for materials.

6. Product Handling

    a. The Contractor shall furnish standard products in manufacturer's standard containers bearing original labels showing quantity, analysis, and name of manufacturer. All containers and bags shall remain on site until work is completed.

7. Tree Delivery

    a. The Contractor shall notify City Inspector three (3) days prior to delivery of trees.

8. Clean-Up

    a. Upon completion of each phase of work under this section, the Contractor shall clean and remove from the area all unused materials and debris resulting from the performance of the work. All paved areas and walks within the project site shall be left in a clean and safe condition.

B. PRODUCTS

1. Plant Material

    a. All plants shall be of the size, variety, age and condition as shown on the approved plans and as specified herein.

    b. Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules and grading.

    c. All trees shall have a growth habit normal to the species and free of insect pests, plant diseases, sun scalds, galls, fresh bark abrasions, excessive abrasions, or other objectionable disfigurements.

    d. All plants shall meet the specifications of Federal, State and County laws requiring inspection for plant diseases and insect control. Specifically, plants shall be in accordance with the California Department of Agriculture's regulation for nursery inspections, rules and grading. All inspection certificates required by law shall accompany each shipment, invoice, or order for stock; and when such plants arrive at the site, the certificates shall be delivered to the City Inspector. Plants shall not be

pruned before delivery.

e. Trees with damaged or crooked leaders, or multiple leaders, unless specified, will be rejected.

f. Roots shall be sufficiently developed to the perimeter of the root ball to hold the root ball together, but should not display roots of ¼ inch diameter or larger, visible on the perimeter of the root ball.

The root ball shall be free of roots 1/5 the trunk diameter visibly circling the trunk, and free of roots protruding above the soil.

In the event there is a disagreement as to condition of the root system, the root condition of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants inspected are found to be defective, the City reserves the right to reject the entire lot, or lots, of plants represented by the defective samples.

g. Trunk taper shall be adequately distributed to properly support the tree's canopy. The tree trunk, when untied from the nursery stake, shall not touch the top of the top rim of the container. After planting, trees must be capable of standing without the trunk or canopy being double staked.

h. Branches shall be radially distributed around the trunk.

Branches should not be more than 2/3 the diameter of the trunk, measured one inch above the branch.

Branch attachment should be free of "*included bark*". *Included bark* is bark embedded between the trunk and a lateral branch at its point of attachment.

i. Plants shall be true to species and variety in accordance with the American Association of Nurserymen Standards. Each group of plant materials delivered to the site shall be clearly labeled as to species and variety and nursery source.

j. There shall be no substitution of plants or sizes for those listed on the approved plans unless approved by the City Engineer.

k. Container stock shall have grown in the containers in which delivered for at least six (6) months, but not over two (2) years. Samples shall show no root-bound conditions. Container plants that have cracked or broken balls of earth when taken from the container shall not be planted.

l. Plants not conforming to the requirements herein specified will be considered defective and such plants, whether in place or not, will be rejected. Contractor shall immediately remove rejected plants from the premises and replace with new acceptable plants at Contractor's expense.

2. Topsoil

a. Soil to be used as a planting medium shall be fertile, well-drained, of uniform quality, and free of stones over 1-inch diameter, sticks, oils, chemicals, plaster, concrete, or other deleterious materials.

b. Imported topsoil shall be from sources approved by the City Inspector which meet the standards specified above.

c. The Contractor shall provide for the testing of proposed topsoil by a certified agronomic soils testing laboratory and shall submit soils analysis, recommendations and topsoil sample to the City Inspector for approval. Import topsoil shall not be delivered to the site prior to City approval. The City may request additional testing of imported topsoil at the site to determine conformance to the approved report. Rejected topsoil shall be removed at no cost to the City.

d. If stockpiling is requested, locations and amounts of stockpile shall be approved by the City Inspector.

3. Soil Amendments, Fertilizer and Mulches

a. Recycled materials shall be used unless unavailable or cost prohibitive.

b. All recycled materials shall be free of contamination detrimental to plant health or public health, construction waste lumber products or human waste. All materials shall have undergone thermophlic aerobic procedures and weed seed/pathogen kill procedures. The Contractor may be required to submit documentation of processing procedures to the City Inspector.

c. All materials shall be standard first-grade quality in prime condition when installed and accepted. Deliver commercially processed and packaged material with manufacturer's guaranteed analysis. Submit a sample of all materials accompanied by analytical data from a laboratory Approved by the City, illustrating compliance or bearing the manufacturer's guaranteed analysis to the City Inspector.

d. Mulches

Mulches shall consist of material conforming in size not to exceed 3 inches in its largest dimension. Mulches shall be *Pacific Mulch Products 1 inch – 3 inches Appearance Grade*, or approved equal.

e. Composted Organic Humus

Composted organic humus shall be used in the replacement of nitrogen stabilized sawdust materials unless an agronomic analysis indicates this would be detrimental to plant establishment and growth. Composted organic humus materials shall be tested by the soils testing laboratory prior to use on the project.

f. Soil Amendments

1) Soil Sulfur - Agricultural grade sulfur containing minimum of 99 percent sulfur (expressed as elemental).

2) Iron Sulfate - 20 percent iron (expressed at metallic iron), derived from ferric and ferrous sulfate, 10 percent sulfur (expressed as elemental).

3) Calcium Carbonate - 95 percent lime as derived from oyster shells.

4) Gypsum - Agricultural grade product containing 90 percent minimum calcium sulfate.

5) Dolomite lime - Agricultural grade mineral soil conditioner containing 35 percent minimum magnesium carbonate and 49 percent minimum calcium carbonate, 100 passing No. 65 sieve; provide *Kaiser Dolomite 65 AG* or other approved.

6) Fine Sand - Clean, natural fine sand free from deleterious material, weed seed, clay balls, or rock with minimum of 95 percent passing a No. 4 sieve and maximum of 10 percent passing a No. 100 sieve.

g. Fertilizer

1) Fertilizer shall be pelleted or granular form consisting of the percentage by weight of nitrogen, phosphoric acid and potash as recommended by the approved agronomic report. Planting fertilizer shall be mixed by the commercial fertilizer supplier.

2) Plant tablets shall be slow release type with potential acidity of not more than 5 percent by weight.

4. Pesticides and Herbicides

a. All chemicals used for weed control shall be registered by the State of California Department of Food and Agriculture and the Environment Protection Agency with registration identification on the label. Label shall be at the job site at all times.

A written recommendation shall be prepared by a licensed California Pest Control Advisor for all pesticides used.

b. All chemicals shall be applied in accordance with registered label instruction and manufacturer's recommendations.

c. Chemicals requiring a licensed applicator must be applied by persons registered with the County of Orange Department of Agriculture's Commissioner's Office as possessing a current, valid California Qualified Applicator's License.

d. The use of any restricted materials is forbidden unless a special use permit is obtained from the County of Orange Department of Agriculture.

e. The nonselective, translocative herbicide shall be *"Roundup"* or approved equal.

5. Erosion Control Material

a. Jute Netting

1) Matting - Erosion control matting shall be open weave, furnished in rolled strips as follows:

Length: Approximately 225 feet

Width: 48 inches plus or minus one inch, with an approximate one-tenth-inch-square mesh.

Fabric shall average four pounds per linear foot. The erosion control matting shall be made from loosely twisted jute yarn not varying in thickness by more than one-half of its normal diameter, green in color, fire retardant and equal in quality to *"Ludlow Soil Saver #48"* or

approved equal.

