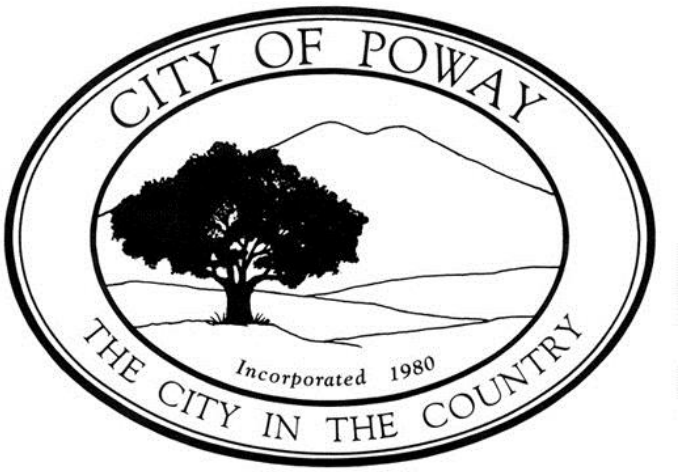
CITY OF POWAY



LANDSCAPE AND IRRIGATION DESIGN MANUAL

Prepared for the City of Poway by
GFH Landscape Architecture

September 2015

City Council Resolution No. P-10-04
Revised City Council Resolution No. P-15-24

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

INTRODUCTION

In 1990, the California Legislature enacted AB 325, the "Water Conservation in Landscaping Act." This legislation required that cities and counties, including Poway, adopt ordinances to promote the design, installation, and maintenance of water efficient landscapes. The City of Poway, *Guide to Landscape Requirements*, was revised to comply with the State mandate and adopted by City Council in 1997.

In 2006, the State repealed the Act and adopted a new Water Conservation in Landscaping Act, Government Code Sections 65591 et seq. This update of the City's standards, entitled *Landscape and Irrigation Design Manual,* reflects current landscape industry standards and practices, and addresses new State mandates for greater efforts at water conservation and more efficient use of water in landscaping by working in conjunction with the Landscape Efficiency standards contained in Chapter 17.41 of the Poway Municipal Code (PMC).

The City of Poway Comprehensive Plan promotes the conservation and efficient use of water. Equally important, the Comprehensive Plan recognizes that landscapes are essential to community character and livability. It is the intent of the City to promote the values and benefits of landscapes, which provide:

- enhancement of the community's visual environment
- clean air and water
- recreation areas
- erosion prevention
- ecosystem and habitat restoration
- fire protection

The *Landscape and Irrigation Design Manual* establishes standards and requirements for landscape and irrigation improvements in the City of Poway. These standards and requirements are an outgrowth of the goals for community development and water conservation outlined in the City's Comprehensive Plan. Public and private development projects are subject to the requirements in this manual.

ONE. LANDSCAPE AND IRRIGATION PLAN SUBMITTAL REQUIREMENTS

A. GENERAL REVIEW PROCESS

1. Private Development Projects

1.1 Applicant shall submit complete landscape construction documents (plans, details, specifications, etc.) to Development Services Department for all projects as identified in Chapter 17.41 PMC or as may be required by the City as part of a discretionary permit review process.

1.2 Construction documents shall be prepared by, or under direct supervision of, registered Landscape Architects (State of California) and shall bear Landscape Architects' signature and seal (unless the City specifically authorizes the plan to be prepared by another professional).

1.3 Two bond print sets of construction documents, plus fees and deposits, shall be submitted to Development Services Department for review and approval.

2. Public Improvement Projects

2.1 Complete landscape construction documents (plans, details, specifications, etc.) shall be submitted to Development Services Department for all projects as identified in Chapter 17.41 PMC or as may be required by the City as part of a discretionary permit review process.

2.2 Public improvements include Landscape Maintenance Districts (see Section Ten), Capital Improvement Projects, parks, and slope revegetation. Landscape Maintenance District (LMD) improvements shall be bonded before final development review.

2.3 Plans shall be prepared by, or under direct supervision of, California registered Landscape Architects. Plans shall bear Landscape Architects' seal and signature.

2.4 If Landscape Maintenance District areas are within project boundaries, then construction documents for those areas shall be prepared and submitted separately from those for private development.

2.5 Conceptual landscape plans for public improvement projects shall be reviewed and approved by the Directors of Development Services and Public Works.

2.6 Three bond print sets of construction documents, plus fees and deposits, shall be submitted to Development Services Department for review and approval.

B. PRELIMINARY LANDSCAPE PLAN SUBMITTALS

1. Existing Conditions Plan

"Existing Conditions" plans shall be submitted to Development Services Department with project applications and conceptual site plans for development review. Plans shall indicate:

1.1 Existing vegetation (native, naturalized, and ornamental trees, shrubs and ground cover areas, including street trees and other parkway plantings). Living trees with trunk diameters in excess of three inches shall be surveyed and plotted on plan.

1.2 Areas to remain in natural state (undisturbed by grading operations).

1.3 Location, type, and quantity of vegetation to be removed.

1.4 Existing topography and significant natural features.

1.5 Buildings, trails, walks, fences, walls, and other existing improvements.

2. Tree Removal Permit

Existing living onsite trees shall be retained and protected during construction unless approved for removal. Dead, dying and potentially dangerous trees shall be approved for removal at the discretion of Development Services Department during review of existing onsite trees. Living trees that are approved for removal shall be replaced as required by Development Services Department.

3. Landscape Concept Plans

Landscape concept plan submittals to Development Services Department shall include, but not be limited to, the following items:

3.1 Three bond prints sets of landscape concept plans with conceptual site plans for project development.

3.2 Proposed slope gradients of 5:1 and greater shall be clearly shown.

3.3 Turf shall be represented distinctly and separately from shrub and ground cover areas. Percentage of landscape area in turf shall be noted on plans.

3.4 Plant legends shall identify proposed plant materials by botanical and common names, graphic symbols, container sizes, and spacing (if applicable).

3.5 Notes describing types of irrigation system shall be on plans. Planting areas utilizing different types of irrigation (i.e., drip vs. spray) shall be clearly identified.

3.6 Provide description of landscape development and design procedures intended to achieve water conservation and efficient landscape water management.

C. LANDSCAPE AND IRRIGATION CONSTRUCTION DOCUMENT SUBMITTALS

1. General Requirements

1.1 The outline below summarizes information required to submit complete construction documents for review and approval.

a. Bond print sets initially required by the Public Works and Development Services Departments for first plan check shall include:
- complete landscape and irrigation plans, specifications, details, notes, etc.;
- City Council resolution of approval;
- agricultural suitability soils analysis report - submit before start of construction;
- irrigation system pressure loss calculations (worst case condition) for each water meter.

b. Landscape plans shall indicate easements, utilities, Fire Department connections, and other improvements that may affect landscape construction as shown on architectural and engineering plans.

c. First submittal of LMD and public improvement plans shall include cost estimate for landscape installation.

d. Approved grading plan, or current grading plan submittal.

1.2 Second and subsequent review submittals to City shall consist of two sets of prints and the original redlines.

1.3 After plan check is complete, final submittal to the Development Services Department shall include following items:

a. Public Projects (LMDs and public landscape improvement plans):
   - wet signature mylar reproducibles (one set) to be kept by City for record purposes
   - two signed sets of bond prints.

b. Private Development Projects:
   - reproducible title sheet to be signed by City and returned to Applicant;
   - two sets of bond prints to be signed by City and kept for inspection and record purposes.

1.4 For plans prepared by a Landscape Architect, the Landscape Architects' seal and signature shall appear on each sheet.

a. Registered license numbers and renewal dates shall appear on construction documents.

b. Licensed contractors, working within classifications for which licenses were issued, may design systems and facilities only for work to be performed and supervised by those contractors. Requirements in this manual shall apply to such work.

1.5 Title block on each page shall contain information noted below (use City standard title block on LMD and public improvement plans):

a. Project title and site address;

b. Tract number, tentative tract number, tentative map number, grading plan number, improvement plan number, landscape maintenance district number, and other applicable reference numbers;

c. Name, address, telephone number, and license number of registered Landscape Architect.

1.6 LMD and public landscape improvement plans shall be prepared on City standard "D" size sheets measuring 24 inches by 36 inches.

1.7 Incomplete construction documents shall not be submitted. Submittals that are not complete will be returned to Applicant.

1.8 Plans shall be prepared at one inch equals forty feet (1 in. = 40 ft.) minimum. Larger plan scales may be required. Scale shall be clearly noted on each sheet.

1.9 North arrows shall appear on each sheet.

1.10 Match lines shall be shown clearly and labeled to provide easy plan reference.

1.11 Following items related to landscape construction shall appear on plans:

a. Public rights-of-way;

b. Property lines, project limits, subdivision boundaries;
c. Building areas (existing and proposed);

d. Paved areas (including street sidewalks);

e. Walls, fences, gates, and trails (existing and proposed);

f. Utilities, easements, streetlights, and fire hydrants as shown on public improvement plans;

g. Electrical and water services necessary for landscape construction.

1.12 Revisions to signed plans shall be reviewed and approved by the City and noted on each sheet prior to construction.

1.13 Text font size shall be 10 point minimum on CAD drawings and 12 point minimum for typewritten specifications.

2. Title Sheet Requirements

2.1 Project location map.

2.2 Vicinity map with following information:

a. Street configuration within or adjacent to tract or project;

b. Nearest arterial or highway intersection;

c. Street names;

d. North arrow;

e. Match lines, if applicable, and key map;

f. Site location;

g. Thomas Bros. map coordinates.

2.3 Sheet index

2.4 General notes (not limited to the following):

a. Contractor shall notify the Development Services Department at least 48 hours (two working days) prior to starting construction.

b. Owner/Developer shall permanently and fully maintain landscaped areas, including street trees, within adjacent public rights-of-way and general utility easements in accordance with project conditions on file with the City.

c. Turf areas shall have a maximum slope of 3:1 (33% gradient).

d. (*Preparer of plans to specify*) soil testing laboratory shall perform agricultural soils tests. Soils testing for agricultural suitability shall be accomplished at conclusion of final grading. Submit two copies of agricultural suitability soil analysis report to the Development Services Department prior to start of construction.

e. Contractor shall verify existing static water pressure at each point-of-connection prior to installing irrigation system. Verification shall be made with the Poway Customer Services Department.

f. Provide concrete mow strips between turf and ground cover, and between turf and walls. Refer to Standard Details regarding mow strips.

g. Contractor shall obtain permits required to complete landscape improvements prior to start of construction.

h. Irrigation systems for individual single-family lots shall have points-of-connection between water meters and water service risers into dwellings, and ahead of water regulating devices installed for dwellings.

i. Landscape work shall be in accordance with City of Poway, *Landscape and Irrigation Design Manual*, latest adopted edition. Contractor is responsible for becoming familiar with this document.

j. Landscape improvements shall be completed and approved by the City prior to issuance of occupancy permits.

k. Contractor shall notify “DigAlert” (1-800-227-2600) prior to start of excavation in public rights-of-way and utility or City-held easements.

l. For private development projects with no public landscape improvements, Contractor shall provide as-built drawings of irrigation system to Owner/Developer at time of final acceptance. Contractor shall provide City with evidence of turnover of as-built plans to Owner/Developer.

m. Contractor shall provide stormwater and non-stormwater pollution prevention measures and Best Management Practices in accordance with City of Poway Grading Ordinance, Standard Urban Stormwater Mitigation Plan (SUSMP) Ordinance, and other applicable codes and ordinances.

n. Owner/Developer shall obtain a Right-of-Way Permit or Encroachment Maintenance and Removal Agreement, as determined by the City of Poway Director of Development Services/City Engineer, prior to the construction of any private improvements, including installation of required street trees, in the public rights-of-way and City-held easements. Permits and agreements shall be reviewed and approved by the Department of Development Services and Department of Public Works.

o. Areas within Landscape Maintenance Districts shall be maintained by Owner/Developer for two (2) years after City Council acceptance of landscape improvements. Acceptance generally occurs 4-6 weeks after initial inspection of landscape improvements.

2.5 Total landscaped area, and percentage of landscaped area in turf, shall be noted on the title sheet. On LMD plan title sheet, the Landscape Architect shall calculate and show the estimated value of the LMD improvements.

2.6 Signature Block for Approvals

Consultants providing landscape plan check services shall sign plans. Signature block shall be provided on title sheet for following signatures:

a. Landscape Maintenance Districts and Public Parks:
- Director of Public Works
- Director of Development Services or City Engineer
- Consulting City Landscape Architect

b. Capital Improvement Projects:
- City Engineer

c. For other projects requiring landscape plans:
- Development Services/Project Planner
- Consulting City Landscape Architect
- Plan Preparer

2.7 When a Landscape Architect has prepared the plans, the Declaration shall appear on the title sheet and shall be signed by the Landscape Architect.

DECLARATION OF RESPONSIBLE CHARGE

I hereby declare that I am the Landscape Architect of Work for this project, that I have exercised responsible charge over the design of this project as defined in Sections 5615 through 5683 of the California Business and Professions Code, and that the design is consistent with current standards.

I understand that the check of the project plans and specifications by the City of Poway [*] is confined to a review only and does not relieve me, as Landscape Architect of Work, of my responsibilities for project design. The plan check is not a determination of the technical adequacy of the design of these improvements.

These plans and specifications have been prepared in substantial conformance with all special conditions of approval related to project landscape improvements, including the approved Landscape Concept Plan.

Landscape Architect's Name: _____

Address: _____

Telephone No.: _____

Landscape Architect's Seal

(Affix and Sign/Date)

* insert following (delete brackets) when submittal of reclaimed water irrigation plans to the County of San Diego is required: [and County of San Diego, Department of Environmental Health]

D. LANDSCAPE DOCUMENTATION PACKAGE

An applicant for a Building Permit for a project described in PMC 17.41.040 shall submit a landscape documentation package with the permit application.

1. The landscape documentation package shall contain the following:

    1.1 A soil management report and plan that complies with PMC 17.41.080, that analyzes the soil within each landscaped area of the project and makes recommendations regarding soil additives.

    1.2 Planting and irrigation plans that comply with PMC 17.41.090 that describes the landscaping and irrigation for the project.

    1.3 A water efficient landscape worksheet, that complies with PMC 17.41.100, that calculates the Maximum Applied Water Use (MAWA) and the Estimated Total Water Use (ETWU) for the project.

    1.4 A grading design plan that complies with PMC 17.41.110, that describes the grading of the project. If the project applicant has submitted a grading plan with the application for the project, the Director may accept that grading plan in lieu of the grading design plan required by this Subsection if the grading plan complies with PMC 17.41.110.

2. Soil Management Report

    2.1 The soil management report required by Subsection D.1 shall be prepared by a licensed landscape architect, licensed civil engineer, licensed architect, or other person with similar training necessary to prepare the applicable plan and report, and shall contain the following information:

        a. An analysis of the soil for the proposed landscaped areas of the project that includes information about the soil texture, soil infiltration rate, pH, total soluble salts, sodium, and percent organic matter.

        b. Recommendations about soil amendments that may be necessary to foster plant growth and plant survival in the landscaped area using efficient irrigation techniques.

    2.2 When a project involves mass grading of a site, the applicant shall submit the soil management report that complies with Subsection 2.1 above with the certificate of completion.

    2.3 The soil management report shall include information regarding proposed soil amendments and mulch:

a. The report shall identify the type and amount of mulch for each area where mulch is applied. Mulch shall be used as follows:

(i) A minimum two-inch layer of mulch shall be applied on all exposed soil surfaces in each landscaped area, except in turf areas, creeping or rooting ground covers, or direct seeding applications where mulch is contraindicated.

(ii) Stabilizing mulch shall be applied on slopes.

(iii) The mulching portion of seed/mulch slurry in hydroseeded applications shall comply with Subsection 2.1 above.

(iv) Flammable mulch material shall not be used**.**

b. The report shall identify any soil amendments, and their type and quantity.

3. Planting and Irrigation Plans

3.1 The planting and irrigation plans required by Subsection D.1 shall be shall be prepared by a licensed landscape architect, licensed civil engineer, licensed architect, or other person with similar training necessary to prepare the applicable plans. The plans shall:

a. Include the MAWA for the plans, including the calculations used to determine the MAWA. The calculations shall be based on the formula in Subsection D7.

b. Include the ETWU for the plans, including the calculations used to determine the ETWU. The calculations shall be based on the formula in Subsection D8.

c. Include a statement, signed under penalty of perjury, by the person who prepared the plans that provides, "I am familiar with the requirements for landscape and irrigation plans contained in Chapter 17.41 PMC, Landscape Efficiency Standards. I have prepared this plan in compliance with those regulations. I certify that the plans implement those regulations to provide efficient use of water."

d. Demonstrate compliance with best management practices required by Division IV of Title 16 and Chapter 13.09 PMC.

e. Address fire safety issues, and demonstrate compliance with State and City of Poway requirements for fire fuel management around buildings and structures, and shall avoid the use of fire-prone vegetation.

3.2 The Planting Plan shall meet the following requirements:

a. The plan shall include a list of all vegetation by common and botanical plant name, which exists in the proposed landscaped area. The plan shall state what vegetation will be retained and what will be removed.

b. The plan shall include a list of all vegetation by common and botanical plant name, which will be added to each landscaped area. No invasive plant species, as identified in the WUCOLS III manual, shall be added to a landscaped area. The plan shall include the total quantities by container size and species. If the applicant intends to plant seeds, the plan shall describe the seed mixes, and applicable purity and germination specifications.

c. The plan shall include a detailed description of each water feature that will be included in the landscaped area, including the water surface area.

d. The plan shall be accompanied by a drawing showing, on a page or pages, the specific location of all vegetation, retained or planted, the plant spacing and plant size, natural features, water features, and hardscape areas. The drawing shall include a legend listing the common and botanical plant name of each plant shown on the drawing.

e. All plants shall be grouped in hydrozones and the irrigation shall be designed to deliver water to hydrozones based on the moisture requirements of the plant grouping. A hydrozone may mix plants of moderate and low-water use, or mix plants of high-water use with plants of moderate-water use. No high-water use plants shall be allowed in a low-water use hydrozone. The plan shall also demonstrate how the plant groupings accomplish the most efficient use of water.

f. The plan shall identify areas permanently and solely dedicated to edible plants.

g. The plan shall demonstrate that landscaping, when installed and at maturity, will be positioned to avoid obstructing motorists' views of pedestrian crossings, driveways, roadways, and other vehicular travel ways. If the landscaping will require maintenance to avoid obstructing motorist's views, the plan shall describe the maintenance and the frequency of the proposed maintenance.

h. The plan shall avoid the use of landscaping with known surface root problems adjacent to a paved area, unless the plan provides for

installation of root control barriers or other appropriate devices to control surface roots.

i. Plants in a transitional area shall consist of a combination of site-adaptive and compatible native and/or non-native species. No invasive species shall be introduced or tolerated in a transitional area. The irrigation in a transitional area shall be designed so that no overspray or runoff shall enter an adjacent area that is not irrigated.

j. On a project other than a single-family residence, if recreation areas are proposed, the plan shall identify if they are passive or active recreational areas.

3.3 The Irrigation Plan shall meet the following requirements:

a. The plan shall show the location, type and size of all components of the irrigation system that will provide water to the landscaped area, including the controller, water lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices.

b. The plan shall show the static water pressure at the point of connection to the public water supply, and the flow rate in gallons, the application rate in inches per hour, and the design operating pressure in pressure per square inch for each station.

c. The irrigation system shall be designed to prevent runoff, overspray, low-head drainage, and other similar conditions where irrigation water flows or sprays onto areas not intended for irrigation. The plan shall also demonstrate how grading and drainage techniques promote healthy plant growth and prevent erosion and runoff.

d. The plan shall identify each area irrigated with reclaimed water.

e. The plan shall provide that any slope greater than 25 percent will be irrigated with an irrigation system with a precipitation rate of .75 inches per hour or less to prevent runoff and erosion. As used in this chapter, 25 percent grade means one foot of vertical elevation change for every four feet of horizontal length. The applicant may employ an alternative design if the plan demonstrates that no runoff or erosion will occur.

f. The plan shall provide that all wiring and piping under a paved area that a vehicle may use, such as a parking area, driveway or roadway, will be installed inside a PVC conduit.

g. The plan shall provide that irrigation piping and irrigation devices that deliver water, such as sprinkler heads, shall be installed below grade if they are within 24 inches of a vehicle or pedestrian use area. The Director may allow on-grade piping where landform constraints make below grade piping infeasible.

h. The plan shall provide that only low-volume or subsurface irrigation shall be used to irrigate any vegetation within 24 inches of an impermeable surface, unless the adjacent impermeable surfaces are designed and constructed to cause water to drain entirely into a landscaped area.

i. The irrigation system shall provide for the installation of a manual shutoff valve as close as possible to the water supply. Additional manual shutoff valves shall be installed between each zone of the irrigation system and the water supply.

j. The irrigation system shall provide that irrigation for any landscaped area will be regulated by an automatic irrigation controller.

k. The irrigation system shall be designed with a landscape irrigation efficiency necessary to meet the MAWA.

l. The plan shall describe each automatic irrigation controller the system uses to regulate the irrigation schedule and whether it is a weather-based system or moisture-detection system. The plan shall depict the location of electrical service for the automatic irrigation controller, or describe the use of batteries or solar power that will power valves or a smart controller.

4. Water Efficient Landscape Worksheet

The Water Efficient Landscape Worksheet required by Subsection D.1 shall be prepared by a licensed landscape architect, licensed civil engineer, licensed architect, or other person with similar training necessary to prepare the applicable plan and report, and shall contain the following:

4.1 A hydrozone information table that contains a list of each hydrozone in the landscaped area of the project and complies with the following requirements:

a. For each hydrozone listed, the table shall identify the plant types and water features in the hydrozone, the irrigation methods used, the square footage, and the percentage of the total landscaped area of the project that the hydrozone represents.

b. The plant types shall be categorized as turf, high-water use, moderate-water use or low-water use.

4.2 Water budget calculations, which shall meet the following requirements:

a. The plant factor used shall be from Water Use Classification of Landscape Species (WUCOLS) III. The plant factor shall be 0.1 for very low-water use plants, 0.3 for low-water use plants, 0.5 for moderate-water use plants, and 0.8 for high-water use plants. A plan that mixes plants in a hydrozone that require a different amount of water shall use the plant factor for the highest water using plant in the hydrozone.

b. Temporarily irrigated areas shall be included in the low-water use hydrozone. Temporarily irrigated, as used in this chapter, means the period of time when plantings only receive water until they become established.

c. The surface area of a water feature, including swimming pools, shall be included in a high-water use hydrozone.

d. The calculations shall use the formula for the MAWA in Subsection D7 and for the ETWU in Subsection D8.

e. Each special landscaped area shall be identified on the worksheet and the area's water use calculated using an ETAF of 1.0.

5. Grading Design Plan

The grading design plan required by Subsection D.1 shall be prepared by a California licensed civil engineer, licensed landscape architect, licensed architect, or person with similar professional training, and shall comply with following requirements:

5.1 The grading on the project site shall be designed for the efficient use of water by minimizing soil erosion, runoff and water waste resulting from precipitation and irrigation.

5.2 The plan shall show the finished configurations and elevations of each landscaped area, including the height of graded slopes, the drainage pattern, pad elevations, finish grade, and any stormwater retention improvements.

6. Irrigation Schedule

The irrigation schedule required by Subsection D.1 shall be prepared by a licensed civil engineer, licensed landscape architect, licensed architect, or person with similar professional training and provide the following information:

6.1 A description of the automatic irrigation system that will be used for the project.

6.2 The ETo data relied on to develop the irrigation schedule, including the source of the data.

6.3 The time period when overhead irrigation will be scheduled, and confirm that no overhead irrigation shall be used between the hours, and during the days of the week, that may be periodically set and modified by the City of Poway.

6.4 The parameters used for setting the irrigation system controller for watering times for:

a. The plant establishment period.

b. Established landscaping.

c. Temporarily irrigated areas.

d. Different seasons during the year.

6.5 The consideration used for each station for the following factors:

a. The days between irrigation.

b. Station run time in minutes for each irrigation event, designed to avoid runoff.

c. Number of cycle starts required for each irrigation event, designed to avoid runoff.

d. Amount of water to be applied on a monthly basis.

e. The root depth setting.
f. The plant type setting.

g. The soil type.

h. The slope factor.

i. The shade factor.

7. Maximum Applied Water Use (MAWA)

A landscape project subject to this chapter shall not exceed the MAWA. The MAWA for a landscape project shall be determined by the following calculation:

MAWA = (ETo)(0.62)[0.7 x LA + 0.3 x SLA]

7.1 The abbreviations used in the equation have the following meanings:

a. MAWA = Maximum Applied Water Allowance in gallons per year.

b. ETo = Evapotranspiration in inches per year.

c. 0.62 = Conversion factor to gallons per square foot.

d. 0.7= ET adjustment factor for plant factors and irrigation efficiency.

e. LA = Landscaped area includes special landscaped area in square feet.

f. 0.3 = the additional ET adjustment factor for a special landscaped area (1.0 - 0.7 = 0.3)

g. SLA = Portion of the landscaped area identified as a special landscaped area in square feet.

8. Estimated Total Water Use (ETWU)

Applicant for a project subject to this chapter shall calculate the ETWU for each landscaped area and the entire project using the following equation:

ETWU = (ETo)(0.62)(PF x HA / IE + SLA)

8.1 The abbreviations used in the equation have the following meanings:

a. ETWU = Estimated total water use in gallons per year.

b. ETo = Evapotranspiration in inches per year.

c. 0.62 = Conversion factor to gallons per square foot.

d. PF = Plant factor from WUCOLS

e. HA = Hydrozone Area in square feet. Each HA shall be classified based upon the data included in the landscape and irrigation plan as high, medium or low-water use.

f. IE = Irrigation Efficiency of the irrigation method used in the hydrozone.

g. SLA = Special landscaped area in square feet.

8.2 The ETWU for a proposed project shall not exceed the MAWA.

TWO. LANDSCAPE WATER CONSERVATION

A. WATER CONSERVATION

The City of Poway has found that limited state water supplies are subject to ever-increasing demands, that the City's economic prosperity depends on adequate supplies of water, and that landscape design, installation, and maintenance can and should be water efficient. Consistent with these findings, the purpose of this section is to establish minimum standards and requirements for designing, installing, and maintaining water efficient landscapes in new projects. These requirements may be used to improve water management practices and encourage water waste prevention in established landscapes. Specific requirements for irrigation and planting design, materials, and installation are outlined in Sections Three and Four following this section.