2) Staples - Staples for erosion control shall be pre-manufactured 11 gauge steel wire bent in a U shape, six inches minimum in length, and one inch wide.

b. Excelsior Blanket

1) The excelsior blanket shall consist of a machine-produced mat of curled wood excelsior of 80%, 6 inch or longer fiber length with consistent thickness, and the fiber evenly distributed over the entire area of the blanket. Fiber dimensions shall be 0.21 inch x 0.42 inch. Average weight per square yard to be 0.08 pound at time of manufacture.

2) The topside of each blanket shall be covered with a biodegradable extruded mesh. The blanket shall be made smolder-resistant without the use of chemical additives.

3) The staples shall be made of wire, 0.091 inch in diameter or greater, "U" shaped with legs 6 inches in length and a one inch crown. Size and gage of staples used may vary with soil conditions and shall be reviewed by the City's representative.

4) Excelsior blanket shall be as manufactured by *American Excelsior Company* or approved equal.

6. Seed

a. All seed shall be labeled by California State Department of Agriculture and shall be of the species and variety specified on the plans. Wet, moldy, or otherwise damaged seed shall not be acceptable. Unlabeled collected seed will be rejected.

b. The seed quantities listed shall be on the basis of pure live seed.

$$\text{Total Seed Material} = \frac{\text{Pounds pure, live seed required}}{\%\ \text{purity} \times \text{percent germination}}$$

7. Turf

a. General

Turf shall be as shown on the approved plans and as specified herein. Turf

shall be a Fescue variety or Hybrid Bermuda variety subject to approval by the City Engineer.

b. Seed shall be 98% pure seed with a minimum 90% germination rate.

c. Sod

1) Sod shall be fully mature, well maintained, of the grass variety specified, free of all other grasses or weeds, and shall have been harvested within 24 hours prior to delivery.

2) All sod shall be cut evenly with a conventional sod cutting machine to a thickness of 1 ½ inches. Sod mat size shall be between 3/8 and 5/8 inches.

3) All sod shall have been treated with appropriate preventative fungicide and insecticides within one week prior to shipment.

4) All sod shall have been inspected by the California Department of Food and Agriculture to ensure conformance with the standards set by the State of California.

d. Stolons

Stolons shall be supplied from an approved source or grower and shall be of the grass variety specified, free of weeds, disease and insect infestations. Net weight should not be less than 0.01 pounds per bushel for Hybrid Bermuda grass.

8. Hydromulch

a. Hydromulch material shall be produced from 100% wood cellulose fiber and shall be of such character that it will disperse into a uniform slurry when mixed with water. The fiber shall be of such character that when used in the applied mixture, an absorptive or porous mat, but not a membrane, will result on the surface of the ground. Materials which inhibit germination or growth shall not be present in the mixture.

b. Commercial fertilizers and soil amendments for hydromulch slurry shall be as recommended by the approved agronomic soils report for products and application rates. Products shall conform to specifications herein.

c. Soil and Fiber Mulch Binders shall be *Az-Tac, Terra Tac 3, Ecology Control*

M-Binder, or approved equal.

d. Chemical Germinating Additives shall be *Catalytic Pre-Emerge* or approved equal.

e. Moisture Retention Additives shall be *Humectant HL-80* or approved equal.

f. Urea Formaldehyde shall be pelletized fertilizer for hydromulch slurry.

9. Staking Materials

a. Tree stakes shall be straight grained lodgepole pine free of knots, splits, checks or disfigurements. Stakes shall be 2-inch minimum nominal size in diameter and 10 feet in length, or as required by tree height. Stakes shall have a 10-inch tapered driving point and chamfered top and shall be treated with copper napthanate or pentachloraphenol to heartwood.

b. Supports for staking shall be *Treestrap* as manufactured by *GCS, Inc.*., or approved equal.

10. Guying Materials

a. Guy wire shall be zinc-coated iron, 10 gauge minimum, and solid core.

b. Turnbuckles shall be galvanized or dip-painted and weldless.

c. Cable clamps shall be galvanized or copper, size as required.

d. Plastic guy covers shall be white class 200 PVC ½ inch in diameter and shall be 6 feet in length or provide 90 percent cover of guy wire.

e. Guying collar shall be ½ inch diameter new 2-ply garden hose (reinforced rubber). The collar shall completely cover the wire and loop around tree limbs. It shall be long enough to permit tree movement within the loop.

f. Deadmen shall be *Steel Rapid Anchors* as manufactured *by V.I.T. Company, Inc.* or approved equal. Size of anchor shall be pursuant to manufacturer's recommendations.

Not allowed in turf areas

11. Trunk Protection

a. Trees within turf areas shall be installed with a 2foot to 4 foot diameter turf free zone covered with a 2 inch minimum layer of organic mulch.

12. Root Control Barriers

a. Root control barriers shall be provided as indicated on the plans, and if tree is located closer to a sidewalk or curb then the "Normal Ground Setback" in the tree planting guideline specified herein and in accordance with Standard Plan No. 608.

b. Barriers shall be constructed of prefabricated high impact polystyrene or polyethylene as manufactured by *Deep Root Corporation*, or approved equal. Barriers may be linear according to the approved plan.

13. Redwood Headerboard

a. Provide a 2 inch x 4 inch rough construction heart redwood for all headerboards.

b. Provide 2 inch x 4 inch x 18 inch redwood stakes at intervals of not more than 5 feet.

c. Make splices with 1 inch x 4 inch pieces no less than 24 inches long.

d. On sharp turns and curves, 4 ½ inch x 4 inch laminate boards, or two (2) 1 inch x 4 inch laminated boards may be permitted.

Nail stakes and splices with galvanized common nails. Nails are required for solid installation.

C. INSTALLATION

1. General

a. The irrigation system coverage test shall be successfully completed and the irrigation system fully functional prior to planting.

b. Perform actual planting only during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice.

c. Confirm location and depth of underground utilities and obstructions. If

underground structures or utility lines are encountered in the excavation of planting areas, other locations for planting shall be approved by the City Engineer.

d. All planting layout and staking shall be accurately made in accordance with the plans. All trees shall be a minimum of 3 feet from City maintenance limit line.

e. Plant locations shall be approved by the City Inspector prior to excavation.

f. Soil amendments and fertilzer applications shall be verified by the City inspector prior to cultivating into the soil.

2. Soil Preparation

a. All grading and mounding with the exception of final planting shall be completed prior to soil preparation. 1 inch of irrigation shall follow the soil preparation and all weeds removed prior to intiating planting.

b. Planting areas shall be free of all weeds stones, stumps, roots, or other debris 1 inch in diameter and greater.

c. Soil shall be graded to a smooth and even surface conforming to required finish grade. Finish grade adjacent to walks, paved areas, curbs, manholes, cleanouts, valve boxes, and similar features shall be 1 inch below the surface in turf and 2 inches below in groundcover/shrub areas. Grades between such features shall be carefully sustained and blended to eliminate abrupt changes.

d. Planting areas to receive sod shall sustain a finish grade of such depth that the top of installed sod mat shall be flush with finish surfaces (walks, paved areas, etc.).

e. Contractor shall allow for soil amendments when establishing subgrade elevations. All planting areas shall have a finish grade conforming to approved plans and specifications after full settlement has occurred.

f. All planting areas adjacent to buildings shall be graded to drain away from the building at a minimum of 2% slope, for a minimum of 5 feet horizontal distance.

g. In all planting areas with gradients less than 2:1, a layer of soil amendments shall be uniformly spread and thoroughly cultivated by means of mechanical tiller into the top 6 inches of soil, or as recommended by the approved agronomic soils report, so that the soil shall be loose, friable, and free from

rocks, sticks and other objects undesirable to planting.

h. Planting areas with slopes 2:1 and steeper shall not be soil prepared unless directed by the City Engineer.

i. Contractor shall not work under muddy conditions.

j. Soil moisture shall be clearly evident and suitable for planting as determined by the City Representative.

k. Specifications for soil prep and grading of the sports turf areas.
   1. Sports fields shall be constructed to the USGA greens specification with subsurface drainage.
   2. The entire athletic field area, including the infields will be laser graded and certified by a surveyor for compliance with the grading plans.

3. Weed Abatement

   a. All weeds shall be eradicated in a manner consistent with State of California regulations. All pesticide application shall be made by a State of California Qualified Applicator.

4. Planting of Trees, Shrubs and Vines

   a. Planting Holes

      Planting holes shall have irregular, nonglazed sides, and shall be a minimum of twice the diameter and onetime the depth of the original plant container.

   b. Planting Procedure

      1) The tree or shrub shall be placed in the planting hole such that the top of the root ball is one inch above the finished grade and soil sloped away from the root ball to finished grade.

      2) Backfill shall be composed of on site amended soil as prescribed by the approved soil report or the City.

      3) Staking should be the minimum necessary to ensure the tree is protected from high winds or vandalism. If pedestrian traffic is unlikely and the

tree stands straight without the nursery stake, then no stakes are necessary. In all other situations, the minimum is one stake per 5-gallon tree, two stakes per 15-gallon or larger tree.

4) Create a ring of soil at four inches above the finished grade surrounding the root ball to collect water. This should be removed prior to turn-over to the City.

5) Two inches of approved mulch shall be applied to cover the entire planting site. However, do not put mulch within six inches of the tree or shrub trunk.

c. Planting Procedure for Field Grown Material.

1) Plant in accordance with the above specification; however, do not use nitrogen stabilized organic amendment in the backfill mix.

5. Groundcover

a. Groundcover plants shall not be allowed to dry out before or while being planted. Roots shall not be exposed to the air except while actually being placed in the ground. Wilted plants will not be accepted.

b. Plant groundcover in straight rows evenly spaced, and at intervals required by drawings. Use triangular spacing.

c. Plant each rooted plant with its proportionate amount of flat soil. Immediately water after planting until entire area is soaked to full depth of each hole.

d. Protect plants from damage and trampling at all times.

6. Turf

a. General

1) After soil preparation, establishment of final grade, and weed abatement, carefully smooth all surfaces to be planted and roll area to expose soil depressions or surface irregularities. Regrade as required. Prior to planting, the soil shall be loose and friable to receive turf.

2) Immediately prior to planting, evenly broadcast a preplant commercial fertilizer as recommended in the approved agronomic soils report. Rake

in lightly. Do not plant turf on dry soil.

3) Fescue turf shall be installed by seeding, hydroseeding or sod. Hybrid Bermuda shall be installed by seeding, stolonizing, hydrostolonizing or sod unless prior approval by City Engineer is given for other methods.

b. Seeded Turf

1) Seed - A satisfactory method of sowing shall be employed using an approved mechanical power drawn driller seeder, mechanical hard seeder, or other approved equipment. The rate of application of seed will be specified on the plans.

2) The seed shall be covered by means of a wire drag, spiked toothed harrow, cultipacker or other approved equipment weighing 60 to 90 pounds per linear foot of roller. Final rolling shall be at right angles to slopes to prevent erosion wherever possible.

3) Top dress with ¼ inch of approved top dressing material.

c. Sodded Turf

1) Lay first strip of sod slabs along a straight line (using a string in irregular areas). Butt joints tightly; do not overlap edges. On second strip, stagger joints much as in laying masonry. Use a sharp knife to cut sod to fit curves, edges, sprinkler heads. Lay sod in one direction only.

2) Do not lay whole lawn before watering. When a conveniently large area has been sodded, water lightly, preventing drying. Continue to lay sod and to water until installation is complete.

3) After laying sod, roll lightly to eliminate irregularities and to form good contact between sod and soil. Avoid heavy roller or excessive initial watering which may cause roller marks.

4) Water the completed lawn surface thoroughly. Soil should be moistened at least 8 inches deep. Repeat watering at regular intervals to keep sod moist at all times until rooted. After sod is established, decrease frequency and increase amount of water per application, as necessary.

5) All unsuccessfully established sod shall be removed and new sod laid to the satisfaction of the City Inspector.

d. Stolonized Turf

1) Soil shall be rototilled so that the soil is loose and free of rocks and debris prior to planting.

2) A satisfactory method of spreading stolons shall be employed using a hydrostolonizer or other approved equipment.

3) The rate of application of stolons shall be as specified on the approved plans.

4) Apply stolons during warm seasons only, late spring to early fall.

5) Water the completed installation thoroughly immediately after stolon application.

6) Maintain water saturation of the soil for the duration of the germination period to ensure proper establishment.

7) Reapply stolon application to all areas where the turf is thin or bare after the germination period.

7. Hydroseeding

a. After soil preparation, establishment of final grades and weed abatement, loosen surface (2 inches of soil) by harrow or rototiller and float level; then irrigate prior to planting.

b. Install trees and shrubs and groundcover, if they occur in hydroseeded area, prior to hydroseeding.

c. An approved hydromulch company shall apply hydroseed in a form of a slurry consisting of wood cellulose fiber, seed, chemical additives, commercial fertilizer and water. When hydraulically sprayed on soil, ensure that the hydromulch forms a blotter-like groundcover impregnated uniformly with seed and fertilizer to allow the absorption of moisture and rainfall to percolate to the underlying soil.

d. Begin spraying immediately after the tank has been filled with the hydromulch mixture specified. Spray with a uniform visile coat by using the green color of the mulch as a guide. Apply the slurry in a sweeping motion in an arched stream so as to fall like rain allowing the wood fibers to build on each other until an even coat is achieved at the required rates.

e. After application of hydromulch, wash excess material from previously planted materials and architectural features. Avoid washing or eroding mulch materials.

g. After the completion of hydroseeding, irrigate each area. Irrigate during the germination period of the seed to keep the hydromulch moist at all times without creating run-off, erosion, or oversaturation.

h. Slurry not used within two hours after delivery to the site shall be removed from the site. Daily worksheets shall be completed by the nozzleman with the following information delivered to the City Inspector:

- Seed type and amount
- Fertilizer analysis and amount
- Mulch type and amount
- Seed additive type and amount
- Number of loads
- Amount of water
- Area covered
- Equipment used
- Capacity
- License number

i. All bare and unsuccessfully germinated areas shall be reseeded within ten (10) days with the same variety of seed as shown on the approved plans . Areas to receive reseeding shall be determined by the City. The Contractor shall be responsible for all seeded areas until an acceptable stand of hydroseeded material is realized and approved by the City Inspector.

8. Erosion Control

a. General

Erosion control measures shall be required for all cut slopes 2:1 and steeper, 5 feet or more in height and fill slopes 2:1 and steeper, 3 feet or more in height. Erosion control measures shall consist of the installation of excelsior blanket, jute netting, hydroseed, groundcover, shrubs, or a combination of methods as approved by the City Engineer.

b. Jute Netting

1) Surface of the slopes shall be uniformly smooth and even with all debris and rocks raked and removed. The soil shall be sufficiently moist to

permit the firm laying of erosion control matting and to prevent sloughing of topsoil.

2) The matting shall be stapled in placed and firmly embedded by means of tamping or rolling as approved by the City to insure that the matting is in contact with the soil and that no erosion can take place under the matting.

3) The erosion control matting shall be laid with the direction of flow of surface drainage and in accordance with the manufacturer's recommendations. The matting shall be cut to provide a visually pleasing slope.

c. Excelsior Blanket

1) The area to be covered with excelsior blanket shall be prepared, fertilized and seeded before the blanket is applied.

2) When the blanket is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area.

3) On slopes, apply the blankets vertically to the slope. Butt ends and sides snugly and staple.