B. WATER EFFICIENT LANDSCAPES

Water efficient landscapes can be achieved through appropriate design and prudent water management. San Diego County Water Authority imports over 90 percent of the water used in the county. A large portion of urban water use is irrigating landscaped areas. Water efficient landscape design recognizes these facts and utilizes appropriate techniques and materials to achieve water conservation without sacrificing pleasing and functional landscapes. Principles of water efficient landscapes can be outlined in seven basic steps.

1. Development and Design

   This initial step is crucial to well-conceived, water efficient landscapes. Consideration should be given to use areas, circulation patterns, and budget. Site conditions, such as sunny and shady areas, low spots, soils, slopes, wind patterns, and views should be analyzed.

2. Soil Improvements

   Most plants do best with good soil drainage. Soil improvements should be directed toward providing adequate water penetration and drainage for healthy root development. Amendments should be based on soil testing for agricultural suitability, and type of planting. Proper amendments improve water-holding capacity of soil.

3. Efficient Irrigation Systems

   Well-designed irrigation systems should be tailored to the needs of different plant groupings. Trees and shrubs can be watered with micro-irrigation systems such as bubblers, drip emitters, and low-volume sprinklers. Turf areas are usually watered with overhead irrigation. However, low-gallonage and low-angle nozzles should be used in turf irrigation systems. Automatic controllers that offer flexible

accurate timing of water application should be used. Water efficient irrigation systems should apply water slowly, and only where it is needed.

The City encourages alternative landscape irrigation methods where appropriate. Reclaimed water and graywater are available in some areas, or will be soon, for use in landscape irrigation. Subsurface drip irrigation can be used in areas where runoff and overspray of irrigation water could be a problem.

4. Plant Selection

Plants should be selected, and grouped together in the landscape, according to their watering needs. Soil conditions should also dictate type of plants used in landscapes. Plants with similar cultural requirements (sun, shade, soil type, water) should be placed together. Predominantly low-water use planting should be used in the majority of landscaped areas.

5. Appropriate Turf Areas

Turf grasses are the highest water users in the landscape. Turf should be restricted to highly visible and active use areas for play, picnicking, sports, and entertainment. If turf areas are necessary, then warm-season (such as hybrid Bermuda) grasses are most drought tolerant and should be used.

6. Mulches

Surface mulches reduce evaporation and cool the soil, thereby conserving water for use by plants. Mulches also slow soil erosion and reduce weed growth. Mulches are either organic (bark chips, shredded plant trimmings, compost) or inorganic (cobble, decomposed granite, pea gravel). They are available in many textures and colors. Spread mulch in a uniform layer two to three inches deep throughout planted areas.

7. Maintenance

Manmade landscapes require maintenance. However, water efficient landscapes should need less pruning, fertilizer, and water than conventional landscapes. Weeds should be removed at least monthly. Mulch should be re-applied where necessary. Check irrigation systems, especially emitters, sprinklers, and filters for blockages and leaks. Adjust irrigation watering cycles and timing to suit seasonal requirements.

C. GENERAL REQUIREMENTS

The following are requirements of the City of Poway regarding water conservation in the landscape:

1. Planting Design

1.1 Predominantly low-water use plants shall be specified for the majority of planting areas. Most plants should be capable of surviving drought conditions for limited periods of time.

1.2 Plants shall be grouped according to their horticultural requirements (water, soil, exposure). Similar plant types should be on the same irrigation circuits.

1.3 Planted areas shall be mulched and cultivated to retain soil moisture and reduce evaporation. A two-inch layer of mulch (minimum) shall be provided in planting areas (except herbaceous groundcover) with 3:1 slope gradient or less.

1.4 Turf shall be limited to highly visible and active use areas only. If turf areas are provided, then warm-season turf grasses, such as hybrid Bermuda, should be specified.

1.5 Turf shall be prohibited in street median islands and parking lot planter islands.

1.6 Consistent with vegetative fuel management requirements, native vegetation shall be preserved wherever possible.

2. Irrigation System Design

2.1 Micro-irrigation systems only shall be specified in street medians and parking lot planter islands. Irrigation systems should provide localized application of water, promote infiltration of water through soil, and prevent overspray onto pavement. Subsurface drip irrigation is required in street medians, where soil conditions do not pose a problem.

2.2 Spray irrigation systems shall be designed with head to head coverage. Overspray onto unplanted areas and hardscape such as driveways, walls, and sidewalks shall be prevented.

2.3 Spray heads shall utilize low precipitation rate, low angle nozzles where appropriate to minimize runoff and wind drift.

2.4 Trees in turf should be provided with low-volume irrigation to promote deep watering. Irrigation circuits for trees shall be separate from turf circuits.

2.5 Automatic irrigation controllers shall be provided on commercial, industrial, and multi-family developments, including common open space areas.

2.6 Water conservation features such as water budgeting, multiple programs and start times, and rain sensors shall be specified with irrigation system controllers.

3. Soil Improvements

3.1 Thorough soil analysis and testing shall be performed to determine necessary soil amendments and treatments.

3.2 Provide good drainage in turf and planting areas.

3.3 Plants that are adapted to existing soil conditions shall be selected in areas where extensive soil improvements are not feasible.

4. Maintenance

4.1 Trees and shrubs shall be pruned during dormancy or before new flush of growth in spring.

4.2 Mower blades shall be sharp at all times, and adjusted to cut turf grasses at their optimum heights.

4.3 Routinely aerate and de-thatch turf areas to facilitate water penetration into soil.

4.4 Planter areas shall be cultivated to control weeds that compete with desirable plants for nutrients and moisture. Pre- and post-emergent herbicides may be used in problem areas.

4.5 Perform routine maintenance on irrigation systems to ensure maximum efficiency and uniformity of coverage.

4.6 Repair malfunctioning, broken, and leaking irrigation equipment immediately.

4.7 Encourage deep rooting of plants and minimize runoff by programming short, frequent irrigation cycles.

4.8 Automatic irrigation systems shall be carefully monitored to ensure that the correct amount of water is applied to plants. Adjustments shall be made for variations in weather conditions and seasonal rainfall. Moisture sensing equipment may be used to monitor soil moisture.

4.9 Operate spray irrigation systems during late evening and early morning to minimize evaporation and wind drift.

4.10 Mulch shall be reapplied in planted areas to maintain a uniform two-inch layer (minimum).

D. RECLAIMED WATER USE FOR LANDSCAPE IRRIGATION

The City of Poway has developed the infrastructure in areas of the City to provide for the use of reclaimed water in landscape irrigation systems. During the project development review process, the City will determine whether or not projects will be required to use reclaimed water. For information regarding reclaimed water use requirements refer to the City of Poway, *Rules and Regulations for Reclaimed Water Use*, latest adopted edition.

1. General Requirements for Reclaimed Water Use in Onsite Landscape Irrigation Systems

   Requirements in Section Three of this document shall apply to design and installation of irrigation systems utilizing reclaimed water, unless noted otherwise.

   1.1 Plans for irrigation systems using reclaimed water require review and approval by the County of San Diego, Department of Environmental Health. Applicant shall be responsible for payment of any fees required by the County for plan check and inspection.

   1.2 After completion of the installation of any irrigation system utilizing reclaimed water, the City and County shall perform a cross-connection shutdown test. The test shall verify that there are no prohibited cross-connections between the potable and reclaimed water distribution systems.

   1.3 Reclaimed water meters shall be installed by City of Poway staff. Unless otherwise indicated on plans, no reclaimed water meters shall be installed until the City and County have successfully completed the required cross-connection shutdown tests.

   1.4 Reclaimed water irrigation plans shall include the City of Poway "Reclaimed Water Notes" on the title sheet (see Appendix C at the end of this document).

THREE. LANDSCAPE IRRIGATION SYSTEMS

The objective of this section is to aid in the preparation of irrigation plans and specifications, with special emphasis on water conservation, for landscape projects within the City of Poway. Special conditions that the Designer/Owner finds during project design and installation, and not covered by these requirements, shall be submitted to the City at the earliest possible date. Refer to Section Ten for additional irrigation requirements in City-maintained areas and Landscape Maintenance Districts. Minimum standards for water conservation in the landscape are contained in Section Two of this manual. Application of water efficient landscape principles in design and maintenance of irrigation systems is required by the City.

A. GENERAL REQUIREMENTS

1. Complete construction documents for automatic irrigation systems shall be submitted to the City for approval as a part of the project development review process. Irrigation systems shall be designed and installed in accordance with the requirements set forth herein.

2. Micro-irrigation systems only shall be utilized in street medians and parking lot planter islands. Micro-irrigation should be used in other landscaped areas adjacent to streets, roads, and parking lots to eliminate overspray onto paving. Landscaped street medians should utilize subsurface drip irrigation systems, except in problem soils (i.e., cobbly or rocky soil).

3. Landscape irrigation systems shall be designed and operated to prevent and minimize runoff and discharge of irrigation water onto roadways, driveways, structures, sidewalks, adjacent properties and areas not under City jurisdiction.

4. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, and sleeves that may be required. Contractor shall carefully investigate structural and finished conditions affecting work and plan accordingly, furnishing fittings and other equipment required to meet site conditions.

5. Drawings are generally diagrammatic and indicative of work to be provided. Work shall be installed so as to avoid conflicts between irrigation systems, planting, utilities, and architectural features.

6. Irrigation drawings shall include a complete and comprehensive irrigation legend indicating sprinkler radii, operating pressures, flows, and patterns. Other equipment and materials utilized in design shall also be included as part of the irrigation legend. Manufacturer, model number, size, and brief description of equipment shall be included in the legend.

7. Pressure Constraints

   7.1 Systems shall be designed to the lowest static pressure available at the meter.

   7.2 Pressure loss calculations for the worst hydraulic condition at each point-of-connection shall be submitted at plan check. Water velocity in PVC pipe shall not exceed five feet per second for pressure main line piping and six feet per second for non-pressure lateral line piping.

8. Irrigation systems shall be designed to minimize vandalism (with special attention at schools, parks, along trails, roads, walks, and street medians).

9. Irrigation systems shall be designed to deliver water at a rate that matches the evapotranspiration (ETo) deficit of mature planting and does not exceed soil percolation rates. Irrigation systems shall be programmed to operate only between the hours of 10:00 p.m. and 6:00 a.m. the following day unless other temporary watering restrictions have been authorized by the City.

10. Germination and plant establishment periods shall be exempt from Item 9 above. Micro-irrigation systems may be operated at any time during the day.

11. Provide details indicating procedures and materials required for installation of major components of the irrigation system in accordance with standard City details.

12. Separate lateral circuits shall be designed for different exposures, types of plant material, hydrozones (low vs. high-water use areas), slopes, and types of irrigation systems.

13. Irrigation plans shall indicate sleeve locations for wiring and piping below paving.

14. Irrigation systems shall deliver water efficiently and uniformly. Malfunctions and breaks shall be promptly repaired, and systems shall operate after repairs as originally designed and installed.

15. Water and Electric Service

   15.1 Separate dedicated meters for electrical and water services shall be provided on all LMD and public improvements projects.

   15.2 Indicate on irrigation drawings the locations of irrigation water meters, irrigation points-of-connection, and electrical points-of-connection for automatic controllers. Indicate whether Contractor, Owner, or utility service company will be responsible for coordination and installation of water and electrical service connections.

15.3 Electrical and water meter locations for irrigation systems shall be shown on plans and checked against public improvement plans.

15.4 The following information shall be provided on plans at each irrigation water meter and point-of-connection:

- static water pressure in pounds per square inch (psi) - contact Customer Services Department;
- meter size;
- peak irrigation demand in gallons per minute (gpm);
- meter elevation;
- service lateral type, size, and length.

16. Temporary and On Grade Systems

Approval in writing from the Development Services Department shall be obtained prior to design and installation of temporary and on grade irrigation systems.

17. Overhead Spray Systems

17.1 Pressure loss due to friction in sprinkler lateral line piping should not exceed 15 percent of sprinkler head operating pressure.

17.2 Separate lateral circuits shall be designed for sprinkler heads with precipitation rates that vary by more than 15 percent.

17.3 Spray heads and nozzles on lateral circuits shall have similar operating characteristics, including matched precipitation rates.

17.4 Spray heads shall be spaced to provide adequate uniform coverage of irrigated areas. Wind conditions and slope factors shall be considered during system design.

18. Micro-Irrigation Systems

“Micro-irrigation systems” refer to low-pressure, low-volume systems that apply water directly to plant root zones. Such systems include drip emitters, bubblers, micro-spray jets, low-volume sprinklers, and subsurface emitter tubing. Overhead spray systems are not considered low pressure, low-volume systems and equipment.

18.1 System components shall be capable of normal operation at low pressures (10-50 psi) and low-volumes (below one gpm).

18.2 Design of micro-irrigation systems shall provide balanced water application to plant materials of different sizes on the same lateral circuit.

18.3 Adequate filtration and pressure regulation shall be provided in accordance with equipment manufacturer's recommendations.

18.4 Lateral circuits shall incorporate devices for flushing accumulated particulate matter from lines. Flushing of laterals shall not cause erosion and other impacts to adjacent landscaped areas.

18.5 Systems shall be designed for mature sizes of irrigated plant material, including eventual rooting pattern of plants. A minimum of 50 percent of the root area of plant material shall be irrigated at all stages of growth, up to and including full mature size. Equipment required for mature plant size irrigation shall be installed initially. Future outlets for tubing shall be capped or otherwise sealed until needed.

18.6 Emitters shall be protected from soil and root incursion, and easily accessible by maintenance personnel (except approved subsurface emitter tubing).

18.7 Installation of subsurface drip irrigation systems is required in street medians to avoid overspray and runoff onto adjacent pavement. Other types of micro-irrigation systems may be utilized where soil conditions preclude use of subsurface drip tubing.

B. MATERIALS AND SYSTEMS REQUIREMENTS

The following standards establish minimum requirements for major components and types of irrigation systems permitted in the City of Poway. Materials and systems other than those noted below may be considered for use provided that such materials and systems can be proven to meet or exceed design and performance requirements contained herein.

1. Backflow Prevention Devices

1.1 Irrigation systems shall be isolated from potable water supplies by use of backflow prevention devices.

1.2 Reduced pressure backflow prevention devices shall be specified for all irrigation systems. Exceptions to this requirement shall be reviewed and approved by the Public Works Director.

1.3 Risers, unions, nipples, and fittings shall be brass or Type K hard copper. Piping between water meter and backflow preventer shall be Type K hard copper.

1.4 There shall be no openings and accessories (i.e.: hose bibs and drinking fountains) between meters or points-of-connection and backflow preventers.

2. Control Systems

2.1 Automatic controllers shall be provided for all irrigation systems. Controllers should have multiple programs and start times, water budgeting, repeat cycles, moisture-sensing capability, and battery backup, appropriate to requirements of the landscape design.

2.2 Controllers shall be equipped with rain-sensing, schedule override devices.

2.3 Controllers shall be located in structures, or installed in locking, weatherproof, vandal-resistant enclosures.

2.4 Control wiring shall be direct burial (DB) copper wire, American Wire Gauge (AWG), Underground Feeder (Type UF), Underwriters' Laboratories (UL) approved, 600 volt.

3. Valves

3.1 Provide main line isolation ball valves for sectional control of irrigation main line. Ball valves shall be bronze or heavy-duty plastic construction (150 psi minimum).

3.2 Manifold ball valves shall be same size as largest control valve in manifold.

3.3 Remote control valves shall be energy- and flow-efficient, globe or angle type, with bodies constructed of brass or heavy-duty plastic. Control valves shall be of slow-closing design, and automatically close if power is interrupted and valves malfunction.

3.4 Quick coupling valves shall be of heavy-duty brass construction, one or two-piece body design, with locking rubber or vinyl covers.

3.5 Anti-drain valves and spring-loaded check valves shall be of PVC Type I material with stainless steel springs and valve stems.

4. Pipe and Fittings

4.1 Irrigation pipe shall be manufactured from Type 1, Grade 1 or 2, 100 percent virgin polyvinyl chloride (PVC) compound in accordance with

American Society for Testing and Materials (ASTM) specifications. Solvent-weld fittings shall be Schedule 40 PVC minimum.

4.2 Polyethylene (PE) tubing shall be manufactured of linear, low-density polyethylene resin with pressure rating of 50 psi (at 100 degrees F.) for 0.5 inch (16 mm) tubing. PE tubing (0.5 inch) shall have minimum wall thickness of 0.048 inch. Specialty fittings shall be compatible with PE tubing.

4.3 Brass pipe shall be standard weight, iron pipe size (IPS), regular red brass. Fittings shall be threaded, Class 125, regular red brass.

4.4 Copper tubing shall be Type K, hard drawn.

5. Solvent Cement

Solvent cement and primer for PVC pipe shall be type recommended by pipe manufacturer. Cement used on pressure main line pipe and fittings shall have medium set time and cure time of 24 hours minimum.

6. Spray Heads

Spray head types and operating characteristics shall be reviewed and approved by the Development Services Department.

7. Sleeving

7.1 Pipe and wiring under vehicular use areas shall be installed in PVC Schedule 40 sleeves.

7.2 Sleeves shall be at least two times diameter of working pipe, or wire bundle, with minimum of two-inch size for irrigation pipe and wiring.

8. Backfill

Backfill for irrigation trenches shall be clean, native or import soil, free of rocks and debris larger than one inch in size.

9. Micro-Irrigation Equipment

9.1 Drip emitters shall be self-flushing and pressure-compensating.

9.2 Pressure gauges, or connections for gauges, shall be provided at drip valve control assemblies.

9.3 Emitter distribution tubing shall be flexible PVC or PE material.

9.4 Filters shall have flush valves and removable screens or disks, accessible for maintenance.

C. INSTALLATION AND MAINTENANCE REQUIREMENTS

1. Contractor shall not willfully install irrigation system as shown on drawings if obstructions, grade differences, and discrepancies in area dimensions exist in the field, which may not have been known during irrigation system design. Notify City as soon as obstructions and differences are discovered. If notification is not performed, then Contractor shall assume full responsibility for field changes.

2. Irrigation system shall meet performance standards with respect to water application and conservation noted below:

   2.1 Irrigation water shall be applied at rates that do not exceed soil percolation rates. If varying soil types are present onsite, then irrigation system design shall be compatible with soil having lowest percolation rate.

   2.2 Automatic systems shall be utilized and programmed to prevent ponding and runoff of irrigation water. If runoff occurs before landscape water requirements are met, then automatic controllers shall be reprogrammed with shorter and more frequent watering cycles.

   2.3 Irrigation systems shall distribute water uniformly throughout landscaped areas, with no excessively wet or dry areas.

3. Backflow Prevention Devices

   3.1 Reduced pressure backflow preventers shall be installed at points-of-connection of irrigation systems (downstream of meters). Concrete pads shall be installed below backflow preventers. Bottom of backflow preventer shall be 12 inches minimum and 18 inches maximum above finished surface of concrete pad.

   3.2 Backflow devices shall meet requirements of State of California Administrative Code, Title 17; California Department of Health Services “Guidance Manual for Cross Connection Control Programs,” latest edition (Public Water Supply Branch); and San Diego Regional Standard Drawings, including City of Poway Supplemental Amendments (latest edition).

   3.3 Backflow preventers, two inches and smaller, shall be installed with ball valves.

3.4 Provide backflow preventers with strainers and pressure regulating valves to protect devices from water supply system pressure surges and high system pressures.

4. Control Systems

4.1 Each controller station shall operate one remote control valve only.

4.2 Controller schedules shall be adjusted seasonally and as weather and plant conditions warrant.

4.3 Provide conduit for wire from electrical meter to controller.

4.4 Electrical work and equipment shall conform to National Electrical Manufacturers Association (NEMA) standards, UL requirements, National Electrical Code (NEC), and local codes.

5. Control Wiring

5.1 Depth of cover over control wires shall be same as main line piping (minimum).

5.2 Common (neutral) wires shall be white. Control wires shall be colors other than white (not red).

5.3 Wire connections to remote control valves shall be made with epoxy filled, waterproof splice kits.

5.4 Wire splices between controllers and valves are not permitted unless approved by the City. Approved wire splices shall be made in pull boxes only.

5.5 Wiring shall be bundled together with tape at 10-foot intervals and placed in same trench below main line piping.

5.6 Provide coil of extra control wire, 24 inches minimum length, at each remote control valve.

5.7 Two spare control wires (min.) shall be installed for each main line run. Install wires from each controller to end of main line trenches.

6. Valves

6.1 Provide isolation ball valves at points-of-connection, and at branches and “tees” in main lines.

6.2 Remote Control Valves

a. Install valves in manifold where possible.

b. Install valves below grade in rectangular valve boxes with locking lids. Valve boxes shall be manufactured of heavy-duty plastic. Install only one valve in each valve box.

c. Clearance between top of valve flow control handles and valve box lids, and between bottom of valves and gravel sumps, shall be two inches minimum and six inches maximum.

d. Clearance between top of piping and bottom of valve boxes and valve box “knock-outs” shall be two inches minimum and four inches maximum.

e. Valves shall not be installed closer than 12 inches from paving and structures.

g. Valves shall be located in shrub and ground cover areas unless otherwise approved by the City.

6.3 Quick Coupling Valves

a. Valves shall be spaced as shown on irrigation plans.

b. Valves located in manifolds with remote control valves shall be placed at ends of manifolds.

c. Valves shall be installed with concrete thrust blocks (one cubic foot minimum).

d. Valves shall be located in shrub and ground cover areas.

6.4 Check Valves and Anti-drain Valves

a. If low head drainage occurs, then install anti-drain valves on spray heads.

b. Check valves shall be installed on laterals as required to prevent drainage of water from irrigation sprinklers due to changes in elevation.

7. Pipe and Fittings

7.1 Pipe shall be “snaked” in trenches to allow for expansion and contraction.

7.2 Pipe shall be installed in trenches with markings at top of pipe and clearly visible for inspection.

7.3 Brass pipe shall be installed with Teflon tape on threaded fittings.

7.4 Cut plastic pipe and tubing cleanly with pipe cutters or shears. Do not cut pipe with saws.

8. Spray Heads

8.1 If irrigation heads are adjacent to trails, paved areas, sidewalks, and high use pedestrian areas, then install popup sprinklers (6-inch or 12-inch height) next to improvements.

8.2 Irrigation heads shall be installed with double swing joints and multiple threaded ells between heads and lateral piping.

9. Micro-Irrigation Systems

9.1 Components shall be installed below grade in plastic access sleeves and valve boxes.

9.2 Lateral piping and polyethylene tubing shall be installed below grade. Emitter tubing shall be installed four inches (minimum) below finish grade.

9.3 Emitter outlets shall be held in place above grade with plastic tubing stakes.

9.4 Emitter outlets on slopes shall be placed up slope of irrigated plants.

9.5 “Bug caps” shall be installed on emitter outlets to prevent debris from entering tubing.

9.6 Emitters shall be located no further than 20 feet from irrigated plants.

9.7 Lateral lines shall be flushed immediately after installation, with lateral end flush valves fully open. Sustain flow until flushed water is visually clear and free of debris.

10. Refer to Section Ten, “Public Works Landscape Improvement Projects,” for irrigation installation requirements related to following items:

- system flushing
- testing

11. Trench Excavation and Backfill

11.1. Trenching

a. Trenches shall be dug with straight runs. Bottoms of trenches shall evenly support pipes. Trenching shall follow layout indicated on plans, unless obstructions occur in the field.

c. Depth of backfill over pipelines and wiring:

- 36 inches minimum over pressure main lines greater than four inches in diameter and pressure lines under roadways.
- 24 inches minimum over pressure main lines three to four inches in diameter and irrigation lines under paving.
- 18 inches minimum over pressure main lines 2½ inches and smaller.
- 12 inches minimum over non-pressure lateral lines.
- 18 inches minimum, or same depth as main lines, for direct burial control wiring and 24 inches for electrical cable in conduit.

11.2 Backfilling

a. Trenches shall not be backfilled until after required tests and inspections are performed. Trenches shall be carefully backfilled with approved excavated materials (loam, sandy loam, sand, decomposed granite) free from large earth clods and stones over ½-inch in size. Backfill shall be mechanically compacted in landscaped areas to relative density equal to adjacent undisturbed soil. Backfill shall conform to adjacent grades without dips, sunken areas, humps, and other surface irregularities.

b. Flooding of trenches will be permitted only with approval of the City representative.

c. If trench settlement occurs, then Contractor shall make required adjustments in elevation of pipes, valves, sprinkler heads, turf and planting, and other construction.

d. Contractor shall provide three inches minimum clean backfill under irrigation lines.

11.3 Trenching and backfill under paving:

a. Trenches located below asphaltic concrete and PCC paving shall be backfilled with sand (six inches below and above pipe). Compact backfill in lifts to 95 percent relative density with manual or mechanical tamping devices. Trenches shall be flush with adjoining subgrade. Contractor shall set in place, cap, and pressure test irrigation piping under paving prior to start of paving work.

b. Installation of irrigation pipe under existing walks (six feet and less in width) may be accomplished by jacking or boring. If cutting or breaking of sidewalks is required, prior approval shall be obtained from the City representative.

c. Provide minimum cover of 18 inches between top of pipe and bottom of aggregate base material for pressure and non-pressure pipe installed under paving.

d. Schedule 40 PVC sleeves shall be installed for irrigation piping under paved areas.

e. Irrigation pipe sleeves under paving shall be marked with metallic locating tape. Marking tape shall be installed 12 inches above, and along entire length of sleeves.

12. Manufacturer's Directions

Refer to manufacturers' instructions and detailed drawings for work not shown in construction documents.

13. Ordinances and Regulations

Applicable laws, ordinances and regulations governing irrigation work are incorporated into these requirements, and their provisions shall be carried out by Contractor. Requirements of this Section shall not be construed to conflict with applicable laws, ordinances and regulations. However, if above requirements describe materials, workmanship, and construction of better quality, higher standard, and larger size than is required by ordinances and regulations, provisions of this Section shall take precedence.

FOUR. LANDSCAPE PLANTING REQUIREMENTS

The intention of this section is to outline planting requirements for landscape improvements within the City of Poway. Application of water efficient landscape principles in the development and design of landscapes is required by the City. Those principles directly related to planting include appropriate turf areas, adequate soil improvements, use of mulches, and selection of low-water use plants. Refer to Section Two for a complete discussion of water efficient landscape principles, and to Chapter 17.41 PMC, "Landscape Efficiency Standards".

A. GENERAL REQUIREMENTS

The following requirements pertain to development within the City of Poway.

1. Because of the likelihood of future state-wide impacted water supplies for landscape purposes, the City stresses the need for water efficient landscapes. Native and naturalized species of plants, and low-water use planting, should be specified for most landscaped areas.

   All development shall comply with the requirements of the adopted Poway Subarea Habitat Conservation Plan and companion Implementing Agreement documents, including the Special Development Requirements and Land Use and Management Requirements thereof.

2. Tree size requirements (excluding slopes 5:1 or greater):

   2.1 Tree planting within open space and green belt areas shall have container size ratio noted below:
   - 24-inch box: 20%
   - 15 gallon: 70%
   - 5 gallon: 10%

   2.2 For all other required landscaped areas, the ratio of 15 gallon trees to 24-inch boxed trees or larger shall be 4:1.

3. Planting density of trees within open space and green belt areas shall be 60 trees per acre (minimum). This requirement may be modified by the City Fire Marshal in areas susceptible to wildland fires. Refer to Section Six, "Vegetative Fuel Management In Very High Fire Hazard Areas."

4. Planting plans shall represent true and accurate descriptions of installed plant materials. Onsite observation will strictly enforce representations, types and quantities shown on planting plans.

   4.1 Plants shall be specified by botanical and common names. Species shall be clearly represented by symbols and callouts on each sheet.

4.2 Legends shall be provided on landscape plans, listing plants specified for the project. Legends shall contain plant species (botanical and common names), symbols, quantities, container sizes, spacing, and remarks.

4.3 Planting plans shall include installation details for container plants, groundcovers, and other plantings shown on plans.

5. Plants with similar water requirements shall be grouped together in distinct hydrozones.

6. Screening Requirements

Plant material utilized to provide landscape screening (with or without fencing) as required in the City's Zoning Development Code shall meet the following standards:

6.1 Plantings shall be evergreen and spaced to ensure adequate screening within two years of installation.

6.2 Plantings shall consist of trees and shrubs, at least 15 gallon and five-gallon container sizes respectively, to provide required screening.

6.3 Electrical transformers and other utility structures over 36-inches high shall be screened from public view with appropriate planting.

7. Selected plants shall be well suited to site conditions, which include, but are not limited to, such factors as:

- soil types,
- available space to develop normal structure and form,
- microclimate,
- source of water (i.e., potable, groundwater, reclaimed),
- aspect and exposure,
- maintenance.

8. Turf

Turf areas and turf grass species shall be appropriate for planned uses. Minor deviations from the requirements below will be permitted, provided the overall intent of minimizing turf areas is observed.

8.1 Turf shall not be planted in areas smaller than ten (10) feet in any dimension.

8.2 Turf shall have a maximum slope of 33% (3:1).

8.3 Turf shall not be planted in street median islands and parking lot planter islands.

8.4 Turf designated for active use shall not be planted in locations inaccessible and unusable to the public and site occupants. Active use areas shall refer to open space for recreation, sports, picnicking, entertainment and similar activities.

8.5 Turf shall not be planted in areas that are not visible to the public and site occupants; behind buildings, service areas, and behind fences and screens (unless designated for active uses).

8.6 Non-active use turf planted with cool-season turf grass species (see Table 4-2 below) shall not exceed 15% of total landscaped area. Non-active use areas shall refer to open space intended primarily as decorative features.

8.7 Large turf areas, including, but not limited to, ball fields and parks shall be designed with emphasis on elimination of turf not essential to their operation.

8.8. Only low-volume or subsurface irrigation shall be used for turf in a landscaped area:

a. On a slope greater than 25 percent grade where the toe of the slope is adjacent to an impermeable hardscape.

b. Where any dimension of the landscaped area is less than six feet wide.

8.9 No turf shall be allowed in a landscaped area that cannot be efficiently irrigated, such as avoiding runoff or overspray.

B. PLANT MATERIAL REQUIREMENTS

1. Plant Materials-General

1.1 Nomenclature: Scientific and common names of specified plants shall conform to “Standardized Plant Names” by the American Joint Committee on Horticultural Nomenclature, except in cases not covered therein.

1.2 Labeling: Each group of plant materials delivered to job sites shall be clearly labeled by species, variety, and nursery source.

1.3 Quality: Plants shall be in accordance with State of California, “Grading Code of Nursery Stock,” No. 1 grade. Plants shall have normal growth and be sound, healthy, vigorous, free of insect infestations, plant

diseases, sunscald, fresh bark abrasions, and other objectionable disfigurements.

1.4 Right of Observation: The Development Services Department reserves right to accept or reject plant material, upon delivery and after planting, based on size, variety and condition.

1.5 Size of plants shall correspond with that normally expected for species and variety of commercially available nursery stock, and as specified on plans.

1.6 Pruning: Do not prune, trim, or top trees and other plant materials prior to delivery.

1.7 Protection: Carefully handle and store plants to protect them from drying out, wind burn, and other injury prior to planting.

1.8 Areas within Poway are subject to periods of frost during winter, which may damage plant material listed below in Table 4-1. The list comprises several commonly specified plant species, and is for reference only. It does not include all frost sensitive plants. Plant material susceptible to frost damage should not be installed in low-lying areas ("cold-air basins") and northern exposures. This is **not** a list of restricted plants.

TABLE 4-1
FROST SENSITIVE PLANTS

Botanical Name	Common Name	*Severity of Damage
Agapanthus africanus	Lily-of-the-Nile	L
Bougainvillea species	Bougainvillea	M
Carissa grandiflora	Natal Plum	S
Cupaniopsis anacardioides	Carrotwood	L
Erythrina species	Coral Tree	M
Ficus rubiginosa	Rustyleaf Fig	M
Geijera parviflora	Australian Willow	L
Hibiscus species	Chinese Hibiscus	M
Lantana species	Lantana	S
Liriope species	Lily Turf	M
Melaleuca quinquinervia	Cajeput Tree	L
Pittosporum undulatum	Victorian Box	L
Plumbago capensis	Cape Plumbago	L
Pyrostega venusta	Flame Vine	S
Tecomaria capensis	Cape Honeysuckle	M
Tristania conferta	Brisbane Box	M

*L-light damage, M-moderate damage, S-severe damage

1.9 Plant species for use in areas of the City of Poway served by reclaimed water should be selected for salt tolerance.

2. Container Stock (one, five, 15 gallon and tree box size)

2.1 Trees shall have straight trunks unless otherwise specified. Terminal leaders shall be uncut and undamaged. Trees with pruned or damaged leaders shall be rejected and removed from job site. Tree trunks shall be sturdy and well hardened off.

2.2 Container stock shall have been grown in containers delivered to project site for six months minimum, but not longer than two years.

2.3 Container stock shall have vigorous and fibrous root systems that are not root-bound, and are free of girdling roots.

2.4 In tree box containers, soil surface shall not be greater than six inches below the top of the box.

3. Flatted Plants

3.1 Groundcover plants from flats shall be grown and remain in flats until transplanted at job site.

3.2 There shall be minimum disturbance of root systems during planting.

4. Turf

Turf grasses can be classified as either warm-season or cool-season species. Generally, warm-season grasses use less water and are better adapted to the Southern California climate. The City encourages use of warm-season grasses, such as hybrid Bermuda. Drought resistance comparisons of warm and cool-season grasses commonly specified in California are presented in Table 4-2 below.

4.1 Sod

Sod shall be fully mature, well-maintained, and specified variety, free of other grasses, weeds, diseases, and insects. Sod shall be evenly cut with sod cutting machines to uniform thickness. Material shall be from same growing grounds and delivered fresh to job site.

4.2 Stolons

a. Stolons shall be fresh, clean, living sections of runners of hybrid Bermuda grass. Stolons shall be free of turf disease, insects and

their eggs, and weeds. Stolons shall be capable of healthy vigorous growth.

b. Sections of stolons shall be 1-4 inches long, with two or three nodes capable of rooting in soil.

TABLE 4-2

RELATIVE DROUGHT RESISTANCE OF COMMON TURFGRASSES

RELATIVE RANKING	**TURFGRASS SPECIES**	
RELATIVE RANKING	**COOL-SEASON**	**WARM-SEASON**
Superior		Bermuda grass (common)
Superior		Bermuda grass (hybrid)
Excellent		Buffalo grass
Excellent		Seashore Paspalum
Excellent		Zoysia grass
Good		St. Augustine grass
Medium	Tall Fescue	
Fair	Perennial Rye grass	
Fair	Kentucky Blue grass	
Fair	Creeping Bent grass	
Fair	Hard Fescue	
Fair	Chewings Fescue	
Fair	Red Fescue	
Poor	Colonial Bent grass	
Poor	Annual Blue grass	
Very Poor	Rough Blue grass	
Source: Texas A & M University, Drs. Beard and Kim, 1989		

5. Seed

5.1 Seed shall be fresh, clean, and from latest season's crop. Mechanically pre-mix seed to specified proportions.

5.2 Seed that has become wet, moldy, and otherwise damaged in transit and storage shall not be used.

5.3 Seed mixes shall be specified by quantity of pure live seed (PLS) of each species per acre.

5.4 Seed used for turf planting, slope revegetation, and other purposes specified on plans shall be furnished in original sealed standard containers. Label seed containers with producers' guaranteed analysis: percentages of seed species, purity, germination, weed seed content, and inert material.

6. Topsoil

6.1 Topsoil shall be “Class A” topsoil in accordance with Section Ten, Public Works Landscape Improvements Projects.

6.2 Topsoil shall be free of undesirable insects, plant pathogens, weed and grass seeds, subsoil, refuse, heavy roots, large clay lumps, stones larger than one inch in size, brush, litter and other deleterious substances.

6.3 Topsoil shall be free of insoluble carbonates, and have the following chemical analysis:

- pH: minimum of 6.0, maximum of 7.5 (acid-alkaline reaction)
- ECe: zero to three maximum (electrical conductivity)
- SAR: zero to six maximum (sodium absorption ratio)

6.4 Topsoil analysis shall be subject to review by City before start of construction.

7. Fertilizers and Soil Conditioners

7.1 General

Soil preparation is necessary in most planted areas. Materials and methods utilized to prepare sites for planting will vary according to soil conditions, type of planting (i.e., turf vs. container stock), and topography, among other factors. Minimum standards for materials used for soil preparation are outlined below.

7.2 Soil Testing for Agricultural Suitability

a. Two (2) copies of soil test report prepared by a qualified agronomic soils testing laboratory shall be submitted to City prior to start of construction. Reports shall contain chemical analysis with written recommendations for soil amendments. Contractor shall comply with recommendations in report. Textural analysis may also be required to determine suitable treatment of trail surfaces (if applicable), selection of plant materials, and appropriate irrigation systems and management.

b. Soil tests shall include 24-hour percolation test to determine soil drainage characteristics. Soil samples for testing should be taken after rough site grading is complete, and before start of planting. Sampling shall be in accordance with soil testing laboratory requirements.

c. Soil analysis shall measure following chemical properties:

- fertility: nitrogen, phosphorus, potassium (N-P-K) and secondary nutrients (calcium, iron, sulfur),
- micronutrients,
- salinity as measured by electrical conductivity (ECe in mmhos/cm @ 25 degrees C.),
- pH (acid-alkaline reaction),
- sodium absorption ratio - SAR (alkali/sodic soil),
- specific toxicities: elements that may restrict plant growth such as boron, chlorine, and sodium.

d. Percolation tests shall be performed to determine soil drainage characteristics. Fill a one-cubic-foot hole (12 inches by 12 inches by 12 inches) at bottom of tree pit with water. Refill after water drains completely from hole. If any standing water remains in the hole 24 hours after refilling, then contractor shall submit procedures to correct poor drainage. Percolation test results shall be submitted to the City representative prior to installation of plants.

7.3 Soil Amendments

Amendments modify chemical and physical properties of soil. Required quantities of soil amendments shall be based on soil report recommendations.

a. Composted organic soil amendments shall be stable, completely decomposed organic matter containing no toxins and harmful organisms that would inhibit plant growth.

b. Compost shall be from selected wood fibers (redwood, cedar, fir, pine) and green waste. Compost shall be leached, nitrogen-stabilized with residual nitrogen content of 0.5%-1.0%, and treated with iron and wetting agent.

E. Amendments (incorporate into soil based on soil report recommendations):

- primary nutrients (nitrogen, phosphorus, potassium),
- secondary nutrients (sulfur, calcium, iron),
- iron sulfate,
- agricultural gypsum (hydrated calcium sulfate),
- micronutrients (magnesium, manganese, zinc, etc.).

7.4 Fertilizer

Fertilizer shall be delivered to site in original, unopened packages, bearing manufacturer's guaranteed analysis. Damaged and caked material shall not be used.

a. Pre- and post-planting fertilizer (N-P-K) shall be commercial grade, pelletized or granular material having chemical analysis as specified in soil report recommendations or on plans.

b. Fertilizer planting tablets shall be tightly compressed commercial grade planting tablets with 12-8-8 or 20-10-5 formulation.

8. Staking and Guying Materials

8.1 Tree Ties

Tree ties shall be flexible vinyl straps nailed to stakes with one inch roofing nails. Tree ties shall be approved by City.

8.2 Nursery tape shall not be used to secure trees to support stakes.

8.3 Tree Stakes

Tree stakes shall be straight-grained lodgepole pine, treated and free from knots, splits and disfigurements. Stakes shall be a minimum of ten feet long. Stakes shall be of uniform thickness with minimum diameter of two inches.

8.4 Guying Materials

a. Tree guys shall be common grade 7-strand galvanized steel cable, $^{3}/_{16}$-inch minimum, and solid core. Wire covering on branches shall be ½-inch diameter minimum, new two-ply garden hose, or reinforced rubber or plastic.

b. Guys shall be flagged, and ninety percent of wire length covered with ½-inch diameter white PVC pipe or plastic tubing.

c. Wire anchors shall be redwood or concrete deadmen, 4 inches x 4 inches x 30 inches minimum.

d. Alternate staking and guying materials may be accepted by the City for review. Contractor shall submit material and installation specifications, and catalog cut sheets, to City representative for review prior to start of work.

9. Root Control Barriers and Trunk Guards

9.1 Street trees, parking lot trees, and trees planted within ten (10) feet of hardscape shall require root barriers adjacent to hardscape. Root barriers shall be approved by the City's Development Services Department or Public Works Department.

9.2 Trunks of trees planted in turf shall be protected from damage by mowers and trimmers.

a. Trunk protectors ("Arbor-guards") shall be plastic, eight inches long (min.), and shall allow for growth of tree trunks.

b. In lieu of plastic trunk protectors, the contractor shall install a mulched circle around the base of each tree trunk. The mulched area shall be a minimum of 24 inches in diameter.

10. Mulch

10.1 Composted organic material-refer to item B.7.3. above.

10.2 Bark Chips

Bark chips shall be from redwood, pine, cedar, or fir bark, consisting of ½-inch to $1^1/_2$-inch chips. Prior to delivery to site, Contractor shall submit samples to City's representative for approval.

10.3 Inorganic mulch (cobble rock, pea gravel, decomposed granite, etc.) shall be approved by the City's representative.

10.4 Mulch consisting of chipped and shredded plant trimmings shall be clean and free of debris and foul odor. Particle size shall range from one inch to four inches. Prior to delivery, submit sample to City's representative for approval.

11. Hydroseeding Materials and Equipment

11.1 Mulch

a. Mulch shall be clean, 100% virgin natural wood fiber. Materials that inhibit germination and growth of seed shall not be present in fiber mulch. Mulch shall be dyed green to facilitate metering of slurry. Fibers should disperse into homogeneous slurry when mixed with water. An absorptive and porous mat shall result when slurry is sprayed on ground surface.

b. Wood fiber mulch shall be applied at minimum rate of 3,500 pounds per acre on slopes (400 pounds per acre if used with straw application).

c. Submit fiber mulch material specifications to the City for review and acceptance prior to application.

11.2 Fertilizer

Fertilizer/soil conditioner shall consist of organic materials comprised of decomposed animal, vegetable, and mineral matter, and composted to support soil bacterial activity. Quantity and type of fertilizer shall be approved by the City prior to application.

11.3 Wetting Agent: Submit product specifications to City for approval prior to use.

11.4 Tackifier

a. Tackifier shall be an organically-derived, biodegradable solid formulation for adhesive binding of wood fiber and straw mulch.

b. Tackifier shall be applied at rate recommended by manufacturer.

11.5 Bonded Fiber Matrix (BFM)/Stabilized Fiber Matrix (SFM)

a. Submit product specifications to the City for review and acceptance prior to application.

b. BFM/SFM shall be applied at the rate recommended by the manufacturer and approved by the City

11.6 Equipment

Mix hydroseed slurry in tanks with built-in continuous agitation and recirculation systems. Tanks shall have sufficient operating capacities to produce homogeneous slurry of fiber, fertilizer, seed, tackifier, and water in specified unit proportions. Discharge systems shall apply slurry to designated areas at continuous and uniform rates.

12. Wetting Agents and Soil Penetrants

Specifications for product formulation shall be submitted to and approved by the Development Services Department prior to use.

13. Weed Abatement

Herbicides shall be approved by the Development Services Department or Public Works Department prior to use. Application procedures shall be in accordance with Federal, State of California, and County of San Diego regulations for safe management of herbicides.

C. INSTALLATION AND MAINTENANCE REQUIREMENTS

Refer to Section Ten, Subsection C, "Materials and Systems Requirements," for additional planting requirements on public works projects in the City of Poway.

1. Fine Grading and Soil Preparation

1.1 Rough grading shall be completed prior to soil preparation.

1.2 Planting areas shall be free of weeds, stones, clods, roots, and other debris (one inch in diameter and larger) for a minimum depth of two inches.

1.3 Soil preparation in planting areas shall be completed in accordance with construction documents and soil report recommendations.

1.4 After soil preparation, planting areas shall be graded to smooth and even surface conforming to required finish grade. Finish grade adjacent to walks, paved areas, curbs, manholes, clean-outs, valve boxes, and similar features shall be one inch below surface of improvements in turf, and 1½ inches below in ground cover and shrub areas. Grades between such features shall be carefully maintained and blended to eliminate abrupt elevation changes.

1.5 Subgrade of areas to receive sod shall be one inch below adjacent improvements. ~~i~~nstalled sod shall be flush with adjacent finish surfaces (walks, paved areas, etc.).

1.6 Planting areas shall have finish grades conforming to approved plans and specifications after full settlement has occurred.

1.7 Eroded areas shall be repaired and restored to finish grade.

1.8 Planting areas shall have positive surface drainage (2% minimum) with no ponding of water. Landscape grading and drainage shall conform to the City's Grading Ordinance, Standard Urban Stormwater Mitigation Plan (SUSMP) Ordinance, and other applicable codes and ordinances.

1.9 Soil in planting areas shall be scarified (loosened) to a minimum depth of 12 inches.

2. Trees, Shrubs, and Vines

2.1 Excavation of plant pits

a. Planting holes shall have vertical sides with scarified surfaces. Holes shall be at least two times the width and slightly less than the height of plant root balls. Holes shall be wide enough to permit handling and planting without injury and breakage to plant roots and root balls.

b. Excess soil generated from planting holes may be distributed onsite and amended as specified in general soil preparation, or legally disposed of offsite.

2.2 Planting Procedures

a. No more plants shall be distributed in planting areas than can be planted and watered in one day.

b. Plants shall be removed from containers so that root balls are not broken. They shall be planted and watered immediately after removal from containers. Plants shall not be removed from containers prior to placing in planting holes.

c. Acceptable topsoil stockpiled during excavation of planting holes shall be amended and used for backfill.

d. Planting backfill shall be amended based on soil report recommendations and project specifications.

e. Root balls shall be inspected by the contractor during planting. Circling roots shall be separated from the root balls and spread out in planting holes. Root balls shall be slashed vertically 4-5 times with sharp tools to a depth of one inch maximum.

f. Plants shall be set in planting holes on firm native soil. Bottom of plant holes shall be scarified to improve drainage. After placement and settling, root crowns shall have the following relationships to surrounding finish grades:

- one and five-gallon sizes: slightly above finish grade,
- 15-gallon and 24-inch box size: one inch above finish grade
- 36-inch box size and larger: two inches above finish grade.

Plants that settle deeper than noted above shall be raised to correct levels.

g. After plants have been placed, planting holes shall be backfilled as follows:

- five-gallon container size and smaller: amended backfill mix shall be added to holes to cover approximately one-half the height of root balls,
- 15-gallon container size and larger: native soil shall be added to holes to within 12 inches of finish grade.

Fill holes with water to thoroughly saturate root balls and adjacent soil.

h. After water has completely drained from holes, fertilizer tablets shall be placed as indicated below. Tablets shall be placed on top of root balls while plants are still in containers to verify required quantity of tablets for each hole.

- 1- 5 gram tablet per liner and flatted plant.
- 1-21 gram tablet per one-gallon container.
- 2-21 gram tablets per five-gallon container.
- 4-21 gram tablets per 15-gallon container.
- 1-21 gram tablet per four inches of tree box size.

If 7-gram tablets are used, follow manufacturer's recommendations.

i. Planting holes shall then be filled to finish grade with amended backfill mix and thoroughly watered.

j. After backfilling, earthen basins shall be constructed around plants. Inside diameter of basins shall be same size as root balls, and contain sufficient water to saturate root balls. Watering basins shall be constructed of amended backfill materials.

k. Immediately after planting, fill basins of trees and shrubs with water. Apply water in moderate streams, without disturbing backfill, until soil around roots is completely saturated.

2.3 Staking and Guying

a. Trees that are not self-supporting shall be staked or guyed.

b. Five-gallon trees shall be single-staked. Fifteen-gallon and 24-inch-box size trees shall be double-staked. Larger trees shall be guyed as required to support the trees.

c. Support stakes shall be placed outside plant root balls.

d. Two vinyl tree ties shall be used with single stakes, and four tree ties with double stakes. Installation of stakes and ties shall allow for adequate movement of tree trunks to ensure proper development.

e. Tree stakes shall not rub against trunks or branches. Trim tops of stakes to six inches below lowest canopy branches.

f. Vine Staking: Vines shall have wood nursery stakes removed without damage to plants. Train vines on adjacent posts and walls. Vines shall be attached to posts and walls with plastic adhesive vine ties or approved substitution (no nails).

2.4 Pruning

Pruning shall be limited to the minimum necessary to remove injured twigs and branches. Pruning for form shall begin the year after installation.

2.5 Root Control Barriers

a. Root barriers shall be installed adjacent, and parallel, to hardscape ten feet or closer to tree trunks. Barriers shall extend ten feet on either side of tree trunks (twenty feet total length, minimum).

b. Root barriers shall be installed in accordance with manufacturer's recommendations.

3. Ground Cover

3.1 As part of soil preparation, ground cover planting areas shall receive pre-planting fertilizer as specified in soil report recommendations and specifications. Fertilizer shall be evenly broadcast throughout planting areas.

3.2 Ground cover plants shall be grown in flats. Roots shall be well-developed so that soil will not fall away when lifting plants from flats.

3.3 Ground covers shall be planted in straight rows and evenly spaced in a triangular pattern. On center spacing shall be as noted on plans. Herbaceous ground cover shall be spaced to attain 90 percent coverage within one year after installation (two years for woody ground cover).

3.4 Plants shall be immediately watered after planting until the entire area is soaked to full depth of root zone. Spread mulch evenly in ground cover planting areas to a depth of one inch (2-inch depth between woody groundcovers).

4. Mulching

4.1 Planting areas with a 3:1 slope and less, except those with herbaceous ground cover, shall receive mulch to a 2-inch depth (minimum).

5. Turf

5.1 Turf shall be planted by broadcast seeding, stolons, hydroseeding, or sodding as indicated on the plans.

5.2 After soil preparation, areas to be planted with turf shall be raked, floated, and rolled to level finish grade by an acceptable method. Finish grade shall be smooth and even, free of rocks and clods, and reasonably well compacted. Prior to planting, the upper two inches of soil shall be sufficiently loose and friable to receive seed, stolons or sod. Planting areas shall be thoroughly irrigated to a depth of six inches.

5.3 Pre-planting Fertilization: Prior to planting turf, City-approved fertilizer shall be evenly broadcast at rates specified in soils report and specifications.

5.4 Seed

a. A satisfactory method of sowing shall be employed using hand seeder or other approved equipment. Rate of application of seed shall be in accordance with plans and specifications. Seeding shall be done in two operations, with the second sowing at right angles to the first.

b. Seed shall be evenly topdressed to a depth of ¼ to ½-inch with approved composted mulch. Seeded areas shall be smoothed and firmed immediately with a water-weighted roller, or other approved equipment. Final rolling of slopes shall be parallel to contours to prevent erosion.

c. Immediately after seeding, apply a light, fine mist spray to anchor the seed and topdressing to soil, forming a protective crust to prevent wind erosion and drying of seed. Turf areas shall be kept moist until fully germinated.

5.5 Sod

a. Requirements for soil preparation, finish grading and fertilization shall be as for seeded turf. Subgrade elevation of areas to be sodded adjacent to walks and paving shall allow for proper relationship of finish grades after sod installation.

b. Sod shall be delivered and installed within 24 hours after harvesting.

c. Subgrade shall be moist, but not muddy, when sod is installed. Trench backfill shall be compacted, with no settling and depressions.

d. Lay sod in one direction only, with close-fitted butt joints. Ends of sod strips shall be staggered to eliminate continuous joints, with no gaps and voids. First course of sod shall be laid against longest adjacent straight edge.

e. Sod shall be lightly irrigated within two hours after being placed.

f. Sodded areas shall be allowed to dry sufficiently to permit rolling with a water-weighted roller to ensure soil contact with grass roots, and to provide firm, smooth mowing surfaces.

g. At the end of each day, sod installed that day shall be sufficiently watered.