4) Drive the staples vertically into the ground, space approximately 2 lineal yards apart, on each side, and one row in the center alternately spaced between each side (60 staples on each blanket). Use a common row of staples on adjoining blankets.

City of Irvine
Landscape Manual

SECTION VIII
INSPECTION SPECIFICATIONS

A. GENERAL

All inspections shall be made by the City Building and Safety Division or Public Works Project Management Division.

B. PRE-JOB MEETING

The contractor shall request a pre-job meeting at least 48 hours in advance of the scheduled meeting. The City Inspector, Contractor, Landscape Architect, Engineer, and developer's representative shall be present to review grading, irrigation, planting and related items.

C. CONSTRUCTION PERIOD INSPECTION

1. Irrigation Systems

Inspection shall be required for the following parts of the work. No item shall be covered or enclosed until it has been inspected and approved by the City Inspector. Each item shall be inspected for conformance to the approved plans and City Standards. Any proposed substitution and all pump data shall be submitted to the City Engineer for approval prior to installation. Refer to Section V *Irrigation Specifications and Section VI Computerized Irrigation Control System Specifications.*

a. Main Lines

1) Layout

2) Trenches

3) Flushing

4) Hydrostatic pressure test

5) Backfill and compaction

b. Sleeves

c. Assemblies

1) Point of connection to water supply

2) Point of connection to electrical supply

3) Point of connection to phone service

4) Valves, pumps, sensors, backflow preventor

5) Control wiring and connections

6) Automatic controller

7) Cluster control units

8) Control and communication systems

d. Irrigation Interconnect

1) Layout

2) Trenches

3) Condits

4) Pulling of wires

5) Connections

6) Pull boxes

7) Backfill and compaction

8) Circuit testing

e. Lateral Lines

1) Layout

2) Trenches and sleeves

3) Pipe, fittings, riser assemblies

4) Backfill and compaction

5) Flushing

f. Sprinkler heads

1) Layout
2) Spacing

g. Coverage Test (See Appendix B for Pre-Planting Irrigation Coverage Checklist.)

2. Landscape Work

Inspection shall be required for the following parts of the work. No material shall be installed until it has been inspected and approved by the City Inspector. Each item shall be inspected for conformance to the approved plans, City Standards and approved submittals. *Refer to Section VII Planting Specifications*

a. Materials delivered to the site including receipt by inspector of all bills of lading and invoices showing quantities of products delivered.

b. Soil preparation, including spreading of fertilizers and amendments prior to incorporation into the soil, and fine grading.

c. Preparation of backfill.

d. Layout of trees and shrubs.

e. Installation of trees, shrubs and groundcover.

f. Weed abatement.

g. Hydroseeding.

h. Clean-up and finish grade.

3. Concrete and other related work

a. Forming and construction of mow strips, sidewalks, access ramps, driveways, and trails.

b. Construction items that require building, electrical, plumbing permits or grading permits shall require a separate inspection under that permit.

D. PRE-MAINTENANCE PERIOD INSPECTION

1. The Contractor shall request in writing a pre-maintenance period inspection upon compliance with the following conditions:

    a. All work required in the approved plans and specifications including all hardscape, irrigation, planting, hydroseeding, and sodding shall be completed.

    b. All punchlist and correction list items shall be completed.

    c. Permanent power to automatic controllers shall be continuous and established.

    d. Permanent water supply shall be continuous and established.

    e. The following shall be submitted and approved by the City Inspector:

        1) One (1) complete blueprint set and one (1) mylar set of record drawings

        2) Landscape Architects Certificate of Compliance. (See Appendix C)

        3) Digital Raster files on CD ROM of the record drawings in TIFF CCITT, Group 4 file format either an AutoCAD drawing file (.DWG) format, a data exchange file (.DXF) format, or an ARC/INFO export file (.E00) format. (City maintained areas only.)

        4) Two (2) sets of 35 mm microfilm in 4 inch x 6 inch jacket.

2. The City Inspector, Contractor, Landscape Architect, and developer's representative shall be present during the inspection.

3. Written approval by the City Inspector shall be obtained prior to the beginning of the maintenance period.

E. MAINTENANCE PERIOD INSPECTION

1. The entire project shall be inspected weekly during the maintenance period. The irrigation coverage and timing shall be checked and adjusted, if necessary.

2. Thirty days prior to the end of the maintenance period the contractor shall request an inspection. At this time, all irrigation systems shall be adjusted in accordance with the Irvine Ranch Water District's guidelines.

At this time, the contractor shall submit the following:

a. Two (2) controller charts for each controller. Controller charts shall be a blackline print of the reduced record drawing, hermetically sealed between two 20-mil-thick plastic sheets. The chart shall be the maximum size that the controller door will allow and shall show the areas covered by the controller. A different color shall be used to show the area of coverage for each valve. If the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a readable size.

b. Maxicom 5-day test certificate if applicable with the Landscape Division's Master Landscape Specialist

c. Two (2) copies of completed "Controller Data Sheet" (Appendix D) for each controller hermetically sealed between two (2) 10 mil thick plastic sheets

d. One (1) individually hardbound copy of the operation and maintenance manuals. The manuals shall describe the material installed. Each complete manual shall include the following information:

    1) Index sheet stating Contractor's address and telephone number, list of equipment including names and addresses of local manufacturer representatives.

    2) Complete operating and maintenance instruction for all equipment.

    3) Spare parts and related manufacturer information for all equipment.

    4) A guarantee for the sprinkler irrigation system which shall be made in accordance with the form in Appendix A. This guarantee form shall be retyped onto the Contractor's letterhead.

    5) Contractor's performance bond information, including bonding company, bond number, agent and phone number.

    6) Listing of all required warranties and guarantees with effective dates and expiration date.

e. Equipment

Supply as part of the contract the following items:

1) Two (2) keys for controller, controller enclosure.

2) Two (2) quick couplers with hose swivels.

F. FINAL ACCEPTANCE

The entire project shall be inspected, prior to final acceptance.

1. The Contractor shall notify the City Building and Safety Division, or Public Works Project Management Division, ten (10) days prior to completion of the maintenance period. Deficiencies noted during inspection shall extend the maintenance period until noted deficiencies are corrected.

2. All turf areas shall have a dense, uniform grass covering 100% of designated turf areas.

3. All filters and irrigation heads shall be cleaned. Valve boxes and sprinklers shall be adjusted to heights required in relation to finish grade.

4. Turf shall be mowed, edged, weeded and clipped around sprinklers, valve boxes, and trees. All plant material not showing vigor or that have been damaged shall be replaced. Hybrid Bermuda requires a reel mower set to 1 inch.

5. Reduced pressure type backflow preventers shall be tested by Contractor and approved by the appropriate agency.

6. End of maintenance shall occur only upon written acceptance by the City Building and Safety Division, or the Public Works Project Management Division. City-maintained areas will be accepted only on the first (1^{st}) and fifteenth (15^{th}) of the month.

7. Partial acceptance of improvements within the scope of work of approved plans shall not be authorized without approval by the City Engineer.

City of Irvine
Landscape Manual

SECTION IX
MAINTENANCE SPECIFICATIONS

A. GENERAL

1. Scope of Work

   The work required includes but is not limited to the following:

   a. Maintenance of the site, planting, and irrigation.

   b. Guarantees and replacement.

2. Tree Replacement

   Any tree shown on the approved plan which is dead or not in satisfactory growth condition during a one-year period from date of acceptance, shall be removed from the site and replaced within fourteen (14) calendar days of notification. Failure to comply will result in appropriate action by the City to assure completion. Trees shall be replaced by the Contractor at no expense to the City, with the same variety and size as originally designated on the plans.

B. MAINTENANCE PERIOD

The entire project shall be maintained by the Contractor for a period of not less than ninety (90) days from the date specified in the written notice from the City Inspector.