5.6 Stolons

a. Stolons shall be planted in a moist prepared seedbed at the rate specified on the plans. However, planting areas shall be sufficiently dry to allow access by mechanical equipment.

b. Stolons shall be worked into the soil to a depth of ½ to 1½ inches with an approved mechanical planter.

c. Hydro-stolonizing may be permitted with written acceptance from the City.

d. Stolons shall be kept evenly moist until the turf is well established.

6. Hydroseed Application

6.1 Weed Control

a. After completion of the irrigation system, and existing weeds have been removed from planting areas, apply 200 pounds per acre of 16-6-8 commercial fertilizer in accordance with manufacturer's instructions. Irrigate planting areas until weed seeds have germinated. Apply only enough water to planting areas to germinate weeds. Slope soils shall not be saturated. After germination, watering shall cease for three days. A non-selective

herbicide shall be applied to eradicate newly germinated weeds. Translocation period for herbicide shall be in accordance with manufacturer's instructions.

b. Allow herbicide to kill weeds. Remove dead weeds from planting areas.

c. If weeds are still found, then repeat weed control procedure until new growth appears. Reapply non-selective herbicide and remove weeds after herbicide has had sufficient time to take effect.

6.2 Hydroseed Preparation and Application

a. Slurry preparation shall take place onsite. Slurry tanks shall be thoroughly clean and free of seed species not specified.

b. Slurry components shall be mixed to provide rates of application in accordance with Plans. Application shall commence as soon as slurry tank is full.

d. Application: Operator shall spray area with uniform visible coat using color of wood fiber and organic amendment as a visual guide. Slurry shall be applied in a downward drilling motion with fan stream nozzle.

d. Time Limit: Hydroseed mixture shall not be left in slurry tanks for more than two hours. Mixture not applied after two hours shall be rejected and disposed of offsite at contractor's expense.

e. Irrigation: Hydroseed areas shall be thoroughly irrigated prior to hydroseed application. Contractor shall note and correct inadequate coverage before and after hydroseeding.

6.3 Protection of Adjacent Areas

Care shall be exercised by contractor to prevent slurry from being sprayed inside reservoirs, basins, drainage ditches, and channels, which may contaminate or impede the free flow of surface water. Slurry sprayed into restricted areas shall be cleaned up at contractor's expense, and to the satisfaction of the City.

6.4 Reseeding

Bare spots shall be reseeded by contractor within ten days after germination. Contractor shall be responsible for reseeding areas until an

acceptable stand of hydroseeded material is realized and accepted by the City.

6.5 Irrigation

Irrigation system shall provide uniform distribution of water to ensure proper germination of hydroseed mixture.

6.6 Fertilization (turf)

Contractor shall apply post-planting fertilizer at specified rates, 45 and 90 days after start of the maintenance period.

7. Maintenance and Plant Establishment

7.1 Planting areas shall be maintained by the contractor for the specified plant establishment period.

7.2 Maintenance shall include watering, mowing, fertilizing, pruning, weeding, and replacement of dead, dying, and injured plant material.

a. Irrigation scheduling shall ensure establishment of healthy root systems, without overwatering.

b. Irrigation shall be gradually reduced after plants are established, to the least amount necessary to maintain healthy, thriving plant material.

c. Irrigation systems shall be monitored and adjusted for efficient operation and uniform coverage.

e. Refer to Section Eleven for maintenance of LMD areas.

7.3 During the plant establishment period (generally 90 days), provide sufficient irrigation to keep root zones moist for optimum plant growth. Berms around shrubs and trees on slopes shall be maintained. Maintenance shall include periodic inspection to eliminate siltation around plant root crowns.

7.4 Trees shall not be staked or guyed for longer than two growing seasons.

FIVE. SLOPE REVEGETATION

The intent of this section is to provide requirements to minimize surface erosion, sedimentation, and soil slippage on cut and fill slopes in Poway, as well as making slopes visually pleasing. This section is intended to be used in conjunction with Section Six for slopes adjoining chaparral and other fire-prone areas. For areas susceptible to wildland fires, planting recommendations in Section Six of this document shall take precedence. Grading and slope revegetation shall conform to the City of Poway Grading Ordinance and Standard Urban Stormwater Mitigation Plan (SUSMP) Ordinance, and the adopted *Poway Subarea Habitat Conservation Plan* and companion Implementing Agreement documents, available at the Poway Development Services Department. Refer to Sections Three and Four in this manual for additional irrigation and planting requirements, respectively.

A. BONDING FOR SLOPE REVEGETATION

Slope stabilization planting and irrigation is bonded as a portion of the grading bond required by the Development Services Department prior to issuance of Grading Permits. Because specific planting procedures are bonded at different rates, the Applicant/Owner should check with the Development Services Department for the current bonding schedule. Plant materials on slopes must be established prior to release of bonds (generally 90 days after installation, unless otherwise noted).

B. GENERAL REQUIREMENTS

1. Slopes of five (5) feet and greater vertical height and 5:1 (20%) and greater slope gradient shall be permanently revegetated, except as provided for in Section 6 of this Manual.

2. Slopes requiring permanent revegetation shall have fully automatic irrigation systems installed per Section Three and Part C below.

3. Temporary Revegetation Without Irrigation

    3.1 Graded and brushed lots, on which no immediate building is intended to occur, shall receive temporary non-irrigated hydroseed approved by the City. Erosion control measures, including hydroseeding, on uncompleted grading projects shall be implemented by October 1 of each year.

    3.2 Properties intended to be sold as lots only shall have required temporary non-irrigated slopes hydroseeded prior to October 1 or finished grade approval, whichever comes first.

4. Permanent Revegetation

    4.1 Developments requiring permanent slope revegetation shall have such improvements completely installed on or before October 1 of each year,

and prior to rough grading approval. If not practicable, then temporary erosion protection measures shall be undertaken as required by the City's Grading Ordinance, Section 16.50.170-B.7.

4.2 Developments shall have permanent slope revegetation measures in place and approved prior to occupancy permit issuance.

5. Slope revegetation plans must be prepared and signed by California licensed landscape architects.

6. City's Representative shall inspect installation of slope revegetation improvements for conformance to approved plans and specifications.

7. Cut slopes steeper than 2:1 may be allowed by the Development Services Department. These areas may be subject to special conditions, including slope serration. Slopes shall have sufficient soil coverage to support healthy plant growth, except exposed rock cuts.

C. SLOPE IRRIGATION REQUIREMENTS

1. Irrigation controllers utilized for slope revegetation projects shall be capable of a minimum of four start times per station per day.

1.1 Controllers shall utilize flow sensors and master valves to automatically monitor and shut down flows if irrigation main line breaks are detected.

2. Irrigation systems shall utilize low-precipitation rate spray heads, micro-irrigation, or both if practicable.

3. On grade irrigation piping shall only be used where irrigation systems are intended to be temporary, or soil conditions limit the use of subsurface piping, as approved by the Development Services Department.

4. Provide separate control valves for lateral circuits operating systems at the top, toe, and intermediate areas of slopes.

4.1 Irrigation piping shall run parallel to contour lines or as close to parallel as possible.

4.2 Valves shall be buried below grade, and be located for easy maintenance access. Main line pressure pipe shall be placed below grade at toe of slopes where possible.

5. Check valves and anti-drain valves shall be installed where necessary to eliminate low-head drainage.

6. Micro-irrigation systems may be used on slopes where appropriate (transition areas adjacent to native vegetation, highly erodable soils, tight clay soils, etc.).

D. SLOPE PLANTING REQUIREMENTS

1. Plant Material-General

1.1 A combination of smaller herbaceous and/or prostrate shrubby groundcovers, and larger deep-rooted shrubs and trees, shall be required to prevent both surface erosion and slope mass movement.

1.2 Low-water use plant material appropriate to site conditions, from seed and container stock, shall be required for slope revegetation.

1.3 Species that germinate quickly and spread rapidly shall be planted to provide quick cover and prevent surface erosion. Long-lived, slow-growing plant material shall also be utilized to ensure long term slope stability.

1.4 Germination of hydroseed shall be required before final project acceptance.

a. A germination rate of 90 percent overall, and 50 percent coverage of soil surface, shall be required after six months for hydroseed on irrigated slopes (minimum).

b. After one year, coverage of soil surface in hydroseeded areas shall be minimum 90 percent.

2. Plant Material Installation

2.1 Trees shall be planted at the rate of one tree per 750 square feet of slope area. This requirement may be modified by the City Fire Marshal in areas susceptible to wildland fires. Refer to Section Six.

2.2 Shrubs shall be planted at the rate of one shrub per 100 square feet of slope area.

2.3 Tree and shrub planting shall consist of deep-rooted species. “Deep-rooted” means that roots are capable of reaching at least three to five feet deep in favorable soil conditions.

2.4 Plant material container sizes shall be as follows:

a. Trees:
- minimum size: one gallon
- maximum size: 15 gallon (Eucalyptus species, if utilized, shall not be larger than five-gallon size)

b. Shrubs and Vines:
- minimum size: one gallon
- maximum size: five gallon

2.5 Groundcovers shall be hydroseeded, or rooted cuttings from flats appropriately spaced to eventually control soil erosion.

2.6 Tree placement should favor lower slopes to preserve viewsheds. Trees planted on upper slopes should be placed in relation to property lines at the top of slopes in order to enhance and protect existing and potential view corridors.

2.7 Refer to Section Six herein for planting techniques in areas susceptible to wildland fires.

2.8 Refer to "Landscape Planting Requirements," Section Four, for further planting requirements. The above requirements shall take precedence in case of conflict.

E. EROSION CONTROL MATERIALS

1. Materials (straw blankets, fiber rolls, silt fence, etc.)

1.1 Erosion control materials shall be approved by the City prior to installation. Provide materials specifications to the City for review and acceptance.

1.2 Open weave jute netting is not acceptable for use as an erosion control material on slopes.

1.3 Staples for erosion control blankets shall be 11 gauge steel wire, bent to form a 'U' shape, six inches minimum length and one inch wide.

2. Installation

Erosion control materials installation shall be required in locations specifically delineated on the drawings, and as required due to field conditions.

2.1 Surface of slopes shall be uniformly smooth and even with debris and rocks larger than three inches in diameter raked out.

2.2 Erosion control materials shall be installed in accordance with the manufacturer's directions.

2.3 On slopes covered with erosion control materials, planting of deep-rooted species shall be required to provide permanent slope revegetation.

F. ADDITIONAL EROSION CONTROL MEASURES

1. Extreme erosion hazards such as steep slopes, highly erodable soils, and impermeable soils may necessitate the use of more stringent erosion control measures as determined by the City Engineer and the Director of Development Services. Such measures may include, but are not necessarily limited to:

    1.1 Erosion control planting with hydroseed, container stock, and cuttings beyond minimum requirements.

    1.2 Placement of erosion control materials.

    1.3 Reduction of slope cuts and embankments.

    1.4 Construction of brow ditches and down drains.

    1.5 Construction or extension of retaining walls.

    1.6 Soil stabilization treatment.

    1.7 Provisions for subsurface drainage.

    1.8 Special requirements for irrigation.

    1.9 Application of chemicals to stabilize soils.

2. Straw Mulch

    Straw application on slopes shall be approved by the Development Services Department. The following are requirements for temporary slope protection in lieu of planting and irrigation:

    2.1 Material: Clean rice straw, free of noxious weed seeds, shall be used for mulching. Straw shall not contain more than five percent cereal seed by weight.

    2.2 Application of Straw Mulch

        a. Straw mulch shall be applied at the rate of two tons per acre (4,000 pounds and three inch minimum uniform depth) on cut and fill slopes.

        b. On cut slopes, hydromulch shall be applied over the straw. Hydromulch shall consist of tackifier (“binder”) and wood fiber mulch applied at minimum rates of 160 pounds per acre and 400

pounds per acre, respectively. Tackifier shall be an organic derivative or processed organic adhesive.

c. On fill slopes, straw shall be incorporated into soil by "crimping" or "punching" with a roller in accordance with specifications of the California Department of Transportation (Caltrans). After straw is anchored in soil, hydromulch shall be applied at the rate specified in 2.2.b. above.

G. TRANSITIONAL LANDSCAPES

Manufactured slopes, and disturbed areas designated as transitional planting between non-native landscapes and native vegetation, shall be revegetated with visually and ecologically compatible planting prior to acceptance of the project. The following requirements shall apply:

1. City of Poway Grading Ordinance prohibits removal and disturbance of native vegetation, with limited exceptions. Refer to the Grading Ordinance for further information and permit requirements for clearing of native vegetation.

2. Areas of natural vegetation adjacent to development are subject to review by the City Fire Marshal. Appropriate vegetative fuel management programs may be required as part of the project review. Refer to Section Six, for vegetative fuel management requirements. Budgeting for ongoing vegetative fuel management programs shall also be addressed as part of project maintenance programs.

3. Additional restrictions may apply adjacent to environmentally sensitive areas (riparian habitat, coastal sage scrub, oak woodlands, etc.) and natural preserves - Blue Sky Ecological Reserve, Rexrode Wilderness Area, BLM lands, and the San Dieguito River Valley. Refer to "Natural Area Restoration" in this Section for additional requirements.

4. Plant species selected for transitional areas shall be ecologically compatible with native vegetation and appropriate to site conditions.

5. Areas immediately adjacent to native vegetation shall be planted with native species only. Non-invasive exotic plant species may be used for quick cover and short term erosion protection as approved by the Development Services Department.

6. Temporary irrigation only shall be installed adjacent to existing native vegetation. Temporary systems shall be removed or abandoned after transitional planting is established.

7. Invasive exotic pest plant species that sprout in transitional areas, such as pampas grass, tamarisk, wild artichoke, Spanish broom, and giant cane, shall be promptly removed.

H. NATURAL AREA RESTORATION

Restoration of native plant communities may be required for disturbed areas within, or adjacent to, environmentally sensitive habitat, or as mitigation for habitat lost to development. This condition will be determined by the Director of Development Services prior to project approval. Oak woodlands, wetlands, vernal pools, Diegan coastal sage scrub, and stipa grasslands are considered sensitive habitat within the City of Poway. Restoration may also be required in other areas deemed appropriate by the Development Services Department. It is the intent of the City to encourage sustainable landscapes, which require the least possible inputs in terms of water, fertilizer, chemical pesticides and herbicides, and labor. Native plant communities represent the ultimate sustainable landscapes. The general requirements for natural area restoration are outlined in this Section. Specific restoration techniques will be reviewed and approved by the City as part of the plan review process. Restoration and/or revegetation of biological impact mitigation areas shall comply with the Poway Subarea Habitat Conservation Plan.

1. Topsoil and Vegetation Removal

    1.1 Desirable native vegetation within proposed grading limits shall be cleared and reduced to a maximum average length of 24 inches.

    1.2 The City's Grading Ordinance requires that topsoil removed in conjunction with grading activities shall be retained onsite and re-used for slope revegetation and habitat restoration, unless noted otherwise.

        a. Topsoil shall be removed to an average depth of 12 inches and stockpiled in windrows with a maximum depth and width of six feet.

        b. Projects with an average topsoil depth of less than 12 inches shall be so noted on the revegetation plans. Topsoil import may be required to compensate for lack of topsoil onsite.

    1.3 Vegetative material less than three inches in diameter shall be incorporated into the stockpiled topsoil.

    1.4 Stockpiled topsoil-vegetative mixture shall be protected from erosion during the rainy season, and the mixture shall not be stockpiled for more than 90 days.

2. Grading

2.1 Cut slopes with a 2:1 slope ratio and steeper shall be serrated in accordance with Caltrans specifications.

2.2 Subject to review and approval by a qualified civil engineer, slopes not serrated shall be roughened and scarified to facilitate bonding of the topsoil-vegetative mixture to the subgrade.

2.3 During the grading process, and as part of dust control, the subsurface soil moisture reservoir shall be built up to adequately support seed germination and plant establishment. Moisture content will vary according to soil types.

2.4 Topsoil-vegetative mixture shall be spread over slopes and disturbed areas at a depth of two inches (minimum) to six inches (maximum), to the finished contours in accordance with approved grading plans.

2.5 Areas receiving topsoil-vegetative mixture shall be "track-walked" by heavy machinery to bond the mixture to the subgrade. The final layer shall be thoroughly wetted by water truck (do not over saturate). The optimum time period for completion of the grading operation is during the months of October through February.

3. Planting

3.1 Supplemental planting of seed and container stock material may be required depending on project goals and constraints.

3.2 Plant material shall be indigenous native species capable of surviving after the establishment period without supplemental watering.

3.3 Emphasis shall be on use of locally collected seed and locally grown container stock for use in restoration projects to preserve species gene pool of the region. Contract growing and collecting of seed shall be utilized if practicable.

3.4 Restoration and/or revegetation of manufactured cut and fill slopes will require the preparation of a Restoration Plan, as outlined in the Poway Subarea Habitat Conservation Plan. The scope of the Restoration Plan will be determined by the Director of Development Services on a "project-by-project" basis.

4. Irrigation

4.1 Temporary irrigation may be required on restoration projects. In some cases, no irrigation will be necessary-subsurface soil water applied during the grading operation provides a reservoir to aid plant establishment and encourage deep-rooting.

4.2 Temporary micro-irrigation of supplemental container stock planting may be required to ensure plant survival until roots penetrate to deep water.

SIX. VEGETATIVE FUEL MANAGEMENT IN VERY HIGH FIRE HAZARD AREAS

California Public Resources Code, Section 4291, established state-mandated requirements for the reduction and mitigation of "flammable vegetation or other combustible growth" around buildings or structures in very high fire hazard areas prone to wildland fires - the "development-wildland interface". The requirements are subject to local enforcement, and governing agencies may adopt additional code requirements in response to local conditions. This section is intended to implement City of Poway requirements for vegetative fuel management as outlined in Chapter 15.05 PMC, the WILDLAND-URBAN INTERFACE BUILDING CODE and Chapter 8.76 PMC, DEFENSIBLE SPACE, VEGETATION MANAGEMENT AND WASTE ACCUMULATIONS.

For additional information refer to Section Five herein for slope revegetation guidelines; the *Poway Subarea Habitat Conservation Plan* for land use and habitat management requirements, available at the City of Poway Development Services Department; and the State of California, Office of the State Fire Marshal, for building standards when in proximity to native vegetation.

A. DEFINITION OF VEGETATIVE FUEL MANAGEMENT

To prevent the spread of wildland fires, management of vegetative fuels shall be implemented around structures and developments in and adjacent to chaparral, coastal sage scrub, and grassland plant communities. Vegetative fuels shall be managed to control flame length, rate of spread, and heat intensity. Developers/Owners of structures and development projects located within and adjacent to wildland areas shall comply with the requirements of the Development Services Department and Safety Services Department for:

1. Fire Protection (including building design, materials, and setbacks).

2. Vegetative Fuel Management (fuel reduction and thinning).

3. Fire-Resistant and Low-Fuel Plantings.

B. GENERAL REQUIREMENTS

Vegetative Fuel Management Plans:

Plans shall be approved prior to fuel modification work. Plans shall be based on site plans and grading plans showing elevation contours (slopes). Plans shall indicate the widths of the fuel modification zones on the site, including slopes. Plans shall include, at a minimum: (1) plan showing existing vegetation; and, (2) grading plans showing location of proposed structures and setback from top of slope to all structures.

Fuel Modification Installations:

All fuel modification work shall be completed prior to the final inspection for issuance of a certificate of occupancy.

Plant Selection and Removal:

Plant lists at the end of this Section (Tables 6-1 and 6-2) suggest species that should be avoided or removed, and are acceptable fire-resistant species. Prior to removal of vegetation, consult a qualified professional landscape architect or biologist to identify desirable native plants to remain. Removal of native trees, as outlined in Chapter 12.32 PMC, URBAN FORESTRY, requires a separate Tree Removal Permit from the City. Native tree species are defined in the City of Poway Urban Forestry Ordinance.

Tree Pruning:

1. Native trees to be retained within fuel modification zones shall be pruned to maintain a vertical separation of not less than six (6) feet above underlying groundcover. If shrubs are located underneath the drip line of a tree, the lowest branch should be at least three times as high as the understory shrubs or 10 feet, whichever is greater. Pruning of the shrubs and groundcover will minimize the impact of the tree pruning.

2. Trees shall not be topped, as defined in the City of Poway Urban Forestry Ordinance.

3. Tree pruning work shall be in accordance with the standards of the International Society of Arboriculture (ISA), Western Chapter. Refer to Section Four, Landscape Planting Requirements, herein for pruning standards.

C. LANDSCAPE DESIGN, INSTALLATION, AND MAINTENANCE REQUIREMENTS

The requirements for vegetative fuel management are implemented in two fuel modification zones. The minimum width for each zone shall be required unless otherwise approved by the City Fire Chief. Fuel modification zones are measured outward from the furthest building projection, generally the building eaves, but may include architectural features such as attached patio covers. See Figure 6-1 in this Section for graphic reference.

Fuel Modification Zone A: Landscaped Area with Permanent Irrigation Adjacent to Buildings and Structures Minimum Width: 40 feet

1. Landscape professionals and homeowners should avoid landscape designs that increase wildland fire hazards. The following design criteria reduces fire hazards near buildings and structures:

    1.1 Do not place dense plant masses adjacent to structures and at bases of trees and tree clusters.

    1.2 Plants shall be fire-resistant and low-fuel species. Refer to the list of fire-resistant plant material at the end of this Section (Table 6-2).

    1.3 Trees may be planted as individual specimens, or clustered with no more than three (3) trees in a single cluster. The minimum distance between the mature canopies of individual trees or tree clusters shall be 20 feet.

    1.4 Tree canopies shall not be allowed to overhang building roofs. Trees shall be placed so that the outer edges of the canopies of mature trees are a minimum of ten (10) feet from building eaves for fire resistive trees, and 30 feet for non-fire resistive trees.

    1.5 Mature heights of new shrub plantings shall be a maximum of 36 inches.

    1.6 Mulch shall not be used directly adjacent to a structure.

    1.7 Mulch shall not include large wood or bark chips. Mulch from shredded plant trimmings and composted landscape mulch are acceptable.

    1.8 Trees shall not be planted within ten (10) feet of the edge of the roadway.

2. Irrigation:

    2.1 Permanent automatic irrigation systems shall be installed and maintained for landscaped areas in Zone A.

    2.2 Irrigation systems shall be designed with conventional overhead sprinklers and automatic controllers. Irrigation systems shall utilize low precipitation rate sprinklers to prevent runoff and soil erosion.

    2.3 Micro-irrigation systems may be utilized as approved by the City, if spray irrigation is not required for fire and life safety.

3. Maintenance:

    3.1 Maintenance shall be performed year-round and include the following tasks:

a. Prune and thin trees and shrubs around structures to decrease fuel volumes, and to provide adequate separation between structures and plants.

b. Remove dead vegetation from trees and shrubs.

c. Trash and debris shall be cleared from around structures, and removed from roofs and rain gutters.

d. Weeds shall be removed.

3.2 Irrigation systems shall function properly, and be maintained in good working order. Planting shall be sufficiently watered to maintain succulent growth.

4. Structures

4.1 Construction with combustible materials is regulated in this zone (decks, patio covers, fences, arbors, vineyard posts, etc.). Combustible materials are defined in the *Wildland-Urban Interface Building Code*.

4.2 Placement of ground-mounted solar panel arrays is regulated in this zone.

5. Driveways and Emergency Apparatus Access Roads:

5.1 Areas within ten (10) feet on each side of driveways and access roads shall be thinned and reduced of undesirable flammable vegetation and planted with fire-resistant plant species. See Tables 6-1 and 6-2.

5.2 The Fire Chief and/or his or her designee are authorized to require up to 30 feet of fuel thinning and reduction on each side for new access roadways as defined in Chapter 15.24 PMC, the City of Poway's Fire Code.

5.3 Fuel Management at Existing Offsite Access Roadways: The Fire Chief and/or his or her designee are authorized to cause the area within 20 feet on each side of the improved width portions of highways and private streets or roads, which are improved, designed, or ordinarily used for vehicular traffic, to be thinned and reduced of flammable vegetation and other combustible growth, and shall comply with the requirements of a fuel modification zone.

5.4 Trees shall not be planted within ten (10) feet of the edge of the roadway.

Fuel Modification Zone B: Transitional Area Between Zone A and Native Vegetation Minimum Width: 60 feet (See Figure 6-1 in this Section for reference)

1. Zone B shall consist of one or a combination of the following: establishment of a fire resistive landscape, trimmed flammable vegetation, and/or cleared flammable vegetation.

1.1 Establish a Fire Resistive Landscape:

1.1.a Plant material on manufactured slopes shall be deep-rooting to control soil erosion and slippage. "Deep-rooting" refers to plant roots that may grow three to five feet deep in favorable soil conditions. At least 50 percent of Zone B area shall be planted with deep-rooted species. For examples of deep-rooted plant species, refer to Table 6-2, Fire-Resistant Plants.

1.1.b Plant species shall be selected to provide good soil coverage for erosion prevention and slope stabilization.

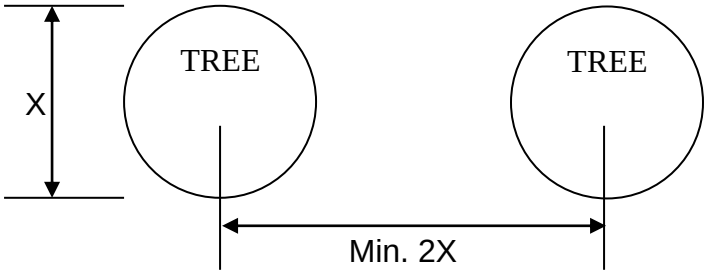
1.1.c Mature heights of new shrub plantings shall be a maximum of 24 inches to reduce flame length.

1.1.d Plant species selected shall have low foliage mass to reduce the vegetative fire fuel load (fire-resistant).

1.1.e Plant species selected shall be visually and ecologically compatible with native vegetation. Fire-resistant native plant species are encouraged in this zone. For examples of fire-resistant native plant species, refer to Table 6-2, Fire-Resistant Plants.

1.1.f Tree Spacing and Canopy Coverage:

Spacing between trees (trunk-to-trunk) in Zone B shall be no less than two times (2X) the diameter of the species' mature canopy (X) as shown in the diagram below. Spacing between trees of dissimilar species shall be no less than two times the diameter of the largest species' mature canopy.



The mature canopy coverage of trees shall be limited to a maximum of 30% of Zone B area (total area of mature tree canopy cover ÷ total area of Zone B ≤ 0.30).

Avoid planting trees directly uphill of one another.

1.1.g Grove planting (agricultural or ornamental) is regulated by Chapter 15.05 PMC, the *Wildland-Urban Interface Building Code*.

1.2 Trim All Flammable Vegetation:

1.2.a All flammable vegetation, which includes native vegetation and/or any other non-fire resistive vegetation, shall be trimmed and maintained at a maximum height of between six to twelve inches above the ground.

1.2.b The root system of trimmed vegetation shall remain in place to prevent erosion.

1.3. Clear All Flammable Vegetation:

1.3.a Clear all flammable vegetation, which entails removal of the vegetation and its root system to prevent its re-growth. These may be graded areas or natural topography areas.

1.3.b Provide permanent erosion control per the specifications identified in Table 6-3.

2. Irrigation:

2.1 Irrigation systems when required shall be designed in accordance with Section 5 of this Manual.

2.2 Irrigation systems shall be adjusted to prevent runoff and overspray into adjacent undisturbed native vegetation.

2.3 Irrigation shall be required with new planting established pursuant to sub-section 1.1 above for at least three years to ensure complete plant establishment.

3. Maintenance:

3.1 Maintenance shall be performed on a seasonal basis.

3.2 Maintenance shall include removal of dead plants and vegetation, weeding, pruning, and inspection and repair of irrigation systems.

3.3 Invasive exotic plant species listed by the California Invasive Plant Council (Cal-IPC) latest edition, shall not be planted in this zone, and shall be removed if present. Refer to Table 6-1 for a list of invasive exotic plant species commonly available from nurseries. Highly combustible native

plant species noted in Table 6-1, *Undesirable Plants*, shall not be planted and shall be removed if present in Zone B.

3.4 Highly combustible native plant species noted in Table 6-1, *Undesirable Plants*, along with annual weeds, shall be removed if present.

4. Structures:

4.1 Construction with combustible materials is regulated in this zone (decks, patio covers, fences, arbors, vineyard posts, etc.). Combustible materials are defined in the *Wildland-Urban Interface Building Code*.

5. Driveways and Emergency Apparatus Access Roads:

5.1 Areas within ten (10) feet on each side of driveways and access roads shall be cleared of undesirable flammable vegetation and are subject to the provisions contained in sub-sections 1.1-1.3 above.

5.2 The Fire Chief and/or his or her designee are authorized to require up to 30 feet of fuel thinning and reduction on each side for new access roadways as defined in Chapter 15.24 PMC, the City of Poway's Fire Code.

5.3 Fuel Management at Existing Offsite Access Roadways: The Fire Chief and/or his or her designee are authorized to cause the area within 20 feet on each side of the improved width portions of highways and private streets or roads, which are improved, designed, or ordinarily used for vehicular traffic, to be thinned and reduced of flammable vegetation and other combustible growth, and shall comply with the requirements of a fuel modification zone.

5.4 Trees shall not be planted within ten (10) feet of the edge of the roadway.

D. EXPANDED FUEL MODIFICATION ZONES IN EXCESS OF 100 FEET FROM BUILDINGS AND STRUCTURES

1. In special circumstances deemed necessary for fire and life safety, and based on topography, vegetation types and fuel loads, the City Fire Chief may increase the total width of Zone A plus Zone B to a maximum of 200 feet. Habitat loss in excess of 100 feet may require habitat mitigation as determined by the City of Poway, Development Services Department.

2. Pruning and Thinning Guidelines in Natural Open Space Areas in Excess of 100 Feet from Buildings and Structures (including areas within the South Poway Specific Plan, Environmentally Sensitive Lands and Archeological Sites):

When fuel modification zones extend into natural open space areas, native vegetation in these areas shall be selectively thinned and pruned to reduce fuel load as determined by the Development Services Department and Safety Services Department.

2.1 Prune and thin dense masses of native vegetation in accordance with the guidelines established in Chapter 8.76 PMC, DEFENSIBLE SPACE, VEGETATION MANAGEMENT AND WASTE ACCUMULATIONS.

2.2 Excessive removal of native vegetation resulting in soil erosion is prohibited. Thinning should both reduce vegetative fuel load and preserve the natural appearance of native plant communities.

a. Clearing and grubbing of native vegetation is prohibited without a City permit. Grubbing refers to the complete removal of an entire plant, including the root system. Mowing may be considered an approved alternative to clearing and grubbing, subject to City approval.

b. If clearing and grubbing is permitted, then the City may require submittal of revegetation and erosion control plans for the cleared area. The Development Services Department shall review and approve revegetation and erosion control plans.

2.3 Irrigation shall not be provided in natural open space areas.

2.4 Maintenance:

a. Vegetative fuel management may be required annually. The Department of Safety Services shall dictate prescribed maintenance intervals in natural open space areas.

TABLE 6-1

UNDESIRABLE AND NON-FIRE RESISTIVE PLANTS

Within Vegetative Fuel Modification Zones A and B

This table lists several species of plants that generate very flammable vegetative fuel, or are invasive exotic plant species.

The plant species below, and other undesirable or invasive species, shall not be planted in fuel modification zones.

BOTANICAL NAME	COMMON NAME
Adenostoma sparsifolium	Red Shanks
Adenostoma fasciculatum	Chamise

Artemisia californica	California Sagebrush
*Cortaderia selloana	Pampas Grass
*Hedera helix	English Ivy
Malosma laurina	Laurel Sumac
*Pennisetum setaceum	Fountain Grass
Salvia (most species)	Sage
*Vinca major	Periwinkle

* invasive exotic plant species commonly available from nurseries

The species below, and other non-fire resistive species, may be planted in fuel modification Zone B if approved by the City Fire Chief. Nonfire-resistive species shall be placed so that the edge of the tree canopy (dripline) at plant maturity is a minimum of 30 feet from structures.

BOTANICAL NAME	COMMON NAME
Acacia (most species)	Acacia
Cedrus species	Cedar
Cupressus species	Cypress
Eucalyptus (most species)	Gum, Ironbark
Juniperus species	Juniper
Phoenix canariensis	Canary Island Palm
Pinus species	Pine
Washingtonia filifera	California Fan Palm
Washingtonia robusta	Mexican Fan Palm

TABLE 6-2

FIRE-RESISTANT PLANTS

For Use Within Vegetative Fuel Modification Zones

Any plant can burn given the right conditions of temperature, humidity, and wind. However, a carefully designed and well-maintained landscape can create defensible space to greatly enhance wildland fire safety. The suggested low-fuel and fire-resistant plants listed below are generally suitable for local soil and climate conditions. The City of Poway assumes no responsibility for the survival of plants in a particular location. Proper maintenance of plantings is the responsibility of the Property Owner/Applicant.

This is not a list of required plants, other suitable low-fuel and fire-resistant plant species may be proposed by qualified professionals.

ZONE A Landscaped Area with Permanent Irrigation

BOTANICAL NAME	COMMON NAME

Groundcovers and Low Shrubs (under 36 inches mature height):

Achillea tomentosa	Woolly Yarrow
Baccharis pilularis 'Twin Peaks'	Dwarf Coyote Brush
Cotoneaster dammeri	Bearberry Cotoneaster
Delosperma 'Alba'	White Trailing Ice Plant
Fragaria chiloensis	Wild Strawberry
Lantana montevidensis	Purple Trailing Lantana
Malephora crocea	Croceum Ice Plant
Myoporum parvifolium	Myoporum
Rosmarinus officinalis 'Prostratus'	Rosemary
Santolina chamaecyparissus	Lavender Cotton
Sedum album	Sedum
Senecio serpens	Senecio

Trees, Low Shrubs, and Turf:

Many ornamental plant species may be utilized in Zone A landscaped areas provided that the requirements of this Section are met with regard to fire-resistance, maintenance, plant spacing and height, and placement around structures.

ZONE B Transitional Landscaped Area with Irrigation

BOTANICAL NAME	COMMON NAME

Groundcovers and Low Shrubs (under 24 inches mature height):

[2] Arctostaphylos ‘Pacific Mist’	Manzanita
[2] Baccharis pilularis 'Twin Peaks'	Dwarf Coyote Brush
[2] Ceanothus griseus hor. ’Yankee Point’	Wild Lilac
[2] Cistus crispus ‘Descanso’	Rockrose
[2] Cistus salviifolius	Sageleaf Rockrose
[1,2] Encelia californica	Bush Sunflower
[1] Epilobium canum	California Fuchsia
[1] Eriophyllum confertiflorum	Golden Yarrow
[1] Eschscholzia californica	California Poppy
[1] Helianthemum scoparium	Peak Rush-Rose
[1,2] Iva hayesiana	San Diego Marsh Elder
[1,2] Lotus scoparius	Deerweed
[1] Lupinus bicolor	Dove Lupine
[1] Mimulus aurantiacus	Monkey Flower
[1] Mirabilis californica	Wishbone Bush

Myoporum parvifolium	Myoporum
Penstemon spectabilis	Showy Penstemon
[1,2] Rosa californica	California Rose
[2] Rosmarinus officinalis 'Prostratus'	Rosemary
Salvia sonomensis	Creeping Sage
Santolina chamaecyparissus	Lavender Cotton
Santolina virens	Green Santolina
[1] Sisyrinchium bellum	Blue-Eyed Grass
[1] Trichostema lanatum	Wooly Blue Curls
[1,2] Yucca whipplei	Our Lord's Candle

Trees:

Arbutus unedo	Strawberry Tree
Ceratonia siliqua	Carob
Cercis occidentalis	Western Redbud
[1] Heteromeles arbutifolia	Toyon
[1] Platanus racemosa	California Sycamore
Prunus ilicifolia ssp. ilicifolia	Hollyleaf Cherry
Prunus ilicifolia ssp. lyonii	Catalina Cherry
[1] Quercus agrifolia	Coast Live Oak
Rhus lancea	African Sumac
[1] Rhus ovata	Sugarbush
[1] Sambucus mexicana	Mexican Elderberry

[1] species native to San Diego County (use is encouraged in fuel modification zones)
[2] deep-rooted groundcover and shrub species (trees are considered deep-rooted)

TABLE 6-3
EROSION CONTROL ON AREAS
WITH A SLOPE GRADIENT LESS THAN 50%

Slope Gradient	**Improvement**
Up to 20%	• Mulch (organic or inorganic) • 2" (50 mm) minimum mulch thickness • Weed Control Fabric (see below)
20% up to 33%	• 1" minimum (20mm) Clean Crushed Rock • 3" (75 mm) minimum thickness • Weed Control Fabric (see below)
33% up to 50%	• 2" minimum (50mm) Clean Crushed Rock • 4" (100 mm) minimum thickness • Weed Control Fabric (see below)

Area Preparation Shall Be as Follows:

Clearing

Areas to receive mulch shall be cleared of trash and debris. All flammable vegetation, including its root system to prevent re-growth, shall be removed. Cleared trash, debris and removed vegetation shall be disposed of properly off-site.

Earthwork

After clearing, areas to receive mulch shall be excavated to a sufficient depth such that the finished elevation of the gravel mulch will meet approved finish grade. The areas to receive mulch shall be graded to a smooth surface, and shall be compacted to not less than 90% relative compaction prior to placement of the mulch.

Weed Control Fabric

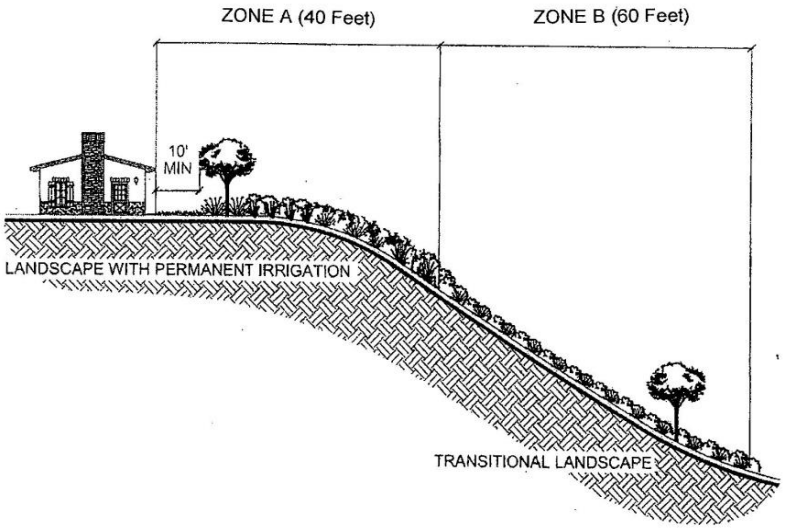
Weed control fabric shall be placed in areas to receive mulch. Weed control fabric shall be placed loosely with longitudinal and transverse joints overlapped 8" (200 mm). Following placement, the fabric shall lie flat, smooth and be in uniform contact with the soil surface, without bulges or wrinkles. Fabric shall be stapled or staked in place to keep fabric in place during mulch placement. Staples shall be 2" (50 mm) wide, 8" (200 mm) in length, and 11 gauge wire. Installation of staples shall be per manufacturer's instructions. Weed control fabric shall be manufactured from thermally spun bonded polypropylene fabric and shall conform to the following:

Specification	Minimum Requirement
Grab Tensile Strength	59 kg
Grab Elongation	60%
UV Resistance	70% @ 150 hours
Mass	102 grams/square meter

Placement

Each layer of mulch shall be raked to evenly form a smooth uniform surface. When placement is complete the surface shall be uniform, and shall maintain original flow lines, slope gradient and contours of the project site. Mulch shall be placed avoiding damage to the weed control fabric. Weed control fabric damaged during placement of mulch shall be removed and replaced.

FIGURE 6-1
FUEL MODIFICATION ZONES
NOT TO SCALE



SEVEN. STREET TREE PROGRAM

Street trees integrate new development into existing neighborhoods, reduce air pollution, visually buffer busy streets, and enhance the visual qualities of streetscapes. It is the intent of the City of Poway to promote the planting and long-term maintenance of street trees. Refer to Section Four and Section Ten for additional requirements.

A. GENERAL REQUIREMENTS

1. Planting of street and parkway trees shall be in accordance with the appropriate City ordinances and standard Conditions of Approval.

2. Trees and other landscape improvements within the public right-of-way shall not be placed in locations that would obstruct the vision of drivers and pedestrians.

3. New street tree planting in older areas of the City shall be compatible with plantings that currently exist.

4. Street tree planting in new developments shall generally require a theme tree for each street. There should be a variety of tree types in neighborhoods to reduce potential for disease and pest problems.

5. Minimum acceptable size of street and parkway trees shall be 15-gallon container size, except larger parkways where a variety container sizes may be appropriate.

6. Spacing of street trees shall be 30 feet on center (average), and as appropriate to selected species. Exceptions to the requirement shall be determined by the Poway Development Services Department.

7. Street trees shall not be planted in the public right-of-way, and City-held or utility easements, unless approved by the Public Works Department, Development Services Department and utility companies.

    7.1 Street trees may be required by the City as a condition of development. In such cases, property owners/developers shall obtain from the City a *Right-of-Way Permit* or *Encroachment Maintenance and Removal Agreement,* as determined by the Development Services Department, prior to the construction of any private improvements, including installation of required street trees, in the public rights-of-way and City-held easements.

8. Street trees in residential tracts shall be planted prior to issuance of occupancy permits. Developers may provide homeowners with vouchers to purchase 15-gallon trees and larger from the recommended street tree list. Project planners must have proof of vouchers prior to final inspection of buildings.

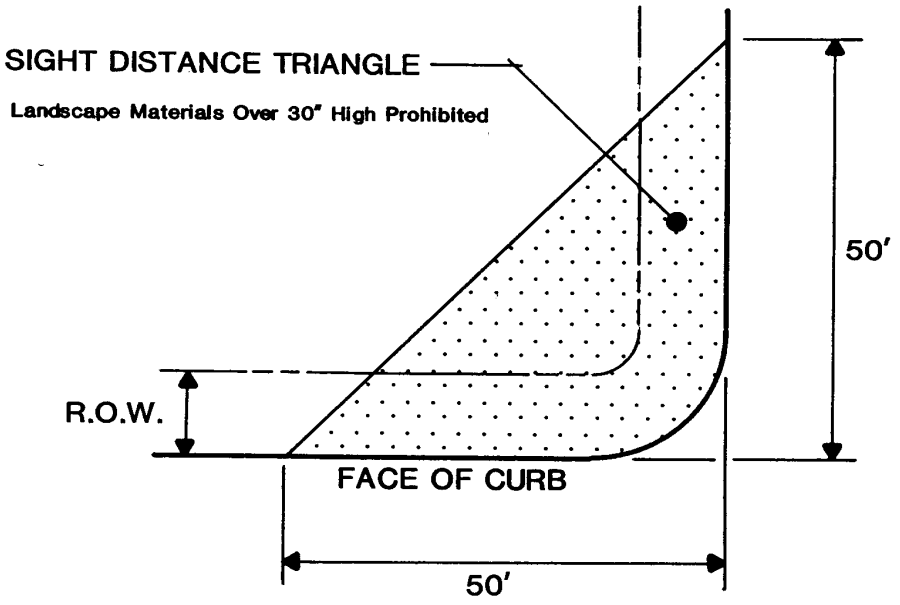
B. PLANTING REQUIREMENTS WITHIN PUBLIC RIGHTS-OF-WAY

1. Plant Placement and Location

1.1 Plant materials (mature height) and landscape improvements over 24 inches in height shall be prohibited within the triangular area 50 feet back from extension of intersecting curb lines of two streets (see Figure 7-1).

FIGURE 7-1

SIGHT DISTANCE TRIANGLE



PLAN

1.2 Plant materials (mature height) and landscape improvements over 24 inches in height within public rights-of-way and LMD areas shall not be planted within five feet of driveways as measured from outer edge of mature growth.

1.3 Trees shall be located and maintained to preserve clearance of at least ten feet from street lights, fire hydrants, utility poles, meters and cable TV boxes, and backs of street and directional signs to tree trunks.

a. Trees shall be planted a minimum of five feet horizontally from underground utilities (verify location with utility companies).

b. Tree placement shall be carefully determined to avoid limiting visibility of traffic control signals and signs.

1.4 The following minimum clearances shall be observed when planting (see Figure 7-2 below):

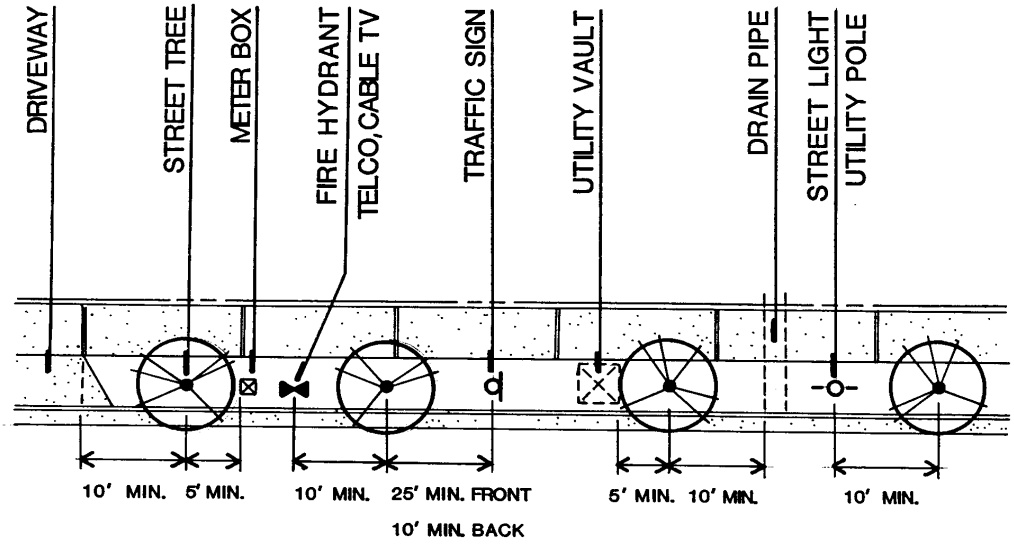
a. Trees: three feet from face-of-curb and edge of sidewalk to trunk;

b. Shrubs: 12 inches from face-of-curb and edge of sidewalk to outer spread of mature growth.

1.5 Trees within ten feet of hardscape improvements shall be installed with root control barriers to promote deep rooting. Root barriers shall be installed adjacent and parallel to hardscape where possible - not encircling root balls. Length of root control barriers shall be a minimum of twenty (20) feet, centered on the tree trunk. Root barriers shall be installed in accordance with manufacturer's recommendations.

FIGURE 7-2

STREET TREE PLACEMENT



PLAN

2. Plant Material Selection

2.1 Street and parkway trees shall be selected from Table 7-1, "Street Trees," at the end of this Section, unless otherwise approved by Development Services Department.

2.2 Plant material selected for installation in rights-of-way and City-held easements shall have the following characteristics:

- trees shall be deep-rooting (no major surface roots),
- require minimal maintenance,
- relatively free of diseases and pests,
- low to moderate water requirements.

2.3 Trees planted in utility easements shall be approved by the utility companies prior to planting.

3. Plant Material Installation

3.1 Trees and other plant material shall be installed in accordance with Section Four herein.

3.2 Required front and street side yard setbacks along streets and major roads (excluding sidewalks and driveways) shall be landscaped (See Figure 7-3).

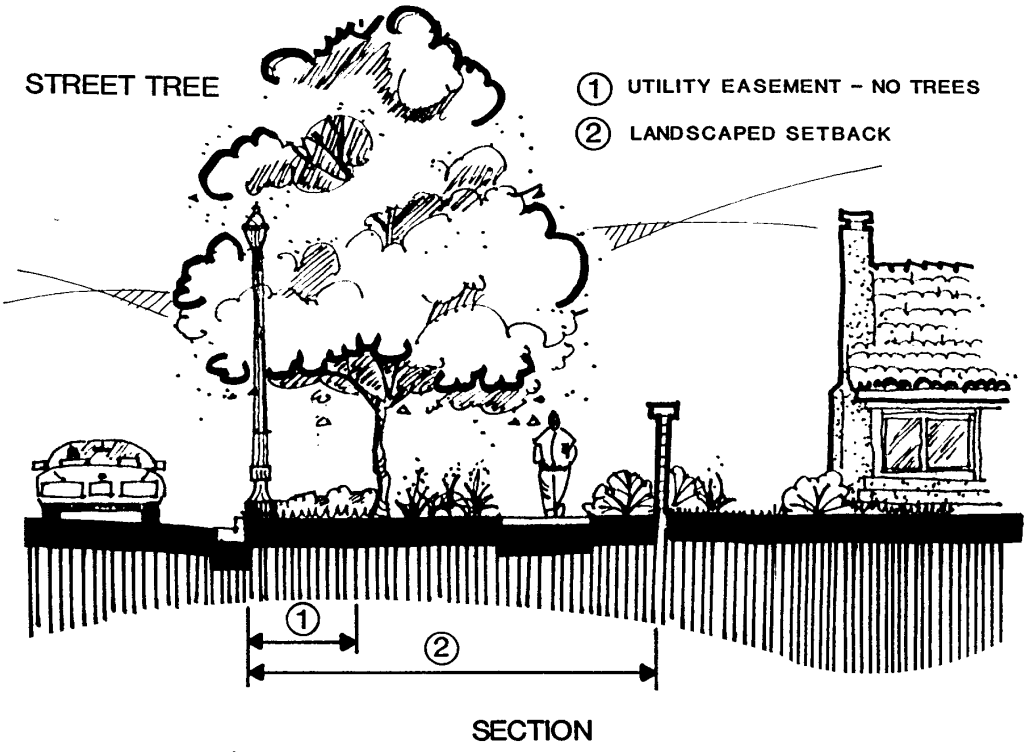
3.3 Areas not planted with groundcover or paved shall be covered with mulch at 2-inch depth minimum.

3.4 Trees planted in paved areas shall have adequate space for root growth through maturity. Planting area of 25 square feet minimum shall be provided for each tree.

3.5 Tree grates and trunk guards shall be utilized in paved areas with pedestrian traffic.

FIGURE 7-3

PLANTING WITHIN REQUIRED SETBACKS



4. Plant Material Maintenance

4.1 Trees and shrubs shall be pruned to avoid blocking walks, building entries, windows, etc.

4.2 Mature trees shall be maintained to create the following minimum vertical clearances between sidewalks and streets, and lowest lateral branches.

- seven feet above sidewalks
- 14 feet above streets

4.3 Shrubs shall be maintained six inches back from sidewalks and 12 inches back from curbs.

4.4 Planting areas shall be kept free of weeds and litter.

4.5 Property owners and developers shall permanently and fully maintain landscaped areas within adjacent public rights-of-way.

4.6 Trees shall not be topped. Tree pruning shall be in accordance with ANSI A300, currently adopted industry standards.

5. Irrigation Requirements

5.1 Street trees shall be irrigated with fully automatic systems utilizing micro-irrigation techniques and equipment, where practical (bubblers, drip emitters, subsurface emitter tubing, etc.)

5.2 If overhead spray irrigation systems are operated adjacent to streets, then there shall be no runoff and overspray onto sidewalks and pavement.

5.3 Micro-irrigation systems only shall be installed to water planting in street median islands.

5.4 Additional requirements are outlined in Section Three in this manual.

TABLE 7-1

STREET TREES

The suggested plants listed below are generally suitable for local soil and climate conditions. However, the City of Poway assumes no responsibility for the survival of plants in a particular location. Proper maintenance of plantings is the responsibility of the Owner/Applicant.