1. General

   a. During the maintenance period the Contractor shall provide all watering, weeding, fertilizing, cultivating, mulching, spraying, pruning and mowing necessary to keep all plants and turf in a healthy weed-free growing condition and to keep the planted areas neat, edged, and attractive.

   b. After planting and during the maintenance period, balanced fertilizer shall be applied at the rate recommended by the approved agronomic soils report. In the event that groundcover, trees or shrubs exhibit micro-nutrient deficiency symptoms, necessary corrective action shall be taken by the Contractor.

   c. During the maintenance period, should the appearance of any plant indicate weakness, that plant or cutting shall be replaced immediately by the Contractor with a new healthy plant. Any trees or shrubs with damaged cambium shall be replaced immediately.

At the end of the maintenance period, all plant materials shall be in a healthy, growing condition and spaced as indicated on the plans.

C. MAINTENANCE OF PROJECTS

1. Trees

If the period between the time of tree planting and time of final acceptance is longer than six (6) months, the tree maintenance requirements will be evaluated by the City Landscape Superintendent and applied as necessary according to the following guidelines:

a. Prune young trees to develop strength and form. Remove lateral branches that are greater than ¾ the size of the central leader, the smallest of two branches creating narrow V-shaped branch forks, water spouts and suckers, diseased, damaged, rubbing branches, weakest/smallest branches to establish a vertical spacing of 8 to 12 inches between branches, and weakest/smallest branches to establish an even radial distribution around the trunk.

b. Do not remove lower branches on young trees at the time of planting. Retain as much foliage on these branches as possible. Remove lower branches only when the tree is able to stand erect without staking or other support.

c. At all times, pruning cuts shall be made in accordance with the *Western Chapter International Society of Arboriculture Pruning Standards* and occur in branch tissue just outside the branch bark ridge and collar. Heading or stubbing is not permitted.

d. If mature tree pruning is included in the maintenance period, it shall be accomplished according to the *Western Chapter International Society of Arboriculture Pruning Standards* and performed by certified arborists and/or certified tree workers.

e. Removal of trees shall include stump removal (under 3 inches diameter) and/or stump grinding (over 3 inches diameter) to 18 inches below grade. Wood chips shall be removed and the site backfilled with native soil and compacted to grade. All wood or leaf waste material shall be reduced, reused, recycled and/or transformed.

2. Shrubs

a. 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. Make pruning cuts to lateral branches or buds. Stubbing will not be permitted.

b. Pinch prune, as necessary, to encourage new growth and to eliminate sucker growth. Old wilted flowers and dead foliage shall be pinched or cut off.

3. Groundcover

a. Apply approved pre-emergent herbicide to all broad leaf groundcover areas in accordance with manufacturer's instructions.

b. Edge groundcover to keep in bounds; trim top growth, as necessary, to maintain an overall uniform appearance.

c. Replace dead and missing plants.

d. Remove accumulated trash weekly.

e. Remove all weeds, including roots.

4. Turf

a. Turf maintenance includes all work required to grow a healthy, uniform turf. All turf shall be mowed to a height recommended for the species at least once a week. Hybrid Bermuda shall be mowed with a reel mower twice a week at 1 inch. Grass clippings shall be removed off site. No more than 1/3 of turf height shall be removed at a mowing. All turf shall be trimmed around sprinklers, valve boxes, and trees during the entire maintenance period.

b. Eradicate weeds by using approved herbicides.

5. Irrigation

a. Contractor shall properly and completely maintain all irrigation systems. A balanced watering program shall be maintained to ensure proper germination and establishment. Contractor shall be responsible for the irrigation system during the entire maintenance period. Irrigation water management shall conform to IRWD guidelines.

b. Maintain all valve boxes and controllers free of debris. Boxes shall remain locked at all times.

6. Site Maintenance

a. All planted areas shall be kept neat and clean and free of all clippings, debris, and trash.

b. All subsurface drains shall be periodically flushed with clear water to avoid build-up of silt and debris. Keep all drain inlets clear of leaves, trash, and

other debris.

c. All paved areas shall be kept free of trash, debris, and silt.

d. The Contractor shall be responsible for the elimination of vertebrate pests, determined by the City, to be detrimental and damaging to the area of development. Elimination shall be performed by safe, approved methods.

7. Utilities

a. All utility costs incurred during the maintenance period shall be the responsibility of the contractor.

City of Irvine
Landscape Manual

SECTION X
TREE PLANTING GUIDELINES

A. GENERAL

The purpose of this section is to establish setback standards to provide ample space for trees to grow to their characteristic mature size without the need for excessive pruning or repair of damage caused by trees. The trees listed in this section do not constitute an "approved tree list." Other species will be considered and setback standards established for any tree not listed. The following shall be used to evaluate any proposed species:

1. The mature size of the species and how that may conflict with surrounding uses, structures or utilities.

2. The compatibility of the species with surrounding landscape and land use.

3. The maintenance needs for the species in terms of pruning, irrigation, and insect or disease pest problems.

4. The compatibility of the species with the local soil and climate conditions.

5. The contribution of the species to accomplishing tree species diversity goals.

6. The contribution of the species to accomplishing the goals of the Sustainability in Landscape Ordinance.

B. TREE MANAGEMENT PROGRAM

These specifications provide the minimum distances required at the time of installation. The City recognizes that there may be a need to install a mature-looking landscape and may, therefore, allow these minimum distances to be reduced. In such cases, a comprehensive tree maintenance program shall be prepared with input from a Western Chapter International Society of Arborists (ISA) Certified Arborist for use by the party ultimately responsible for maintenance. The program should address pruning intervals, tree removal schedules, and projected replanting requirements. It should include a tree inventory and tree location map, ISA specifications for planting and pruning, and estimated costs projected over an appropriate time period.

C. SETBACK REQUIREMENTS

1. Ground Setback:

Required minimum planting distance (in feet) from any ground level structure such as sidewalks, curbs, and fences. The setback may be reduced by the following schedule with the installation of root control devices at the time of planting.

Normal Ground Setback	Reduced Ground Setback
3	3
4	3
5	4
6	5
8	5
10	6
15	No reduction
20	No reduction

2. Aerial Setback:

Required minimum planting distance (in feet) from any building or other structure over six feet in height.

3. Minimum Spacing:

Required minimum distance (in feet) between trees as shown in the tree list.