BOTANICAL NAME	COMMON NAME (E-evergreen; D-deciduous)
ESPOLA ROAD	
Liquidambar styraciflua 'Rotundiloba'	American Sweet Gum (D)
Pistacia chinensis	Chinese Pistache (D)
Platanus acerifolia 'Columbia'	London Plane Tree (D)
Quercus ilex	Holly Oak (E)
Schinus molle	California Pepper Tree (E)*
TWIN PEAKS ROAD	
Liquidambar styraciflua ~~cv.~~ 'Rotundiloba'	American Sweet Gum (D)
Quercus ilex	Holly Oak (E)
Quercus virginiana	Southern Live Oak (E)
Platanus acerifolia 'Columbia'	London Plane Tree (D)
MIDLAND ROAD	
Cinnamomum camphora	Camphor Tree (E)
Liquidambar styraciflua 'Rotundiloba'	American Sweet Gum (D)
Pistacia chinensis	Chinese Pistache (D)
Quercus ilex	Holly Oak (E)
Quercus virginiana	Southern Live Oak (E)

COMMUNITY ROAD

Geijera parvifolia	Australian Willow (E)
Lagerstroemia indica (Indian tribe cv.)	Crape Myrtle (D)
Liquidambar styraciflua 'Rotundiloba'	American Sweet Gum (D)
Podocarpus gracilior	Fern Pine (E)

POWAY ROAD

Liquidambar styraciflua 'Rotundiloba'	American Sweet Gum (D)
Lagerstroemia indica (Indian tribe cv.)	Crape Myrtle (D)
Platanus acerifolia 'Columbia'	London Plane Tree (D)
Podocarpus gracilior	Fern Pine (E)
Quercus agrifolia	Coast Live Oak (E)

POMERADO ROAD

Cinnamomum camphora	Camphor Tree (E)
Geijera parvifolia	Australian Willow (E)
Koelreuteria bipinnata	Chinese Flame Tree (D)
Platanus acerifolia 'Columbia'	London Plane Tree (D)
Quercus virginiana	Southern Live Oak (E)

*Requires large planting space

TABLE 7-2

ALTERNATIVE STREET TREES

The suggested plants listed below are generally suitable for local soil and climate conditions. However, the City of Poway assumes no responsibility for the survival of plants in a particular location. Proper maintenance of plantings is the responsibility of the Owner/Applicant.

(E-evergreen; D-deciduous)

BOTANICAL NAME	COMMON NAME

TREES (25 to 40 feet in height):

Agonis flexuosa	Peppermint Tree (E)
Bauhinia variegata	Purple Orchid Tree (D)
Koelreuteria paniculata	Goldenrain Tree (D)
Ligustrum lucidum	Glossy Privet (E)
Magnolia grandiflora cv.	Southern Magnolia (E)
Melaleuca styphelioides	Black Tea Tree (E)
Prunus lusitanica	Portugal Laurel (E)
Pyrus calleryana cv.	Ornamental Pear (D)

TREES (over 40 feet in height):

Cedrus deodara	Deodar Cedar (E)
Gingko biloba (male only)	Maidenhair Tree (D)
Jacaranda mimosifolia	Jacaranda (D)
Lithocarpus densiflorus	Tanbark Oak (E)
Pinus canariensis	Canary Island Pine (E)
Podocarpus macrophyllus	Yew Pine (E)
Quercus suber	Cork Oak (E)
Ulmus parvifolia cv.	Chinese Elm (D)

EIGHT. PARKING LOTS

Parking lots are a common feature of the urban landscape. Without areas of planting, these large unbroken expanses of paving are unsightly. Unshaded pavement absorbs solar energy and radiates energy back as heat, which raises urban temperatures. The intent of this section is to reduce the negative visual and environmental effects of parking areas. Refer to Section Three and Section Four for additional requirements.

A. GENERAL REQUIREMENTS

1. Parking lots shall be planted to screen them from adjacent walkways and streets. Plant canopy trees to screen views of parking lots from windows in adjacent buildings.

2. The landscape objective for new and redeveloped surface parking lots shall be to have the tree-shaded paved areas within fixed time periods after completion of landscape installations. Effective shade canopy coverage goals are based on several factors, including:

   - growth rate of selected shade tree species,
   - tree spacing in parking lots,
   - projected crown size of trees after fixed time periods,
   - canopy area that actually shades pavement.

   2.1 The goal of tree planting in parking lots is to achieve an effective shade canopy within five, ten, and 15-year time frames. Pedestrian walkways and circulation routes should be provided with effective shade. The following objectives for shade canopy coverage shall apply:

      b. 15 percent coverage by shade canopy at five years (minimum 10% coverage).

      c. 30 percent coverage by shade canopy at ten years (minimum 20% coverage).

      c. 60 percent coverage by shade canopy at 15 years (minimum 40% coverage).

   2.2 Trees selected to provide shade in parking lots shall have the following characteristics:

      a. Moderate to fast growth rate.

      b. Broad spreading crown.

      c. Relatively clean and free of pests.

      d. Deep-rooting (no surface roots).

2.3 Shade canopy coverage of paved areas shall be determined at midday during the month of July.

3. Parkways and pedestrian medians should be used to separate pedestrians and vehicular traffic. Planting islands shall be utilized to break large expanses of parking into smaller areas. Provide separation between vehicles and buildings with landscaped buffers.

4. Permeable pavement and storm water detention areas within parking lots are encouraged to facilitate groundwater recharge, and to filter pollutants from runoff before entering the storm drain system.

5. Trees within ten feet of hardscape require installation of root control barriers adjacent to the hardscape (not encircling root balls).

6. Trees shall not be planted closer than ten feet to lighting standards.

7. If necessary, trees shall be trimmed during the dormant season only (November 15th to February 15th) to reduce pruning shock, allow sufficient recovery time for maximum summer shade, and lessen possibility of insect infestation.

8. Trees shall not be topped. Tree pruning shall be in accordance with ANSI A300, currently adopted industry standards.

B. REQUIREMENTS FOR PARKING LOT DEVELOPMENT

1. Site Development Standards

1.1 Parking lot installations shall adhere to the City of Poway Standard Conditions of Approval. With regard to landscape requirements, the Conditions of Approval state:

"A minimum of one 15-gallon tree is required for every three parking spaces. Parking lot islands adjacent to stalls shall be provided with a minimum 12 inch wide walk, and six inch high, six inch wide P.C.C. curb."

1.2 Chapter 17.42 PMC, Off-Street Parking, contains requirements outlined below.

a. 17.42.060 B: *"Any unused space resulting from the design of the parking area shall be used for landscaped purposes."*

b. 17.42.060 C: *"…landscaped islands shall have a minimum inside dimension of four feet and shall contain a 12-inch-wide walk adjacent to parking stall and be separated from vehicular areas by a six-inch-high, six-inch-wide Portland concrete cement curbing."*

(Required concrete walk and curb shall not encroach into four-foot wide planter area. Total island width shall be seven feet minimum.)

c. 17.42.060 D: “All landscaping areas shall be irrigated automatically *and kept in a healthy and thriving condition free from weeds, debris and trash.”*

1.3 The following requirements for landscaped areas in parking lots shall be adhered to:

a. Parking lots of 5,000 square feet and larger shall have at least ten percent of total paved area landscaped.

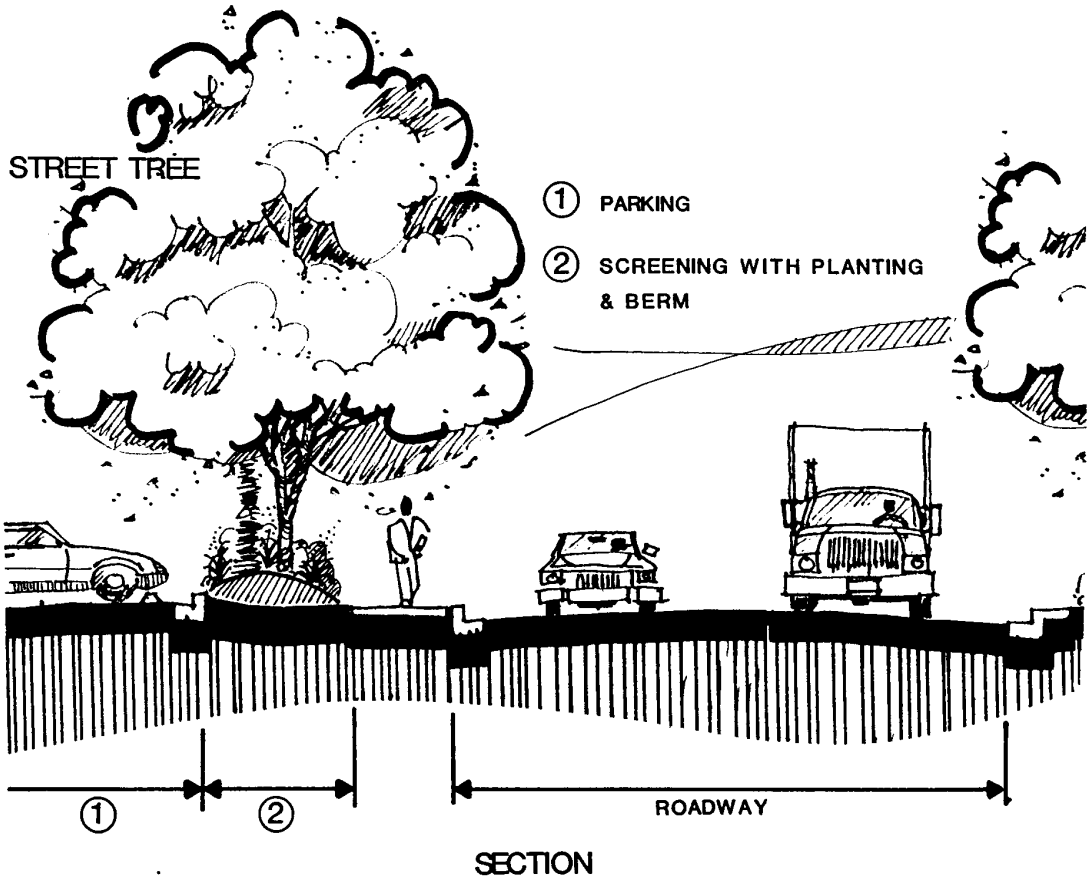
b. Parking lots less than 5,000 square feet shall have at least five percent of total paved area landscaped.

c. Required landscaped areas shall occur within paved parking lots, and shall not include landscaped setbacks and buffer areas adjacent to buildings.

1.4 Parking lots shall be screened from views from public streets. Screen planting shall be at least 36 inches tall, except in areas where sight distance is a factor. Screening shall be accomplished with earth berms, walls, planting or a combination of these (see Figure 8-1).

FIGURE 8-1

SCREENING FOR PARKING LOTS



1.5 Tree wells may be used to satisfy the parking lot tree planting requirement (one tree per three parking spaces). Tree wells shall be six feet square minimum, face-of-curb to face-of-curb. Concrete walks are not required in tree wells.

1.6 Refer to Section Seven for sight distance and driveway setback requirements for landscape materials.

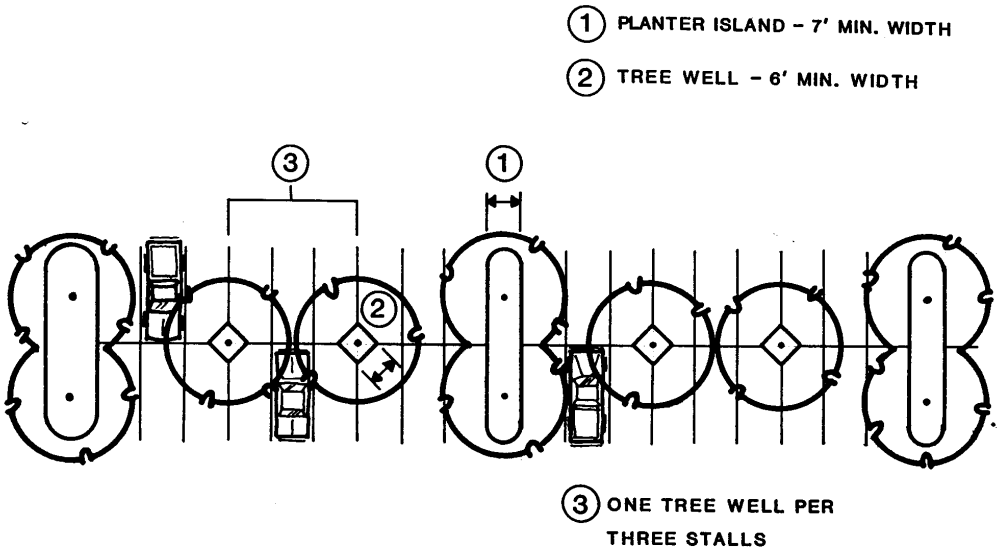
1.7 In parking stalls adjacent to planters, wheel stops shall be placed two feet from landscaped areas.

1.8 Landscaped areas between buildings and parking shall be provided in situations where the area is not needed for pedestrian or vehicular circulation or access to the building, not including sidewalks.

1.9 Setbacks between parking and property lines shall be landscaped.

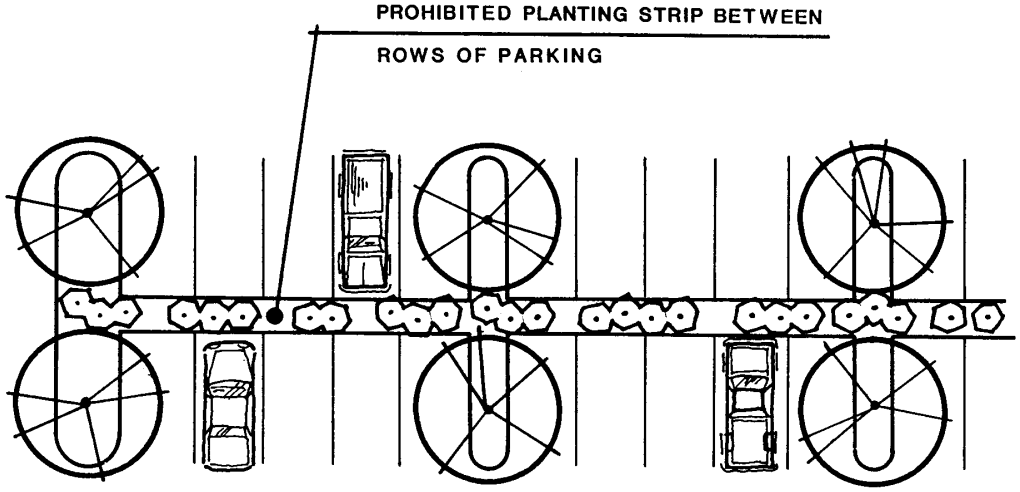
1.10 Landscaped islands shall occur between every 8-10 parking spaces. Planter islands shall be the same length as parking stalls (see Figure 8-2.)

FIGURE 8-2
PARKING LOT PLANTER ISLANDS



1.11 Landscaped islands between rows of parking without access for pedestrians shall be prohibited (see Figure 8-3).

FIGURE 8-3
PROHIBITED CENTRAL PLANTER STRIP



1.12 Centrally located and shaded walkways for pedestrian access are encouraged in large parking lots.

2. Plant Material Requirements

2.1 Lists of suggested plants for parking areas are at the end of this Section.

2.2 Except in small parking lots, three or more tree species should be utilized to provide diversity and avoid pest problems.

2.3 Plant material container sizes for parking areas shall be as follows:

a. There shall be a minimum ratio of one 24-inch box tree (or larger) to four 15 gallon size trees.

b. Parking lot islands shall receive at least 20% of total shrub planting as five-gallon container size plants.

c. Ground cover shall be planted at twelve inches on center minimum.

d. Place shredded wood mulch in planter islands at a depth of two inches minimum.

2.4 Enriched paving may be used in parking lots and planter islands. Use of enriched paving shall not alter requirements for tree planting and landscaped area within parking lots.

2.5 Tall shrubs shall not be planted within five feet of ends of planter islands to provide adequate sight distance. Plant materials used in this five-foot area shall not exceed 24 inches in height.

3. Irrigation Requirements

3.1 Parking lot planting shall be irrigated with fully automatic systems. Refer to Section Three in this manual for complete requirements.

3.2 Parking lot planter islands should utilize micro-irrigation systems. Micro-irrigation should be used in other landscaped areas adjacent to parking lots, where practical, to eliminate overspray onto paving.

TABLE 8-1

SUGGESTED PARKING LOT PLANT MATERIALS

The suggested plants listed below are generally suitable for local soil and climate conditions. However, the City of Poway assumes no responsibility for the survival of plants in a particular location. Proper maintenance of plantings is the responsibility of the Owner/Applicant.

BOTANICAL NAME	COMMON NAME (E-evergreen; D-deciduous)
TREES (25 to 40 feet in height):	
Agonis flexuosa	Peppermint Tree (E)
Bauhinia variegata	Purple Orchid Tree (D)
Geijera parviflora	Australian Willow (E)
Koelreuteria bipinnata	Chinese Flame Tree (D)
Lagerstroemia indica (Indian tribe cv.)	Crape Myrtle (D)
Magnolia grandiflora cv.	Southern Magnolia (E)
Melaleuca quinquenervia	Cajeput Tree (E)
Melaleuca styphelioides	Black Tea Tree (E)
Pistacia chinensis	Chinese Pistache (D)
Prunus cerasifera atropurpurea 'Krauter Vesuvius'	Purple Leaf Plum (D)
Pyrus calleryana 'Bradford'	Bradford Pear (D)
Tipuana tipu	Tipu Tree (D)
TREES (over 40 feet in height):	
Jacaranda mimosifolia	Jacaranda (D)
Liquidambar styraciflua	American Sweet Gum (D)
Lithocarpus densiflorus	Tanbark Oak (E)
Pinus canariensis	Canary Island Pine (E)
Platanus acerifolia 'Columbia'	London Plane Tree (D)
Podocarpus gracilior	Fern Pine (E)
Quercus agrifolia	Coast Live Oak (E)
Quercus ilex	Holly Oak (E)
Quercus suber	Cork Oak (E)
Quercus virginiana	Southern Live Oak (D)
Ulmus parvifolia	Chinese Elm (D)

SHRUBS (under six feet in height):

Agapanthus africanus	Lily-of-the-Nile
Calliandra californica	Calliandra
Calliandra eriophylla	Fairy Duster
Cassia artemisioides	Feathery Cassia
Ceanothus ‘Blue Cushion’	Ceanothus
Cistus purpureus	Purple Rockrose
Coleonema pulchrum	Breath of Heaven
Cotoneaster buxifolius	Bright Bead Cotoneaster
Cotoneaster congestus	Pyrenees Cotoneaster
Dietes vegeta	Fortnight Lily
Encelia californica	California Encelia
Encelia farinosa	Desert Encelia
Eriogonum crocatum	Saffron Buckwheat
Hemerocallis hybrids	Daylily
Lavendula angustifolia	English Lavender
Leptodactylon californicum	Prickly Phlox
Ligustrum japonicum ‘Rotundifolium’	Privet
Myrtus communis	Myrtle
Nandina domestica cv.	Heavenly Bamboo
Nerium oleander cv.	Dwarf Oleander
Pittosporum tobira cv.	Mock Orange
Raphiolepis indica cv.	India Hawthorn
Rosmarinus officinalis ‘Prostratus’	Rosemary
Salvia clevelandii	Cleveland Sage
Salvia leucantha	Mexican Bush Sage
Salvia leucophylla	Purple Sage
Santolina species	Lavender Cotton
Viburnum tinus ‘Dwarf’	Laurustinus
Xylosma congestum ‘Compacta’	Dwarf Shiny Xylosma

GROUNDCOVERS:

Ceanothus griseus horizontalis cv.	Carmel Creeper
Delosperma ‘Alba’	White Trailing Iceplant
Gazania species	Gazania
Hedera helix cv.	English Ivy
Iva hayesiana	San Diego Marshelder
Juniperus procumbens ‘Nana’	Japanese Garden Juniper
Oenothera berlandieri	Mexican Evening Primrose
Polygonum capitatum	Pink Clover Blossom
Potentilla tabernaemontanii	Spring Cinquefoil
Sollya heterophylla	Australian Bluebell Creeper
Trachelospermum jasminoides	Star Jasmine

NINE. LANDSCAPE GRADING AND CONSTRUCTION

The intent of this Section is to establish minimum requirements for landscape grading, drainage, and construction improvements. Information regarding permit requirements for grading and wall construction can be obtained from the Development Services Department.

A. LANDSCAPE GRADING REQUIREMENTS

Landscape grading can be defined as the finished manipulation of landform to accomplish a specific landscape purpose. This operation typically involves the movement of relatively small amounts of earth, as opposed to rough (or mass) grading, which significantly alters landforms. Landscape grading is performed to create playfields, recreational trails, pedestrian circulation, earth mounds for screening, adequate drainage, and other landforms.

1. Existing and proposed finish grades shall be indicated by contours and spot elevations on landscape grading plans. Landscaped areas shall have positive drainage away from structures and toward collection points.

2. Grades, flow lines, drainage structures, and other grading improvements within public rights-of-way shall be indicated on landscape grading plans.

3. Grading plans shall conform to the following slope criteria:

    3.1 Bike path grade: 5 percent maximum slope (steeper grades will be permitted for distances up to 500 feet).

    3.2 Disabled access: 8.33 percent maximum slope. Refer to State Building Code, Title 24, Part 2, California Administrative Code, and latest supplements for additional requirements.

    3.3 Minimum grade of turf and groundcover areas: 2 percent.

    3.4 Mounded turf areas shall have a maximum design slope of 3:1 (33%). Groundcover areas shall have a maximum design slope of 2:1. Landscaped areas with mulch only shall have a maximum slope of 3:1.

    3.5 Recreational trails: refer to Recreational Trail Design Standards (Appendix B).

    3.6 Gradients for turf grass playfields:

        a. Open play areas - 3% maximum
        b. Active sports fields - 1.5% minimum and 2% maximum

3.7 Hardcourts shall be constructed with a slope of one inch per ten feet.

4. Grading and drainage improvements affecting adjoining properties (public and private) shall conform to City of Poway Grading Ordinance. Subsurface drain lines shall connect into storm drain system or exit through curb faces and into gutters.

5. Grading and drainage improvements within public rights-of-way shall be subject to approval by City Engineer.

B. LANDSCAPE CONSTRUCTION REQUIREMENTS

1. Bike Paths (Class I Bikeways)

1.1 Asphalt concrete bike paths shall be constructed in accordance with Caltrans Highway Design Manual, *"Bikeway Development and Design,"* latest edition. Bike paths shall have a ten-foot minimum width unless other approved by the City Traffic Engineer. Testing for expansive soils may be required in areas where bike trails are planned. Trail designs exceeding Caltrans standards may be required, if warranted by soil conditions.

1.2 Asphalt concrete shall be Type "A" or "B" in accordance with Caltrans Standard Specifications (½-inch maximum aggregate and medium grading).

2. Concrete Walks

2.1 Concrete walks shall be constructed in accordance with San Diego Regional Standard Drawings, and Standard Specifications for Public Works Construction (latest editions), unless noted otherwise. If tree wells occur within sidewalk paving, then four-foot clearance shall be maintained between tree trunks and edges of sidewalk to allow for pedestrian access.

2.2 Multi-family residential, commercial, and industrial developments shall provide convenient separate access for pedestrians from streets to main building entrances.

3. Lighting

Wherever possible, lighting designed to accent landscape features, buildings, and signage shall be located on private property. Lighting systems located within public rights-of-way shall be designed by qualified professionals. Electrical plans shall be submitted with landscape improvement plans, and shall be

approved by City Engineer. Refer to the PMC for lighting requirements and "dark skies" restrictions.

4. Landscaped Setbacks along Major Roads

Setbacks between property lines and sound attenuation walls, as determined by noise attenuation studies, shall be established for major roads. Setbacks shall be landscaped with appropriate low maintenance planting that effectively screens sound walls. Landscape setbacks shall be a minimum of five feet wide, excluding wall footings, unless an alternate minimum width requirement has been established by and approved Specific Plan.

5. Concrete Mow Curbs

5.1 Concrete shall be a mixture of general purpose Portland cement, clean water, and aggregates.

5.2 Admixtures may be used with approval of the City Engineer.

5.3 Concrete shall have a minimum compressive strength of 2,500 psi at 28 days.

5.4 Mow curbs adjacent to pilasters and walls shall maintain minimum width as shown on plans.

5.5 End of mow curbs shall meet hardscape elements and walls with expansion joints.

6. Decomposed Granite Paths

6.1 Paths shall have edges to contain decomposed granite, such as redwood 2 x 6 headers or concrete curbs.

6.2 Subgrade shall be well-compacted, well-drained, and treated to control vegetative growth.

6.3 Decomposed granite shall be wetted and compacted to 90 percent relative density after placement.

7. Asphalt Concrete Pathways

7.1 Subgrade shall be treated with City-approved soil sterilant in accordance with manufacturer's recommendations.

7.2 Subgrade shall be scarified to depth of six inches and compacted to 90 percent relative density.

7.3 Asphalt concrete shall be three inches minimum thickness over compacted subgrade in accordance with Standard Details.

8. Bus Stops

8.1 Contact Community Services Department and Development Services Department for approved bus stop shelter design.

8.2 Benches shall be similar to Dumor, Inc. Model 34-60R, or approved substitution.

9. Chain Link Fencing and Gates

9.1 Concrete footings shall consist of Class 500-C-2500 concrete.

9.2 Fence posts, rails, and braces shall be Schedule 40 galvanized steel pipe in accordance with ASTM A53.

9.3 Chain link fabric shall conform to ASTM A392. Fabric shall be nine-gauge for fences over 60 inches in height (11-gauge for fences 60 inches high and less). Fabric shall be woven into 1¾-inch mesh and galvanized after fabrication.

9.4 Hinges, fittings, latches, and post tops shall be of galvanized metal.

9.5 Reinforcing tension wires shall be at least seven-gauge galvanized coil spring steel wire. Tension bars used in fastening fabric to end and corner posts and gate frames shall be galvanized high carbon steel bars not smaller than $^{3}/_{16}$ x ¾ inches.

9.6 Truss and tension rods shall be adjustable $^{3}/_{8}$-inch diameter galvanized steel rods. Adjustment shall be provided by galvanized turnbuckles or other approved tightening devices.

9.7 Installation of chain link fencing shall be in accordance with Standard Specifications for Public Works Construction, and San Diego Regional Standard Drawings (latest editions).

10. Recreational Trail Fences

Recreational trail fences shall be installed in accordance with requirements contained in the City's "Recreational Trail Design Standards" in Appendix B. Also refer to Recreational Trails in Section Ten.

11. Sound Attenuation Walls

11.1 Concrete footings shall be poured against subgrade that is firm and free from standing water. If subgrade is dry, then it shall be thoroughly dampened to ensure that moisture is not absorbed from fresh concrete. If concrete footings are poured on rock, the rock shall be fully exposed, cleaned, and its surface shall be removed to expose sound rock. Seams in rock shall be grouted under pressure, or treated otherwise, and accepted by the City Engineer.