D. TREE LIST

No.	Botanical Name	Common Name	Ground Setback	Aerial Setback	Minimum Spacing
1.	Acacia baileyana	Bailey Acacia	6	10	20
2.	Acacia cultriformis	Knife Acacia	4	8	15
3.	Acacia melanoxylon	Blackwood Acacia	8	10	25
4.	Acacia pendula	Weeping Myall	6	8	15
5.	Acer negundo	Box Elder	8	15	30
6.	Acer saccharinum	Silver Maple	8	15	30
7.	Agathis robusta	Queensland Kauri	6	10	20
8.	Agonis flexuosa	Peppermint Tree	4	10	25
9.	Albizia julibrissin	Silk Tree	6	15	35
10.	Alnus cordata	Italian alder	6	10	25
11.	Alnus rhombifolia	White alder	8	10	35
12.	Angophora costata	Gum Myrtle	6	10	35
13.	Araucaria heterophyla	Norfolk Island Pine	6	12	25
14.	Arbutus unedo	Strawberry Tree	3	8	15
15.	Archontophoenix cunninghamiana	King Palm	3	6	10
16.	Arecastrum romanzoffianum	Queen Palm	3	6	10
17.	Bauhinia blakeana	Hong Kong Orchid tree	3	8	15
18.	Bauhinia variegata	Purple Orchid tree	5	8	25
19.	Betula pendula	European White Birch	5	10	20
20.	Brachychiton acerifolius	Flame Tree	5	10	25
21.	Brachychiton populneus	Bottle Tree	5	10	30
22.	Brahea edulis	Guadalupe Palm	3	6	2
23.	Callistemon citrinus	Lemon Bottlebrush	3	6	15
24.	Callistemon viminalis	Weeping Bottlebrush	4	8	15
25.	Calocedrus decurrens	Incense Cedar	6	15	25
26.	Calodendrum capense	Cape Chestnut	5	10	35
27.	Cassia leptophylla	Gold Medallion tree	4	6	15
28.	Casuarina cunninghamiana	River She-Oak	5	10	30
29.	Casuarina stricta	Mountain She-Oak	5	8	20
30.	Cedrus deodara	Deodar Cedar	6	15	35
31.	Ceratonia siliqua	Carob	10	15	35
32.	Cercis occidentalis	Western Redbud	3	6	15
33.	Chionanthus retusus	Chinese Fringe tree	4	7	15
34.	Chorisia speciosa	Floss Silk Tree	6	10	30
35.	Cinnamomum camphor	Camphor Tree	6	20	40
36.	Crinodendron patagua	Lily of the Valley	6	8	20
37.	Cupaniopsis anacardiodes	Carrotwood	4	10	30
38.	Cupressocyparis lelandii	Leyland Cypress	5	10	25

No.	Botanical Name	Common Name	Ground Setback	Aerial Setback	Minimum Spacing
39.	Cupressus sempervirens	Italian Cypress	5	10	15
40.	Dodonaea viscosa	Hopseed Bush	3	8	15
41.	Eriobotrya deflexa	Bronze Loquat	4	8	15
42.	Erythrina caffra	Kaffirboom Coral tree	8	20	35
43.	Erythrina crista-galli	Cockspur Coral	6	8	20
44.	Eucalyptus camaldulensis	Red Gum	6	10	35
45.	Eucalyptus citriodora	Lemon-Scented Gum	4	8	25
46.	Eucalyptus cladocalyx	Sugar Gum	5	8	35
47.	Eucalyptus erythrocorys	Red-Cap Gum	4	8	20
48.	Eucalyptus ficifolia	Red Flowering Gum	4	10	30
49.	Eucalyptus globulus	Blue Gum	10	20	35
50.	Eucalyptus lehmannii	Bushy Yate	4	10	25
51.	Eucalyptus leucoxylon	White Ironbark	5	12	25
52.	Eucalyptus maculata	Spotted Gum	4	8	30
53.	Eucalyptus nicholii	Willow-Leafed Peppermint	4	10	20
54.	Eucalyptus polyanthemos	Silver Dollar Gum	5	10	30
55.	Eucalyptus robusta	Swamp Mahogany	6	15	25
56.	Eucalyptus rudis	Flooded Gum	5	15	30
57.	Eucalyptus sideroxylon	Red Ironbark	5	10	25
58.	Eucalyptus torquata	Coral Gum	3	6	20
59.	Eucalyptus viminalis	Manna Gum	6	20	35
60.	Feijoa sellowiana	Pineapple Guava	5	10	20
61.	Ficus benjamina	Weeping Fig	6	10	20
62.	Ficus microcarpa nitida	Indian Laurel Fig	6	15	30
63.	Ficus rubiginosa	Rusty Leaf Fig	10	20	35
64.	Fraxinus uhdei	Shamel Ash	10	20	35
65.	Fraxinus velutina	Arizona Ash	8	15	30
66.	Geijera parviflora	Australian Willow	5	10	20
67.	Ginkgo biloba	Maidenhair Tree	6	15	20
68.	Grevillea robusta	Silk Oak	8	20	30
69.	Harpephyllum caffrum	Kaffir Plum	6	12	25
70.	Heteromeles arbutifolia	Toyon	6	12	20
71.	Hymenosporum flavum	Sweetshade	4	8	20
72.	Ilex altaclarensis	Wilson Holly	4	8	15
73.	Jacaranda mimosifolia	Jacaranda	5	12	30
74.	Juglans regia	English Walnut	7	20	35
75.	Juniperus chinensis torulosa	Hollywood Juniper	3	8	10
76.	Koelreuteria bipinnata	Chinese Flame	5	10	30
77.	Koelreuteria paniculata	Goldenrain	5	10	30
78.	Lagerstroemia indica	Crape Myrtle	3	8	20
79.	Leptospermum laevigatum	Australian Tea Tree	6	10	25

No.	Botanical Name	Common Name	Ground Setback	Aerial Setback	Minimum Spacing
80.	Ligustrum lucidum	Glossy Privet	7	20	35
81.	Liquidambar formosana	Chinese Sweet Gum	6	12	30
82.	Liquidambar styraciflua	American Sweet Gum	6	12	30
83.	Liriodendron tulipifera	Tulip Tree	7	20	35
84.	Magnolia grandiflora	Southern Magnolia	6	20	35
85.	Magnolia grandiflora	Samuel Sommer variety	6	8	25
86.	Magnolia grandiflora	St. Mary variety	4	8	20
87.	Melaleuca armillaris	Drooping Melaleuca	4	10	20
88.	Melaleuca decussata	Lilac Melaleuca	4	10	20
89.	Melaleuca linariifolia	Flaxleaf Paperback	5	15	25
90.	Melaleuca quinquenervia	Cajeput Tree	5	10	20
91.	Metrosideros excelsus	New Zealand Christmas	4	10	25
92.	Morus alba	Fruitless Mulberry	10	20	35
93.	Myoporum laetum	Myoporum	6	12	20
94.	Nerium oleander	Oleander	3	8	12
95.	Olea europaea	Olive	5	12	25
96.	Olmediella betschlerana	Guatemalan Holly	4	10	20
97.	Pinus canariensis	Canary Island Pine	4	10	20
98.	Pinus eldarica	Afghan Pine	5	10	20
99.	Pinus halepensis	Aleppo Pine	6	12	30
100.	Pinus pinea	Italian Stone Pine	8	25	30
101	Pinus thunbergiana	Japanese Black Pine	3	5	8
102.	Pinus torreyana	Torrey Pine	8	20	30
103.	Pistacia chinensis	Chinese Pistache	6	20	35
104.	Pittosporum rhombifolium	Queensland Pittosporum	5	8	20
105.	Pittosporum undulatum	Victorian Box	6	20	35
106.	Pittosporum viridiflorum	Cape Pittosporum	4	10	20
107.	Plantinus acerifolia	London Plane Tree	6	15	35
108.	Platinus racemosa	California sycamore	8	15	35
109.	Podocarpus gracilior	Fern Pine	5	15	25
110.	Podocarpus macrophyllus	Yew Pine	6	15	25
111.	Populus nigra italica	Lombardy Poplar	10	20	20
112.	Prunus carolinina	Carolina Laurel Cherry	5	10	20
113.	Prunus cerasifera	Purple-Leaf Plum	4	12	20
114.	Pyrus calleryana	Ornamental Pear	5	15	25
115.	Pyrus kawakami	Evergreen Pear	5	15	25
116.	Quercus agrifolia	Coast Live Oak	8	20	40
117.	Quercus ilex	Holly Oak	6	15	30
118.	Quercus virginiana	Southern Live Oak	6	15	35
119.	Rhus lancea	African Sumac	4	10	20
120.	Robinia pseudoacacia	Black Locust	8	20	30
121.	Salix babylonica	Weeping Willow	10	20	35

No.	Botanical Name	Common Name	Ground Setback	Aerial Setback	Minimum Spacing
122.	Schinus molle	California Pepper	8	20	35
123.	Schinus terebinthifolius	Brazilian Pepper	8	20	30
124.	Sequoia sepervirens	Coast Redwood	8	20	30
125.	Stenocarpus sinuatus	Firewheel T ree	4	12	20
126.	Tabebuia avellaneda	None	4	8	15
127.	Tabebuia chrysotricha	Golden Trumphet	4	8	15
128.	Tipuana tipu	Tipu Tree	6	10	30
129.	Trachycarpus fortune	Windmill Palm	3	5	8
130.	Tristania conferta	Brisbane Box	4	10	15
131.	Ulmus parviflora	Chinese Elm	8	15	35
132.	Umbellularia californica	California Laurel	6	10	25
133.	Vitex lucens	New Zealand Chaste Tree	6	15	30
134.	Washington robusta	Mexican Fan Palm	3	6	10

APPENDIX A

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

I hereby guarantee that the sprinkler irrigation system I have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse or neglect excepted. I agree to repair and replace any defects in material or workmanship, including settling of backfilled areas which may develop during the period of one year from date of acceptance and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the City. I shall make such repairs or replacements within 48 hours of notification that repair work is necessary. In the event of my failure to make such repairs or replacements within 48 hours after receipt of written notice from the City, I authorize the Owner to proceed to have said repairs or replacements made at my expense and I will pay the costs and charges therefore upon demand.

PROJECT: _____

LOCATION: _____

PERMIT NUMBER: _____

SIGNED: _____
Contractor

ADDRESS: _____

_____

PHONE: _____

DATE OF ACCEPTANCE: _____

APPENDIX B

PRE-PLANTING IRRIGATION COVERAGE CHECKLIST

JOB NAME: **REVIEWED BY:**

JOB NO: **DATE:**

	ON PLAN	ON SITE	COMMENTS
Water meter			
Meter is type and size per approved plan.			
Meter is fully open.			
Angle stop and customer service valves are fully open.			
Point of Connection Assembly			
Devices are per approved plan and city standards.			
Basket strainer is clean.			
Gate valves are open.			
Pressure regulator is adjusted to provide Static and Operating pressures in accordance with approved plan and manufacturers specifications.			
Master Valve			
Device is per approved plan and city standards.			
Device activates through controller.			
Irrigation Controller			
Controller is per approved plan and city standards.			
Controller enclosure is per approved plan and city standard.			
Exterior ground rod installed.			
Controller has permanent power supply.			
Controller operates all remote control valves.			
Radio remote access plug installed and operational.			
Back up battery installed.			
PTS warranty provided.			
Maxi Cluster Control Unit. (CCU)			
Device is per approved plan and city standards.			
CCU enclosure is per approved plan and city standard.			
Exterior ground rod installed.			
Phone line connected and operational.			
Flow meter installed and connected.			
PTS warranty provided for CCU and Flow Meter.			

	ON PLAN	ON SITE	COMMENTS
Gate Valves			
Gate valves are per approved plan and city standards.			
Gate valves are fully open.			
Remote Control Valves			
Remote control valves are per approved plan and city standards.			
Valve stems adjusted to provide specified sprinkler operating pressure.	-	-	-
Valve wire connectors are per approved plan and city standard.			
Remote Control Valve Boxes			
Boxes are per approved plan and city standards.			
Boxes are heat-branded with controller station number.	-	-	
Box lids have IRWD reclaimed water warning labels.			
Quick Couplers			
Couplers are per approved plan and city standards.			
Device boxes are heat-branded per city standard.			
Sprinkler Heads			
Sprinkler heads are per approved plan and city standards.			
Sprinkler nozzles are per approved plan and manufacturers specifications.			
Sprinkler head spacing is per approved plan and manufacturers specifications.			
Sprinkler heads are perpendicular to grade.			
Sprinkler nozzle operating pressure is per approved plan and manufacturers specifications.			
Sprinklers appear to have “head to head” coverage.			

APPENDIX C

City of Irvine
1 Civic Center Plaza
Irvine, CA 92606-5208

Attention:_____City Inspector

Subject: Landscape Architect's Certificate of Compliance

Reference

Project: Permit Number _____

Job Address _____

Owner_____

General Contractor _____

Work Began_____Work Completed _____

I certify that I have observed the installation of the landscape and irrigation improvements. The improvements are in substantial compliance with the plans approved by the City of Irvine.

By _____Date _____

_____ LA# _____ Exp. Date

Name and Title

APPENDIX D

CONTROLLER DATA SHEET														
Architect & Contractor Data														
Project Name				Meter Address					Design Flow GPM				Design Pressure	
Meter #				Meter Size					Meter Type				Irrigated Area in Sq Ft	
Valve #	RCV Size	RCV GPM	Sprinkler Type	Sprinkler GPM	Sprinkler Spacing	Sprinkler Count	Sprinkler precip rate	Turf or Shrubs/groundcover	Cool or Warm	Soil Type	Topography	Plan Page	Area Description	
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

21													
22													
City Staff Data													
Controller type				Controller ID #				Controller Serial #					
Maxicom channel #				Site Description								Date	

APPENDIX E

EXAMPLE WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the *project applicant* for each Point of Connection. Please complete all sections of the worksheet.

Point of Connection # 1

Maximum Applied Water Allowance

Total *MAWA* = (ETo x 0.7 x LA in Sq. Ft. x *0.62*) + (ETo x 1.0 x *SLA* in Sq. Ft. x *0.62*) = Gallons per year for LA+*SLA*

where:

MAWA = *Maximum Applied Water Allowance* (gallons per year)
ETo = Reference Evapotranspiration **Appendix A** (inches per year)
0.55 = ET Adjustment Factor (ETAF) for residential areas
0.45 = ET Adjustment Factor (ETAF) for non residential areas1.0 = ET Adjustment Factor (ETAF) for *Special Landscape Area*
LA = Landscaped Area (square feet)
0.62 = *Conversion factor* (to gallons per square foot)
SLA = *Special Landscape Area* (square feet)

Example Calculation: a hypothetical landscape project in Santa Ana, CA with an irrigated landscape area of 40,000 square feet with 10,000 square feet of *Special Landscape Area*. To calculate *MAWA*, the annual reference evapotranspiration value for Santa Ana is 48.2 inches as listed in the Reference Evapotranspiration Table in **Appendix A**.

	ETo		ETAF		LA or *SLA* (ft^2)		Conversion		*MAWA (*Gallons Per Year)
MAWA for LA =	48.2	x	0.45	x	40,000	x	*0.62*	=	537,912
MAWA for *SLA* =	48.2	x	1.0	x	10,000	x	*0.62*	=	298,840
Total *MAWA* =					50,000				836,752 Gallons per year for LA+*SLA*

Estimated Applied Water Use

EAWU = ETo x K_L x LA x *0.62* ÷ *IE* = Gallons per year

where:

EAWU = *Estimated Applied Water Use* (gallons per year)
ETo = Reference Evapotranspiration **Appendix A** (inches per year)
K_L = *Landscape Coefficient*
LA = Landscaped Area (square feet)
0.62 = *Conversion factor* (to gallons per square foot)
IE = Irrigation Efficiency = IME x DU
IME = Irrigation Management Efficiency (90%)
DU = Distribution Uniformity of irrigation head

K_L = K_s x K_d x K_{mc}

K_s = species factor (range = 0.1-0.9) (see *WUCOLS* list for values)
K_d = density factor (range = 0.5-1.3) (see *WUCOLS* for density value ranges)
K_{mc} = *microclimate* factor (range = 0.5-1.4) (see *WUCOLS*)

WUCOLS – ***www.owue.water.ca.gov/docs/wucols00.pdf***

Example Calculation:

	ETo		K_L		LA		Conversion		*IE*		*EAWU (Gallons per year)*
Special Landscape Area	48.2	x	1.00	x	10,000	x	*0.62*	÷	0.75	=	398,453
Cool Season Turf	48.2	x	1.00	x	0	x	*0.62*	÷	0.71	=	0
Warm Season Turf	48.2	x	0.65	x	0	x	*0.62*	÷	0.71	=	0
High Water Using Shrub	48.2	x	0.70	x	0	x	*0.62*	÷	0.71	=	0
Medium Water Using Shrub	48.2	x	0.50	x	15,000	x	*0.62*	÷	0.65	=	344,815
Low Water Using Shrub	48.2	x	0.30	x	25,000	x	*0.62*	÷	0.75	=	298,840
Very Low Water Using Shrub	48.2	x	0.20	x	0	x	*0.62*	÷	0.71	=	0
Other	48.2	x	0.50	x	0	x	*0.62*	÷	0.71	=	0
Other	48.2	x	0.50	x	0	x	*0.62*	÷	0.71	=	0
Total *EAWU* =					50,000						1,042,109 Gallons per year

Compare *EAWU* with *MAWA*.
The *EAWU* (1,042,109 gallons per year) is less than *MAWA* (1,135,592 gallons per year). For this example, the water budget complies with the *MAWA*.