11.2 Forms shall be of suitable material and of a type, size, shape, quality and strength to ensure construction as designed. Forms shall be true to line and grade, clean, smooth and free from surface irregularities. Approved releasing agents may be applied to forms provided they will leave no objectionable films on finished concrete.

11.3 Reinforcing Steel Bars

a. Reinforcing bars shall be placed as shown on plans. Rebar shall be firmly and securely held in position in accordance with the *"Manual of Standard Practice"* of the Concrete Reinforcing Steel Institute. Placing or adjusting rebar after concrete is poured shall not be permitted. Before placing in forms, reinforcing steel shall be cleaned thoroughly of mortar, oil, dirt, loose rust, and foreign matter that would impair bonding.

b. Do not pour concrete until placement of reinforcing steel bars has been inspected and approved by the City. If rebar is spliced, then bars shall be lapped at least 30 diameters, unless shown otherwise on plans. Rebar shall not be bent or straightened in a manner that will damage the material.

11.4 Concrete Block

Concrete block shall be "Adobe" slump block type, or as specified on plans. Concrete masonry units shall be made with sand-gravel aggregate and conform to ASTM C90 for Grade N-1 units. Unless otherwise specified, units shall weigh 125 pounds per cubic foot (oven dry weight of concrete).

11.5 Mortar, Grout, and Water

a. Mortar shall be class "D" or "E" (1 part cement per 2½ to 3 parts sand) to which ¼ to ½ part hydrated lime or lime putty has been added. Mortar shall attain a minimum compressive strength of 1,800 psi in 28 days.

b. Grout in cells less than four inches clear in any dimension shall be 1 part Portland cement and 2¼ to 3 parts coarse sand. In cells four inches and larger in all horizontal directions, grout shall be 1 part Portland cement, 2 to 3 parts sand, and 1¼ to 2 parts concrete aggregate (No. 4). Grout shall attain a minimum compressive strength of 2,000 psi in 28 days.

c. Use minimum quantity of water required to produce a sufficiently workable mixture for the purpose intended. Water used in mortar and grout shall contain no deleterious substances.

11.6 Wall Construction

a. Construction shall be performed in accordance with industry standards, the Uniform Building Code, and requirements of the City of Poway. Walls shall be laid true, level, and plumb. Masonry units shall be cured, dry, and surfaces shall be clean when laid in walls.

b. During construction, partially laid walls and units in storage shall be protected from moisture. Masonry units and portions of walls that become wet shall be thoroughly dry before work is resumed.

c. Masonry cuts shall be neat and regular. Edges exposed in finished work shall be cut with a power driven abrasive saw. Mortar joints shall be straight, clean, and uniform in thickness.

d. Reinforcing steel shall be inspected prior to placing grout. Vertical cells shall be filled solid with grout, unless otherwise noted.

e. Sound attenuation walls in residential zones shall conform to City ordinances as stated in the PMC.

TEN. PUBLIC WORKS LANDSCAPE AND IRRIGATION IMPROVEMENT PROJECTS

A. GENERAL REQUIREMENTS

1. This section outlines the requirements of the City of Poway for landscape and irrigation improvements for public works projects. The Public Works Department and Development Services Department review, administer and supervise design, construction and maintenance of landscape, irrigation and recreation improvements required with Landscape Maintenance Districts (LMDs), Capital Improvement Projects, City Park projects, and all other public works landscape installations.

2. Conceptual plans for public works projects require review and approval by the Director of Public Works. These plans shall identify project boundaries, including LMD, utility and City-held easements, medians, rights-of-way, creeks, parks, and recreational trails. Conceptual landscape plans shall identify areas to be landscaped and display the landscape treatment of the project. Conceptual landscape plans shall be approved as a condition of Tentative Tract Maps, Conditional Use Permits, and other discretionary actions.

3. Comprehensive landscape plans shall conform to requirements set forth in this manual. Landscape requirements that relate to workmanship, materials, and equipment in public rights-of-way and other public works landscape improvement projects are included in this section.

    3.1 The square footage of landscape maintenance district areas shall be noted on the title sheet of LMD plans.

4. Comprehensive landscape plans shall be reviewed by the Director of Public Works. Plans shall be prepared in conjunction with final approved grading plans and Resolutions of Approval. Plans shall be completed and approved prior to issuance of Building Permits.

5. Director of Public Works may authorize extensions of time schedules relating to conceptual plans, comprehensive landscape plans, and completion of landscape improvements due to extenuating circumstances.

6. Public Works Landscape Maintenance (Refer to Section Eleven for complete maintenance requirements.)

    6.1 The required landscape maintenance and plant establishment period for LMD areas (excluding parks and capital improvement projects) shall be two years, unless noted otherwise.

6.2 The Contractor shall continuously maintain landscaped areas during the progress of work and establishment period until final acceptance of work by the City.

6.3 The City reserves the right to assume maintenance of projects at the Developers' or Contractors' expense during the establishment period. Developers and Contractors may also request that the City assume maintenance responsibilities at their expense.

7. Bonding for LMD Improvements

Bonds are required by the City of Poway at the approved rate per square foot, or the approved bonding estimate. Landscape Maintenance Districts, parks, landscaped rights-of-way, landscaped easements, medians, creeks, and open space are considered public improvements. Cash deposits and certificates of credit may also be used to bond projects. At the time of City Council acceptance of projects, the full amount of bonds shall be refunded in exchange for a warranty (25 percent of bond) from Developers. Warranties shall be posted with the Public Works Department. If the Director of Public Works determines that maintenance work is not being performed to standards established within this manual, then the maintenance period shall be extended. Warranty bonds held against projects shall be released upon City Council acceptance of all landscape improvements.

8. Refer to Section Two, Section Three and Section Four of this manual, and Chapter 17.41 PMC, for additional requirements not contained in this Section.

B. DESIGN REQUIREMENTS

1. Street Median Island Design Standards

1.1 Micro-irrigation (low-volume) only shall be utilized in street medians.

1.2 Planting areas shall be within 50 feet of quick coupling valves.

1.3 Medians shall have separate water and electrical meters and services unless otherwise approved by the City.

1.4 Medians shall have separate automatic irrigation controllers unless otherwise approved by the City.

1.5 Irrigation piping and control wiring shall be located in PVC sleeves where crossing of public streets is required.

1.6 Medians shall have 18-inch-wide (minimum) maintenance walks adjacent to six-inch-wide curbs around planting areas. Paving material shall be

approved by the Development Services Department and Public Works Department.

1.7 Medians that are five feet in width and less, shall receive enhanced paving only (no planting).

1.8 Plant material in medians adjacent to turning lanes, and other areas where sight distance is critical, shall be 24 inches and less in height, or enhanced paving as approved by the City.

1.9 Turf grasses shall not be planted in medians.

C. SYSTEMS AND MATERIALS REQUIREMENTS

All landscape construction materials and methods for public works projects in the City of Poway shall conform to the *"Standard Specifications for Public Works Construction" ("GREENBOOK")*, latest adopted edition including modifications and supplements. GREENBOOK specifications are referenced, and the modifications and supplements are contained, in Appendix C of this manual.

ELEVEN. PUBLIC WORKS LANDSCAPE AND IRRIGATION MAINTENANCE

For public works landscape and irrigation installation and material requirements refer to Section Ten. Requirements for acceptance of public works landscape improvements are outlined in Section Thirteen, "Acceptance of Improvements."

A. GENERAL REQUIREMENTS

1. The objectives of this section are general results to be achieved by Contractors in their methods of performing work. The purpose of these objectives is to allow the Contractor to assist in interpreting requirements for long-term appearance of landscaped areas, and to ensure that design criteria and objectives established by the City are being met. If specified methods are not adequate to meet general appearance requirements, or additional work and special maintenance are required, then Contractor shall adjust maintenance schedules accordingly, with approval of the City representative.

2. Landscape goals for the City of Poway include visually unifying various land uses, maintaining high standards of quality for community appearance, lowering urban temperatures, and reducing water used for landscape irrigation.

    2.1 The objective of landscape plantings is to establish an informal, natural appearance. Pruning activities that create formal hedge and topiary effects shall be avoided. Turf and ground cover areas should have sharply defined edges adjacent to hardscape improvements.

    2.2 Landscaped areas such as street median islands, and parkways and slopes adjacent to streets, trails, and sidewalks, shall have a well-maintained appearance. Trash, and dead branches, leaves and flowers, should be removed from plants and landscaped areas regularly. Maintenance personnel shall pay special attention to the appearance of highly visible areas.

    2.3 Plant masses (except groundcovers) shall be allowed to develop informal edges adjacent to structures, masonry, and other landscape elements.

    2.4 In general, plant material in public landscaped areas has been selected for low-water use requirements. A gradual transition from normal water application during plant establishment, to reduced irrigation after establishment, shall take place over a three to four month period. Irrigate only as required to allow water penetration through soil to maximum rooting depth, and to avoid runoff. After plant material is established, water only to maintain healthy plant growth.

3. Scope of Work- Maintenance

3.1 Contractor shall furnish labor, equipment, materials, tools, services, and special skills to perform complete landscape maintenance. Scope of work shall include, but not be limited to, irrigation, pruning, shaping, trimming, and training of trees, shrubs and ground cover plants; fertilization; cultivation; weed control; control of plant diseases and pests; mowing, thatching, and aeration of turf; sweeping; maintenance and repairs of trails, pathways, irrigation, and drainage systems, including natural drainage features; litter removal; removal of illegal dumps; plant replacement and other work required to maintain public landscaped areas in a safe, attractive, and usable condition. Plant material shall be maintained in healthy condition with horticulturally acceptable growth and color.

3.2 Maintenance standards in this manual shall apply to work of Developers and Contractors during the required maintenance period for Landscape Maintenance District improvements, LMD contract maintenance areas, City parks, and Capital Improvement Projects.

3.3 Contractor shall submit Maintenance Schedule Charts provided by the City. Schedule of maintenance operations shall include, but not be limited to, tree pruning; weed control; insecticide and herbicide application; fertilizer types and frequency of application; growth inhibitor application; thatching, mowing, and aeration of turf. Contractor shall provide irrigation controller schedules with controller identification numbers (keyed to as-built irrigation plans), station numbers, cycles per day, total time per station per week, and comments to City representative. Approved maintenance and irrigation schedule forms for submittal shall be provided by the Special District's Office, or the Contractor may submit forms for review and acceptance by the City prior to start of the plant establishment period.

B. IRRIGATION SYSTEM MAINTENANCE

1. Irrigation systems shall be operated efficiently to conserve water and maintain healthy plant growth. Application of water should consider soil types, topography, weather conditions, and be tailored to distinct planting areas (hydrozones). Special attention shall be directed to slopes to prevent soil saturation and runoff. Contractor is responsible for replacing plant materials that die because of poor irrigation scheduling.

2. Contractor shall observe irrigation systems while functioning at least once every week to ensure proper and efficient operation.

3. Contractor shall maintain irrigation equipment to provide proper coverage and operating capability. Adjust irrigation systems to prevent excessive runoff and overspray into streets, sidewalks, rights-of-way, and other areas not meant to be irrigated. Sprinkler heads shall be maintained and adjusted, clean, and free from plant growth that may obstruct normal operation. Valves and heads shall be adjusted to keep systems operating at design pressures. Pressure-regulating valves and pressure-compensating screens shall be employed to prevent heads from fogging.

4. Contractor shall check rain sensors monthly throughout the rainy season to verify that sensors function properly. Controllers shall not operate if rainfall is sufficient to meet landscape water requirement.

5. Areas where the irrigation system is temporarily inoperable shall be hand watered by Contractor to ensure healthy and thriving plant material. Contractor shall be responsible for providing equipment, nozzles, hoses and couplers to accomplish the task.

6. Contractor shall replace plants lost due to irrigation system malfunctions, except malfunctions caused by natural disasters. Contractor shall prevent irrigation water runoff and overspray that impacts surrounding properties, and creates traffic hazards.

7. Remote control valves shall not be operated manually unless electrical power is unavailable or temporarily interrupted, except for testing and periodic valve maintenance.

8. Moisture sensors and weather stations shall be monitored and adjusted monthly (or as required) by the Contractor to assure proper performance.

9. Repairs to irrigation systems shall be made in accordance with original contract documents. Contractor shall make required repairs and operate systems as originally intended.

10. Contractor shall submit copies of irrigation schedules for automatic controllers to City representative.

11. Irrigation system repairs caused by conditions over which Contractor has no control shall be performed by others, or paid for by the City. Repairs under this category shall be “extra work” and are noted below:

    11.1 Loss due to theft;

    11.2 Storm damage and other natural occurrences; and

    11.3 Damage by vandalism, and accidents caused by other than Contractor and his employees.

12. Contractor shall adjust heights of sprinkler risers to compensate for growth of plant materials.

13. Strainers at backflow preventers shall be flushed out semi-annually as a preventative maintenance measure.

14. Controller enclosures shall be painted as needed to prevent rust. Color shall be determined by the City representative.

15. Micro-irrigation (low-volume) Systems

15.1 Strainers and filters shall be cleaned monthly, or as required, to maintain efficient operation.

15.2 Systems without automatic flush valves shall be flushed monthly, or as required, to eliminate accumulated debris in irrigation lines.

15.3 Plant growth and vigor shall be monitored closely for signs of stress due to lack of water, which may indicate clogged emitters and other system malfunctions.

15.4 System pressure shall be monitored periodically to ensure proper emitter operation.

C. PLANTING MAINTENANCE

1. Trees

Trees are a vital element of community character and provide important environmental benefits. The City's goal is to maintain trees in LMD areas, parks, and other public facilities in a healthy, vigorous, and growing condition for current and future residents. The objective of the following requirements is to promote proper tree maintenance.

1.1 Pruning

a. Trees shall be pruned for safety and appearance, and to encourage sound structure, healthy growth, and good form. Pruning shall be supervised and performed by certified consulting arborists and qualified tree care personnel utilizing proper arboricultural practices.

b. Contractor shall provide pruning and tree care in accordance with professional tree care industry standards, including Western Chapter of the International Society of Arboriculture and National Arborist Association standards.

c. Evergreen trees shall be thinned out and shaped when necessary to prevent wind and storm damage. Major pruning of deciduous trees shall be performed during the dormant season. Damaged trees, and those that constitute health and safety hazards, shall be pruned when necessary.

d. Pruning cuts shall be made just above lateral branches and buds, or just outside branch bark collars, utilizing natural target pruning practices. "Stub cuts" and "topping" shall not be permitted.

e. Tree pruning shall be performed in accordance with ANSI Safety Standards, latest published edition. Adequate safety precautions for protection of tree workers and the public shall be observed by Contractor.

f. No more than 25 percent of a tree's foliage shall be removed during pruning operations unless authorized by the City representative.

g. Trees shall be pruned to allow, at maturity, adequate vertical clearances as required in Section Seven and "Recreational Trail Design Standards," Appendix "B."

h. Lower branches of young trees shall not be removed, except for safety. Lower branches may only be "tipped back" to encourage caliper growth large enough to support trees without stakes and guys.

i. Surface tree roots that present maintenance and safety problems may be removed or pruned at the direction of the City, especially those adjacent to paved areas. Surface roots shall be properly pruned, treated, and covered without delay.

j. Eucalyptus trees may be selectively pruned to improve poor appearance and structure, as directed by the City's representative.

k. If necessary, trees shall be trimmed during the dormant season only (November 15th to February 15th) to reduce pruning shock, allow sufficient recovery time for maximum summer shade, and lessen possibility of insect infestation.

1.2 Watering and Mulching

a. Watering basins shall be maintained around tree root balls during plant establishment periods. Irrigate as needed to establish adequate moisture throughout plant root zones.

b. Encourage deep-rooting of trees with appropriate timing and frequency of irrigation cycles.

c. Mulches shall be maintained at least two inches deep to reduce evaporation and weed growth. Do not apply mulch in contact with tree trunks. See Section Four for mulch materials.

d. Periodic moisture checks shall be made at locations in the landscape representative of various exposures and planting types. Soil probes should be used to check moisture in root balls and surrounding soil. Moisture requirements of plants shall determine watering frequency and timing by automatic irrigation systems.

1.3 Fertilizer Application and Pest Control

a. Fertilizers shall be City-approved, balanced commercial types determined by soils testing. Fertilizers should be applied to entire root zones of trees. Gently cultivate and thoroughly water fertilized areas to prevent burning tree roots. Apply fertilizers at minimum rates required to keep trees healthy and vigorous.

b. Ailing and stunted trees, which fail to meet City standards, shall receive appropriate supplements to correct nutrient deficiencies.

c. Plant pests and diseases, and weeds, shall be controlled with proper application of insecticides, fungicides, and herbicides. Tree wells shall be weeded monthly.

d. Pesticides and herbicides shall be applied by licensed and certified pest control applicators.

1.4 Staking and Guying

a. Tree stakes, ties, and guys shall be checked monthly and adjusted if necessary. Ties shall be adjusted to prevent girdling of tree trunks. Broken stakes and guy wires shall be replaced. Stakes, ties, and guys shall be removed as directed by the City Representative.

b. Re-stake trees, if necessary, with two-inch-diameter by ten-foot-long, treated lodge pole stakes. Tree ties shall be flexible vinyl straps. Nail straps to sides of stakes with one-inch roofing nails. Eucalyptus trees shall receive twelve-foot-long stakes.

c. Stakes on Eucalyptus species shall be removed the first year after planting, or at beginning of next growing season, whichever comes first.

d. For trees other than Eucalyptus species, existing stakes and guys shall be removed after two years, or after trees attain trunk caliper of four inches. If trees are unable to support themselves, removal of stakes shall be determined by the City representative.

e. 15-gallon size trees shall be double-staked, 24 and 30-inch box size trees shall be double-staked or guyed, and trees larger than 30-inch box size shall be guyed, unless directed otherwise by City representative.

2. Shrubs

Shrubs shall be maintained to promote vigorous and healthy growth in accordance with standard horticultural practices. Utilize proper pruning techniques, fertilizer applications, and pest control procedures.

2.1 Pruning

a. Prune shrubs as required to maintain public safety, as well as general health and appearance of plants.

b. Objectives of shrub pruning are the same as for trees. Shrubs shall not be clipped into topiary forms. Natural characteristics and branching structure of plants shall be retained.

c. Pruning cuts shall be made just above lateral branches and buds, and just outside branch bark collars. “Stubbing” shall not be permitted.

d. Pruning shall be accomplished by removing woody stems from inside of shrubs at least twice yearly. Heading back of shrubs shall be performed only after completion of interior selective branch pruning. Shrubs shall not be sheared and hedged.

e. Remove dead flower stalks and spent blossoms to present a neat, clean appearance.

2.2 Fertilizer Application and Pest Control

a. City-approved, balanced commercial fertilizers shall be applied to promote optimum growth and vigor. Fertilizers shall be watered in after application to prevent burning of plant tissues.

b. Insecticides, fungicides, and herbicides shall be applied as necessary by licensed pest control applicators only.

2.3 Mulches shall be maintained uniformly at least two-inches deep to reduce evaporation and weed growth. Do not apply mulch in contact with shrub stems.

3. Vines

Vines shall be maintained to promote vigorous and healthy growth in accordance with best horticultural standards. Utilize proper watering, tying, fertilizing, and pest control procedures.

3.1 Deep water vines in planting pockets to assure optimum growth and root depth.

3.2 Prune and maintain espaliered vines properly. Nails shall not be used in masonry walls. Secure vines with epoxy vine ties to promote directional growth.

3.3 City-approved, balanced commercial fertilizers shall be applied to promote optimum growth and vigor. Vines shall be watered after fertilizer application to prevent burning of roots.

3.4 Insecticides, fungicides, and herbicides shall be applied as necessary by licensed pest control applicators only.

4. Groundcover

Ground cover shall be maintained to promote vigorous and healthy growth according to best horticultural standards. Utilize proper trimming, fertilizing, pest control, and renovation procedures.

4.1 Trimming

a. Groundcover shall be maintained within intended planting areas. Maintain edges of planting so that groundcover does not encroach into turf, shrub beds, sidewalks, and adjacent areas.

b. Groundcover shall be trimmed away from controller enclosures, valve boxes, quick couplers, other plants, structures and walls, and walks. Maintain well-edged beds adjacent to walks for best appearance and safety.

4.2 Fertilizer

Apply City-approved, balanced commercial fertilizers at minimum rates required to promote healthy and vigorous growth. One application should be in early spring after new growth begins.

4.3 Pest Control

a. Groundcover areas shall be cultivated regularly and kept free of litter.

b. Control weeds, insects, diseases, and snails.

c. Chemical pest controls shall be applied only if necessary by licensed pest control applicators.

4.4 Renovation and Replacements

a. Groundcover shall be renovated by cutting and mowing to promote new vigorous growth. Apply City-approved, balanced commercial fertilizer after renovation of groundcover areas.

b. If replanting is required to replace dead groundcover areas, then replacements shall be determined by City, using cuttings from adjacent groundcover areas, or other approved sources.

5. Turf

Turf shall be maintained to promote vigorous and healthy growth in accordance with best horticultural standards. Utilize proper watering, mowing, renovation, fertilizing, and pest control procedures.

5.1 Watering

Turf shall be irrigated to maintain horticulturally acceptable growth and color and to encourage deep rooting. Daily irrigations should be avoided in favor of scheduling applications every other night, or twice weekly. Additional irrigations may be scheduled if unusually hot and dry weather conditions prevail for extended periods. Turf shall be dry before mowing.

5.2 Mowing and Edging

a. Turf shall be mowed at optimum heights weekly during growing seasons. Frequency of mowing may need to be adjusted during cooler months. Rotary and reel (for Bermuda grass) mowers with sharp blades shall be used. Avoid removing more than one-third of

grass blades at one mowing. Damage to trees, obstacles, and turf caused by wheel ruts shall be repaired by Contractor. Grass clippings shall be mulched in place with mulching mowers.

b. Trimming and edging shall be performed weekly. Frequency of trimming and edging may need to be adjusted during cooler months.

5.3 Renovation

a. Turf areas shall be renovated yearly when the least amount of stress is likely, usually in winter. Scheduling shall be recorded on Maintenance Schedule Charts.

b. Turf shall be mechanically aerated with plug aerators (one-half inch tines minimum) at least yearly to reduce compaction and improve water penetration to roots. Hybrid Bermuda grass shall be verticut as required to remove thatch.

c. Shaded and worn areas of turf shall be reseeded with approved shade and wear tolerant grass seed species.

5.4 Fertilizing

City-approved, balanced commercial fertilizers should be applied to keep turf green and healthy. Fertilizer types will vary seasonally in accordance with good turf management practices.

5.5 Pest Control

a. Turf areas shall be inspected regularly for signs of diseases and pests. Contractor shall have licensed pest control applicators apply appropriate controls at recommended rates.

b. Contractor shall maintain weed-free turf by approved means. Contractor shall exercise caution if applying chemicals to control weeds to avoid damage to turf and adjacent areas. Before herbicide applications are made, turf should be well-established and in vigorous condition.

6. Hydroseeded Planting

Existing hydroseeded areas shall be maintained in the same manner as ground cover areas.

7. Pest Control

7.1 Contractor shall provide complete and continuous control and eradication of plant pests and diseases, including weeds. Comply with City, County, State, and Federal regulations and laws regarding chemical controls.

7.2 Contractor shall assume liability and responsibility for use of chemical controls.

7.3 Procedures for chemical use shall follow those outlined by State of California Department of Agriculture, and County of San Diego Department of Weights and Measures for safe handling of pesticides, fungicides and herbicides.

7.4 Contractor shall be responsible for obtaining necessary licenses for applying pesticide materials.

8. Weed Control

8.1 Basins and planting areas shall be free of weeds. Trees in ground cover and turf areas shall have 24 inches of open soil maintained around bases of trunks. Avoid damage to tree trunks and roots by machinery and excess water. Properly applied growth regulators may be used to control vegetation in open areas around trees. Use mulches to help prevent weed seed germination. Weeds that have germinated shall be eradicated (do not use string trimmers near tree trunks) within three weeks of germination, or before setting seed.

8.2 Weeds shall be completely removed from turf and shrub areas, groundcover beds, and planters. Remove weeds weekly from cracks in paved areas: sidewalks, curbs, asphalt, hardscape, and areas covered with ornamental rocks. For the purpose of these requirements, weeds will be considered as “any undesirable or troublesome plants.” Weeds shall be controlled by hand, mechanical, or chemical methods. The City may restrict use of chemical weed control in certain areas.

8.3 Groundcover and hydroseeded materials within four feet of improved surfaces, such as concrete sidewalks, service roads, and pathways should be continuously controlled so that height does not exceed 12 inches.

8.4 Plants noted below will be treated as unacceptable growth in natural open space areas, and promptly removed:

- Pampas grass
- Artichoke

8.5 Annual plants over six inches in height shall be mechanically controlled upon completion of growth cycle to reduce fire hazard in areas deemed necessary by the City.

8.6 Open space areas adjacent to existing homes shall be kept free of weeds. Refer to Section Six for required fire buffer zones and maintenance requirements.

8.7 Street median island maintenance shall include removal of weeds growing in paved and unpaved areas of median islands.

9. Fertilizer Application

9.1 Contractor shall inform City's Representative at least 48 hours before beginning fertilizer application. Contractor shall have previously submitted schedules showing sites, dates, approximate times of fertilizer application, type of fertilizer and quantity of fertilizer to be applied.

9.2 Fertilizers shall be delivered in original unopened containers bearing manufacturers' guaranteed analysis. Damaged packages will not be acceptable to the City. Contractor shall furnish the City's Representative with duplicate signed, legible copies of certificates and invoices for fertilizer. Invoices shall state grade and quantity of fertilizer delivered to site. Copies retained by the City and Contractor shall be signed by the City's Representative before materials may be used. Contractor shall not begin fertilizer application until requirements noted above have been met.

9.3 Fertilizers shall have City-approved guaranteed analysis. Contractor shall follow manufacturer's recommendations for rates of application.

9.4 Fertilizers shall be applied to turf as recommended by soils test results and at times noted below.

- Nitrogen: as needed to maintain health and appearance
- Complete: October 1-15, March 1-15

9.5 Fertilizers shall be applied to shrubs, groundcover, and small trees (three-inch caliper and smaller) at times noted below.

- Complete: March 1-15, July 1-15, October 1-15

9.6 Adequate irrigation shall precede and immediately follow applications to carry fertilizers into soil. After fertilizer applications, adjust irrigation schedules to eliminate runoff and leaching of fertilizers.