List *sprinkler heads*, microspray and drip *emitters* here along with average *precipitation rate* and *Distribution Uniformity of Irrigation Head*.

***Sprinkler Head* Types**	**Average *Precipitation Rate***	***Distribution Uniformity of Irrigation Head***
Drip		
Microspray		
Bubbler		
Low precipitation rotating nozzles		
Stream rotors		

WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the *project applicant* for each Point of Connection. Please complete all sections of the worksheet.

Point of Connection #__

Maximum Applied Water Allowance

Total *MAWA* = (ETo x 0.7 x LA in Sq. Ft. x *0.62*) + (ETo x 1.0 x *SLA* in Sq. Ft. x *0.62*) = Gallons per year for LA+*SLA*

where:

MAWA = *Maximum Applied Water Allowance* (gallons per year)
ETo = Reference Evapotranspiration **Appendix A** (inches per year)
0.55 = ET Adjustment Factor (ETAF) for residential areas
0.4 5 = ET Adjustment Factor (ETAF) for non residential areas1.
1.0 = ET Adjustment Factor (ETAF) for *Special Landscape Area*
LA = Landscaped Area (square feet)
0.62 = *Conversion factor* (to gallons per square foot)
SLA = *Special Landscape Area* (square feet)

MAWA Calculation:

	ETo		ETAF		LA or *SLA* (ft^2)		Conversion		*MAWA (*Gallons Per Year)
MAWA for LA =		x	0.45	x		x	*0.62*	=	
MAWA for *SLA* =		x	1.0	x		x	*0.62*	=	
Total *MAWA* =									

Estimated Applied Water Use

EAWU = ETo x K_L x LA x *0.62* ÷ *IE* = Gallons per year

where:

EAWU = *Estimated Applied Water Use* (gallons per year)
ETo = Reference Evapotranspiration **Appendix A** (inches per year)

K_L = K_s x K_d x K_{mc}

K_s = species factor (range = 0.1-0.9) (see *WUCOLS* list for values)

K_L = *Landscape Coefficient* LA = Landscaped Area (square feet) *0.62 = Conversion factor* (to gallons per square foot) *IE = Irrigation Efficiency = IME x DU* *IME = Irrigation Management Efficiency (90%)* *DU = Distribution Uniformity of irrigation head*	K_d = density factor (range = 0.5-1.3) (see *WUCOLS* for density value ranges) K_{mc} = *microclimate* factor (range = 0.5-1.4) (see *WUCOLS*) *WUCOLS* – ***www.owue.water.ca.gov/docs/wucols00.pdf***

EAWU Calculation:

	ETo		K_L		LA		Conversion		*IE*		*EAWU (*Gallons Per Year)
Special Landscape Area		x		x		x	*0.62*	÷		=	
Cool Season Turf		x		x		x	*0.62*	÷		=	
Warm Season Turf		x		x		x	*0.62*	÷		=	
High Water Using Shrub		x		x		x	*0.62*	÷		=	
Medium Water Using Shrub		x		x		x	*0.62*	÷		=	
Low Water Using Shrub		x		x		x	*0.62*	÷		=	
Very Low Water Using Shrubs		x		x		x	*0.62*	÷		=	
		x		x		x	*0.62*	÷		=	
		x		x		x	*0.62*	÷		=	
		x		x		x	*0.62*	÷		=	
		x		x		x	*0.62*	÷		=	
		x		x		x	*0.62*	÷		=	
		x		x		x	*0.62*	÷		=	
Other		x		x		x	*0.62*	÷		=	
Total *EAWU* =											

List *sprinkler heads*, microspray and drip *emitters* here along with average *precipitation rate* and *Distribution Uniformity of Irrigation Head*.

***Sprinkler Head* Types**	**Average *Precipitation Rate***	***Distribution Uniformity of Irrigation Head***
Drip		
Microspray		
Bubbler		
Low precipitation rotating nozzles		
Stream rotors		

Appendix F - Prescriptive Compliance Option.

(a) This appendix contains prescriptive requirements which may be used as a compliance option to the Model Water Efficient Landscape Ordinance.

(b) Compliance with the following items is mandatory and must be documented on a landscape plan in order to use the prescriptive compliance option:

(1) Submit a Landscape Documentation Package which includes the following elements:

(A) date
(B) project applicant
(C) project address (if available, parcel and/or lot number(s))
(D) total landscape area (square feet), including a breakdown of turf and plant material
(E) project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed)
(F) water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well
(G) contact information for the project applicant and property owner
(H) applicant signature and date with statement, “I agree to comply with the requirements of the prescriptive compliance option to the MWELO”.

(2) Incorporate compost at a rate of at least four cubic yards per 1,000 square feet to a depth of six inches into landscape area (unless contra-indicated by a soil test);

(3) Plant material shall comply with all of the following;

(A) For residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for 75% of the plant area excluding edibles and areas using recycled water; For non-residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for 100% of the plant area excluding edibles and areas using recycled water;
(B) A minimum three inch (3″) layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.

(4) Turf shall comply with all of the following:
(A) Turf shall not exceed 25% of the landscape area in residential areas, and there shall be no turf in non-residential areas;
(B) Turf shall not be planted on sloped areas which exceed a slope of 1 foot vertical elevation change for every 4 feet of horizontal length;

(C) Turf is prohibited in parkways less than 10 feet wide, unless the parkway is adjacent to a parking strip and used to enter and exit vehicles. Any turf in parkways must be irrigated by sub-surface irrigation or by other technology that creates no overspray or runoff.

(5) Irrigation systems shall comply with the following:

(A) Automatic irrigation controllers are required and must use evapotranspiration or soil moisture sensor data and utilize a rain sensor.

(B) Irrigation controllers shall be of a type which does not lose programming data in the event the primary power source is interrupted.

(C) Pressure regulators shall be installed on the irrigation system to ensure the dynamic pressure of the system is within the manufacturers recommended pressure range.

(D) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be installed as close as possible to the point of connection of the water supply.

(E) All irrigation emission devices must meet the requirements set in the ANSI standard, ASABE/ICC 802-2014. "Landscape Irrigation Sprinkler and Emitter Standard," All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.

(F) Areas less than ten (10) feet in width in any direction shall be irrigated with subsurface irrigation or other means that produces no runoff or overspray.

(6) For non-residential projects with landscape areas of 1,000 sq. ft. or more, a private submeter(s) to measure landscape water use shall be installed.

(c) At the time of final inspection, the permit applicant must provide the owner of the property with a certificate of completion, certificate of installation, irrigation schedule and a schedule of landscape and irrigation maintenance.