9.7 Weather conditions may require adjustments to fertilizer application schedules. If possible, avoid application of fertilizers prior to forecast of windy weather and heavy rains.

9.8 Precautions shall be taken during broadcast application of fertilizers with cyclone spreaders to avoid overthrow onto paved areas. Use of gravity flow spreaders is encouraged to keep fertilizers contained in planting areas, eliminating or reducing sidewalk stains.

9.9 Fertilizer tablets shall be applied to new replacement trees and shrubs at required rates noted in Section Four of this document. Tablets (21-gram) shall also be applied to trees and shrubs that require supplemental fertilization. Annual fall fertilization of trees and shrubs shall be at the rate of one 21-gram tablet for each one-half inch of trunk caliper. Place tablets six to eight inches into root zones with soil probes and water in thoroughly.

10. Replacement of Plant Material

10.1 To ensure vigorous, healthy growth and pleasant appearance of plantings, it may be desirable to replace plants periodically. Plant replacement shall be determined by the City Representative. Plants may be provided and installed by City forces at no expense to Contractor (if plants are not under Contractor's guarantee), or may be replaced by Contractor with cost negotiated prior to planting.

10.2 Contractor shall notify City representative within two days of plant material losses due to any cause. Dead plant material that is not replaced within one week after notification will be replaced by the City at Contractor's expense.

10.3 Contractor shall supply labor and materials to replace plants that are damaged or die resulting from Contractor's faulty maintenance or negligence. Container sizes and species of replacement plant materials shall be determined by the City Representative.

10.4 Plants damaged or dead because of storms and other natural causes, vehicular damage, theft, and damage not resulting from performance of work by Contractor shall be replaced in kind and size as approved by the City. Contractor may supply and install replacement plants selected by the City Representative, and shall bill total replacement costs separately.

10.5 Remedial landscape improvements shall conform to the City of Poway "*Landscape and Irrigation Design Manual*."

D. MAINTENANCE OF OPEN SPACE AREAS

Many open space areas are marginal lands for development that have been disturbed from their natural state by nearby development. Open space areas are necessary to protect resources, relieve density of community development, and provide greenbelt buffers between built-up neighborhoods.

1. The City's intent is to establish native plant communities in disturbed natural open space areas, and to maintain these areas as close as possible to natural conditions prevailing in the region.

2. It is the responsibility of the City's Maintenance Operations Manager to interpret open space concepts, and adjust maintenance activities and practices in accordance with public safety and desires of the community.

3. Litter and trash removal shall be scheduled monthly, or more often as required.

E. MAINTENANCE OF CREEKS AND DRAINAGE CHANNELS

1. Maintenance personnel shall be responsible for maintaining surface drainage systems, such as creeks, channels, drain inlets, and catch basins to assure proper functioning. Maintenance personnel shall remove debris, including soil, weeds, and litter that may restrict proper flows within channels, swales, and drain inlets.

2. Creeks shall be maintained in natural condition. Remove trash and debris within watercourses. Periodically remove willows and other hard growth in streambeds, including root systems. Plant removals shall be performed manually - do not apply chemical herbicides in stream courses. Weeds and grasses on embankments shall be cut semi-annually. Trim overhanging trees annually. Remove sand bars as required to maintain hydraulic capacity of stream channels. Reed and tule growth in streambeds shall be allowed to re-sprout. Maintenance work in creeks shall be performed only during the months of August through November to avoid disturbance of wildlife habitat at critical nesting times for birds.

3. Rock lined channels shall be cleaned of silt. Trim overhanging trees and surrounding vegetation annually to ensure proper channel flows. Chemical vegetation control may be used on embankments between rip-rap, above low-flow watercourses. Perimeter fencing shall be maintained as required.

4. Concrete or asphalt lined swales shall be cleaned of silt. Trim overhanging trees and surrounding vegetation annually to assure proper flow. Use of chemical vegetation control on embankments between cracks in concrete shall be permitted by the City.

5. Work shall conform to Resource Agency permit requirements for activities in environmentally sensitive habitat, if applicable.

F. CLEAN-UP

1. Contractor shall promptly remove debris generated by pruning, trimming, weeding, edging, and other work. Immediately after working in areas near public streets and walks, driveways, and paved areas, Contractor shall clean them with suitable equipment. Debris and green waste shall be removed and disposed of legally offsite. No debris will be allowed to remain in public areas at end of work days.

2. Remove litter immediately. Litter shall include, but is not limited to, bottles, animal droppings, cans, paper, cardboard, metallic items and other debris, and illegally dumped materials.

3. Shrub areas not planted with ground cover shall be raked and cultivated at least twice monthly.

4. Walks shall be kept clean and free of soil, debris, and hazards to foot traffic at all times during maintenance operations.

TWELVE. FIELD INSPECTIONS

A. GENERAL REQUIREMENTS

1. The purpose of inspections on landscape projects is to ensure substantial conformance to approved landscape plans, and to City Council Resolutions of Approval.

2. Inspections by the City's Representative are required during installation of landscape improvements on all projects. Inspections shall be made and work accepted by the City's Representative before projects can receive final acceptance from the City Council.

   Contractor shall request inspections by notifying the Public Works Department (public works projects only) and Development Services Department at least 48 hours (two working days) in advance of scheduled inspection times. Notification should be made by Owner's or Developer's representative, and only when Contractor agrees that work is completed and ready for inspection.

   If scheduled inspection visits cannot be performed due to incomplete work or Contractor's absence, then Owner will be charged for additional time for rescheduled inspections.

3. Changes

   3.1 Revisions to approved landscape plans shall be reviewed and accepted by the City before work is performed that is inconsistent with original construction documents. Submit two sets of revised plans to the City for review. Refer to Section One, for additional information.

   3.2 Changes in the field to approved landscape construction documents (materials and installation) shall be prohibited unless written approvals of changes are provided by the City's Representative.

4. A Certificate of Completion shall by submitted to the City pursuant to Chapter 17.41 PMC.

B. INSPECTION REQUIREMENTS—PUBLIC WORKS

1. Work items listed below are subject to inspection by the City's Representative. Inspection requirements are variable from project to project, and shall be determined during the plan review and approval process. However, additional inspections other than the following may be required during the course of work as determined by the City.

2. Required inspections (some may be combined into one site visit, if possible):

2.1 Pre-construction meeting prior to start of work

2.2 Grading and Construction

a. Finish grading.

b. Staking of flatwork.

c. Concrete formwork and reinforcement.

d. Trail improvements.

e. Boulder placement.

2.3 Irrigation

a. Trenching for irrigation main lines and lateral pipe.

b. Installation and pressure testing of main lines and lateral lines prior to backfilling trenches.

c. Installation and testing of backflow prevention devices, remote control valves, control wires, and automatic controllers.

d. Operation and coverage tests (prior to planting) after irrigation system is completed.

2.4 Planting

a. Soil preparation and application of amendments (supply delivery slips and invoices).

b. Completion of finish grading prior to planting.

c. Approval of plant materials upon delivery to site.

d. Tree and shrub locations, before excavation of planting pits.

e. Installation of plant material.

2.5 Completion and Maintenance

a. Approval of completed landscape installation, start of maintenance period.

b. Final site inspection at completion of maintenance period, acceptance of work.

c. Additional inspections may be required as determined by the City's Representative.

d. Initial inspections of completed public works landscape improvements shall be performed prior to start of the maintenance and plant establishment period. Work shall be complete and in accordance with City requirements as determined by the Special Districts Office and/or City representative.

e. Projects that have not been maintained to City standards during maintenance periods shall be held without acceptance until requirements and conditions of the City have been met.

f. Final inspections shall be performed at the end of the maintenance period. The Special Districts Office and/or City representative will determine whether or not maintenance requirements have been met by Contractor prior to City Council final acceptance. Refer to acceptance procedures in Section Thirteen.

C. INSPECTION REQUIREMENTS—PRIVATE DEVELOPMENT

1. The following inspections shall be performed on private projects:

1.1 Pre-construction meeting.

1.2 Installation and hydrostatic test of pressure main line pipe prior to backfilling trenches.

1.3 Testing and certification of backflow prevention devices; certificate from qualified backflow tester is required prior to final acceptance.

1.4 Installation of irrigation valves, wiring, and automatic controller.

1.5 Operations test (prior to planting) after completion of irrigation system.

1.6 Review of soil test report; provide delivery slips and invoices for soil amendments.

1.7 Review and acceptance of street trees prior to planting.

1.8 Acceptance of completed landscape installation prior to occupancy.

1.9 Additional inspections may be required as determined by the City's Representative.

2. Landscaped areas shall be maintained in a healthy and thriving condition - free of weeds, trash, and debris. Dead plants shall be replaced with new healthy container stock.

THIRTEEN. ACCEPTANCE OF IMPROVEMENTS

Refer to Section Eleven in this manual for Public Works Landscape Maintenance requirements. Section Ten contains requirements for materials and installation for public works landscape improvement projects.

A. GENERAL REQUIREMENTS

Acceptance of public works landscape improvements by the City Council will be made after work is substantially complete in accordance with approved construction documents and City of Poway landscape requirements. Maintenance and plant establishment shall be for the following time periods unless otherwise approved by the City:

- LMD areas: Owner or agent in control of properties shall maintain planting and irrigation systems for two (2) calendar years.
- All other public works projects: As specified in the approved construction documents.

After final inspection of improvements by City's Representative at the satisfactory conclusion of the maintenance and plant establishment period, the Landscape Maintenance District or Department of Public Works will be available to service the area for continuing maintenance, formally relieving Contractor of maintenance responsibilities.

1. Public Works Acceptance Standards

1.1 Landscape improvements, walls, walkways, curbs, utilities, trails, benches, public improvements, and special conditions required within Landscape Maintenance District and public works project boundaries shall be provided in accordance with approved construction documents prior to initial inspection and City Council acceptance.

1.2 Plant material standards outlined below shall be met prior to final inspection by the City's Representative.

a. Turf: Turf areas shall be completely filled in with grass. Turf shall be green and healthy with no discolored and dead patches, weeds, and insect pests. Turf shall be mowed weekly for at least two consecutive weeks, and at correct mowing heights.

b. Hydroseeded areas (non-turf): Plant material shall be at least three inches in height, with 90 percent coverage of hydroseeded areas. If hydroseed has not germinated within 30 days after application, then bare areas shall be reseeded. At that time, all hydroseeded areas shall be free of weeds and litter.

c. Hand-planted groundcover: Planted areas shall be healthy, vigorous, and free of weeds and litter.

d. Shrubs, Vines, and Trees: Plant material shall be healthy, showing no signs of discoloration, injury, fungus, and insect infestation. Plants shall be pruned, trimmed, and neat in appearance. Trees shall be staked as required with approved tree ties. Nursery tape shall be removed.

1.3 Irrigation systems shall be fully functional and operating in accordance with project construction documents and City requirements.

2. Public Works Acceptance Procedures

2.1 The City's Special Districts Office representative will recommend acceptance of improvements in Landscape Maintenance Districts after initial inspections are performed. Work shall be substantially complete as determined by the City's representative.

2.2 After initial inspection and approval of work by the City's representative, City Council shall accept the project, provided that conditions of approval have been met. Preparation of staff report and City Council acceptance may take from 4-6 weeks after initial inspection. Maintenance period shall begin on date of City Council acceptance.

2.3 After initial acceptance, bonds, cash deposits, and secured letters of credit held against Developer or Contractor may be reduced. Securities will be released at end of maintenance period upon approval by the Director of Public Works.

2.4 At end of the maintenance and plant establishment period, the project shall undergo final inspection by City's Special Districts Office representative. Project will be approved if maintenance requirements have been met by Contractor.

3. Acceptance of other public landscape improvements after construction and maintenance period are completed shall be based on condition of the project at final inspection. City's Representative shall determine whether or not requirements have been met, procedures followed, and equipment installed satisfactorily before recommending acceptance of the project.

APPENDIX A

DEFINITION OF TERMS

The following is a definition of terms used in this manual. Additionally, the list of defined terms in Chapter 17.41 PMC should be used for reference. For terms used in Appendix C, Refer to Standard Specifications For Public Works Construction ("Greenbook").

Agricultural Suitability Soil Test
Test to determine soil fertility, texture, pH, salinity, and alkalinity; includes recommendations for soil amendments.

Backfill
That soil which is replaced in a hole or trench after excavation and placement of irrigation lines or plant materials.

Construction Documents
A set of precise plans and details, with written specifications, used for the construction of a landscape project.

Drought Tolerant Plant
Plants that can survive drought conditions for limited periods of time.

Erosion
The transportation of soil particles, or mass movement of soil (mass wasting), by water, wind, or mechanical means.

Greenbelt
An area specifically planted to buffer differing uses; i.e., a landscaped easement along the side of a major road may buffer adjacent uses from traffic noise and fumes.

Landscape Maintenance District (LMD)
An area of landscape that is the City's responsibility to maintain and is funded through assessments.

Landscape
A combination of plants, natural materials, and artifacts arranged in such a manner as to affect a design on the land.

Landscape Architect
One whose profession is the design of the land for human use and enjoyment. The practice of landscape architecture is regulated by the State of California.

Landscape Contractor
One skilled in the planting and construction of landscapes. Landscape contracting is regulated by the State of California.

Micro-irrigation (also “low-irrigation”)
Low-volume, low-pressure irrigation systems that deliver water directly to the root area of plants; includes drip line, emitter, bubbler, and tubing systems.

Native Plants
Plants that are indigenous to Southern California, or the Southwestern United States and Northwestern Mexico.

Naturalized Plants
Plants introduced to Southern California from other places that have become established in wildlands without cultivation.

Open Space
Areas set aside for resource conservation or recreational use. Many of these areas are natural and undisturbed; many are parks and other recreational facilities.

Ornamental Plants
Plants that are cultivated for ornamental use in the landscape.

Parkway
That area of a public street that is between the curb and sidewalk, or between the sidewalk and the property line of the adjacent property owner, which is used for planting or pedestrian access.

Revegetation
Restoration or recreation of self-sufficient and self-regenerating plant communities on disturbed sites utilizing native or naturalized plant species.

Slope
An expanse of rising or falling land, especially a hillside.

Street Trees
Trees planted along City streets for environmental and aesthetic benefit of the general public.

Topsoil
Soil, which is within the upper horizon of a soil profile, containing organic matter, nutrients, and the microorganisms necessary for normal plant growth.

Water Conservation
Water management procedures, including design and maintenance procedures, which direct their result to saving water.

Wildlife
Indigenous or naturalized bird, reptilian, mammalian, fish, or invertebrate life found outdoors.

APPENDIX B

RECREATIONAL TRAIL DESIGN STANDARDS

A. GENERAL REQUIREMENTS

1. Street Crossings

Recreational trails that cross City streets shall receive appropriate signs and pavement markings in accordance with City of Poway and State of California standards. Paving requires approval of City Engineer and Director of Public Works. All concrete paving for trails shall have a heavy broom finish.

2. Owner or Developer shall provide structural soils tests in areas where recreational trails are planned. Based on soil classification and soil report recommendations, trails shall be constructed as noted below.

2.1 Expansive soil: Excavate to six-inch depth and apply City-approved soil sterilant. Construct six-inch-deep decomposed granite trail.

2.2 Non-expansive soil: Scarify trail area to a depth of six inches and remove rocks, clods, and other unsuitable material. Apply City-approved herbicide, fine grade, and compact native soil to satisfaction of Director of Public Works.

2.3 Local trails shall be six to ten feet wide, on average. Regional and Community trails will vary from 15 to 20 feet wide. Trail dimensions shall be determined by Director of Public Works.

2.4 Landscaped borders adjacent to recreational trails may be used rather than trail fencing, with approval of Department of Public Works Trails Supervisor.

2.5 Recreational trail fencing shall be constructed in accordance with City standards. Fencing shall occur on both sides of trails unless otherwise approved by Director of Public Works.

2.6 Concrete footings for posts shall contain at least five cubic feet of Class 470-C-2000 concrete.

2.7 Wood fence members shall be approved construction grade lodgepole pine, and treated with City-approved wood preservative.

B. TRAIL STANDARDS

1. Recreational Trail Types

Designation	Width
Regional multi-purpose trails	20 feet
Community trails	15 feet
Local feeder trails	10 feet

2. Trail Classifications: Determined by Development Services Department according to proposed population density.

- Urban
- Rural
- Wilderness

3. Trail Tread Design and Construction Standards

3.1 Trail Clearance

a. Vertical clearance shall be at least ten feet from trail surface with brush, weeds, debris and rocks removed from trail tread.

b. Where topography, right-of-way configuration, grading, and existing vegetation prevent full width construction of trails as noted above, the Public Works Department or Development Services Department, with input from Public Works, may reduce trail width requirements.

3.2 Trail Grades and Tread Construction

a. Vertical grades:

- 0-5% optimum
- 5-10% maximum for distance over 500 feet
- 10-15% maximum for distances limited to 250 feet
- 15-20% maximum for short distances under 100 feet

b. Switchbacks: May be required on steep slopes as a special condition.

c. Cross slopes:

- 1- 2% optimum
- 6% maximum in approved locations only

d. Drainage:

Prevent erosion by proper grading and use of diversionary devices such as water bars and berms.

e. Culverts:

Culverts, bridges and stream fords shall be installed where trails cross streams.

f. Trailway excavation:

Trail routes may traverse slopes with varying degrees of steepness. City shall review and approve construction techniques and procedures for construction of trail treads.

g. Side slope cuts and fills: 2:1 maximum gradient

Slopes shall be compacted to prevent erosion. Rock retaining walls shall be required if slopes are not compacted, or exceed 2:1

h. Surfacing:

Native soils, if suitable for construction, and decomposed granite shall be used for trail treads. Trail treads shall be cleared of rocks over one inch in diameter, debris, and roots, then surfaces graded evenly. In poor soil areas, decomposed granite or reclaimed base material, with Public Works approval, shall be furnished and placed.

i. Utilities and concrete drainage ditches:

Above-ground utilities, utility boxes, and concrete drainage ditches shall not be permitted in recreational trail easements.

4. Trail Structure Design and Construction Standards

4.1 General Requirements

a. Fences shall follow grades of trail treads. Posts shall be leveled and in line with one another. Fences shall follow contours of landforms upon which they are constructed. Where fencing is required on both sides of trails, fences shall run parallel and level with one another. Fences shall be constructed on easement lines.

b. Fence post footings shall be concrete, each with at least 80 pounds of dry Portland cement. Footings shall not be visible upon

completion of trail construction. After cutting lodgepole pine fencing, cuts shall be treated with wood preservative. Dark wood preservatives (City-approved) may be used below ground.

4.2 Trail Fencing Standards

a. Urban and rural classifications -- regional and community trails:

Approved lodgepole pine fencing shall be provided - two-rail fencing treated with wood preservative.

b. Wilderness trails:

Fencing is not required, except in hazardous areas (for example, if adjacent down slopes exceed 1.5:1). Steep conditions shall require approved lodgepole fencing on down slope sides of trails.

c. Hazardous areas:

Other fencing materials may be required in hazardous areas.

4.3 Off Road Vehicle (ORV) Barriers

ORV barriers shall be constructed where breaks in fences occur that would allow vehicle access onto trails. If trails are dedicated to the City of Poway, the City will provide locks upon completion of trails. ORV barriers shall be at least eight feet and eight inches in width, and attached to ends of fence posts nearest to roads.

4.4 Trail Signs

a. Trail identification signs shall be placed every one-half mile. Trail signs on community and regional trails shall be constructed in accordance with State of California trail design standards.

b. Hazard signs shall be constructed to State trail design standards. Place signs wherever potential safety hazards may be present - for example, steep embankments and 20 percent, or greater, trail grades.

c. Local feeder trails shall be identified with the hazard sign design.

C. TRAILS MAINTENANCE (during Developer's maintenance period)

1. Contractor shall be responsible for replacing damaged redwood headers on trails. Contractor shall also reposition and maintain headers that have been kicked free from original positioning.

2. Shrubs and trees shall be trimmed along trails to allow safe clearance for trail users. Refer to "Recreational Trail Design Standards," Appendix "B" for required clearances.

3. Contractor shall maintain weed free trails with approved mechanical or chemical methods.

4. Trails shall be dragged and rolled monthly.

5. Holes greater than three inches in diameter shall be filled-in weekly.

APPENDIX C

MATERIALS AND METHODS FOR PUBLIC WORKS LANDSCAPE INSTALLATION

The following are modifications and supplements the *"Standard Specifications for Public Works Construction"* ("GREENBOOK"), latest adopted edition, for landscape and irrigation work (Subsections not referenced herein shall indicate no change to the Standard Specifications):

SECTION 211 SOILS AND AGGREGATE TESTS (The following is added to Section 211)

211-5 AGRONOMIC SOILS TEST.

At the conclusion of rough grading, and prior to soil amendment and preparation, Contractor shall obtain soil samples from representative planting locations onsite as approved by the Engineer. Contractor shall transmit soil samples to an approved agronomic soil-testing laboratory for analysis. Provide a soil analysis report from the laboratory, with recommendations for soil amendment and preparation. Submit a copy of the report to the Engineer for review. Contractor shall pay for soil sampling and testing. Soil analysis shall indicate following soil properties:

(a) organic matter content (%)
(b) fertility -- nitrogen (N), phosphorus (P), potassium (K)
(c) pH reaction (acid-neutral-alkaline)
(d) ECe (salinity)
(e) SAR (sodium absorption ratio)
(f) particle size analysis (% sand, % silt, % clay)
(g) micronutrients (calcium, magnesium, copper, zinc, manganese, iron)
(h) specific toxicities (boron, chloride, fluoride, sodium, etc.)
(i) percolation (water infiltration rate)
(j) recommendations for amendments

SECTION 212—LANDSCAPE AND IRRIGATION MATERIALS

212-1 LANDSCAPE MATERIALS.

212-1.1 Topsoil.

Topsoil shall be the uppermost soil horizon (to [ ]-inch depth), stripped and stockpiled onsite as specified in Section 300-2, "Earthwork-Unclassified Excavation." Stockpiled topsoil shall meet requirements of Section 212-1.1.2 *"Class A Topsoil"*, relating to agricultural suitability.

212-1.1.2 Class "A" Topsoil. The following Subsections are added or not applicable as noted:

4) Salinity. The topsoil shall be reasonably free of harmful salts (ECe rating of 3.0 millisiemens/cm or less) and shall be free from insoluble carbonates and toxic substances harmful to plant growth or a hindrance to maintenance operations.

5) Weeds. The topsoil shall be free of seeds, rhizomes, and runners from objectionable weeds and grasses (nut grass, salt grass, Bermuda grass, kikuyu grass, artichoke, Russian thistle, etc.).

6) Soil analysis. Topsoil shall have the following analysis:

- pH—6.0 (min.) to 7.5 (max.)
- SAR—zero (0) to six (6)

7) Topsoil shall consist of no more than five (5) percent by volume of stones smaller than one inch, coarse sand, and small clay lumps.

212-1.1.3 Class “B” Topsoil. (Not applicable)

212-1.1.4 Class “C” Topsoil. (Not applicable)

212-1.2 Soil Fertilizing and Conditioning Materials.

212-1.2.2 Manure. (Not applicable)

212-1.2.3 Commercial Fertilizer. (Add the following sections)

212-1.2.3.1 Pre-Plant Fertilizer.

(a) Pre-plant commercial fertilizer shall contain the following minimum available percentage by weight:

Nitrogen	6%
Phosphoric Acid	20%
Potash	20%

(b) Pre-plant commercial fertilizer for planting backfill mix shall be “Gro-Power Plus,” “Tri-C 6-2-4,” or approved substitution, with the following minimum available percentage by weight:

Nitrogen	5%
Phosphoric Acid	2%
Potash	1%

212-1.2.3.2 Post-Plant Fertilizer.

(a) Turf (during plant establishment period): Post-planting commercial fertilizer shall contain the following minimum available percentage by weight:

	Warm Season	Cool Season
Nitrogen	21%	22%
Phosphoric Acid	0%	3%
Potash	0%	9%

(b) Shrub and Turf (end of plant establishment period): Post-planting commercial fertilizer shall contain the following minimum available percentage by weight:

Nitrogen	21%
Phosphoric Acid	7%
Potash	14%

212-1.2.3.3 Iron Sulfate.

Iron sulfate shall be a long-lasting, pelletized soil supplement, and shall contain the following minimum available percentages by weight:

Calcium	1.00%
Copper	0.06%
Iron	11.00%
Nitrogen	1.00%
Sulfur	12.00%
Manganese	0.05%
Magnesium	1.00%
Zinc	0.50%

212-1.2.3.4 Fertilizer Tablets.

Fertilizer tablets shall be tightly compressed, long-lasting and slow-release with the following minimum guaranteed analysis:

Nitrogen	20%
Phosphoric Acid	10%
Potash	5%

212-1.2.4 Organic Soil Amendment. (Delete entire section and substitute the following):

Soil amendment shall be nitrogen-stabilized, composted organic material derived from wood shavings (fir, pine, redwood, or cedar) and green waste. Organic soil amendment shall have the following analysis based on dry weight:

(a) Particle Size

Percent Passing (min.)	_____Sieve Size_____
100%	9.51 mm (3/8-inch)
95%	6.35 mm (1/4-inch)
80%	2.38 mm (#8, 8 mesh)
30%	0.50 mm (#35, 32 mesh)

(b) Organic Content: 90% as determined by ash analysis (8% ash min.).

(c) Chemistry:

1. pH: 6.0-7.5
2. Minimum 0.80% available nitrogen.
3. Minimum 0.10% diluted acid soluble iron.
4. Salinity shall not exceed 3.0 millisiemens/cm @ 25°C. as measured by the saturation extract method.

(d) Organic soil amendment shall be treated with a nonionic wetting agent.

212-1.2.5 Mulch. The entirety of this Subsection is replaced with the following:

Mulch shall consist of shredded, fibrous, woody chips and shall be clean and free of debris and foul odor. Particle size shall range from 1 to 4 inches long. Provide sample for review and approval by City.

212-1.2.6 Agricultural Gypsum.

Agricultural gypsum shall be commercially processed and packaged, with 92% minimum guaranteed active ingredient (calcium sulfate dihydrate) and 17% minimum sulfur by volume. 100% of material shall pass a 10-mesh screen.

212-1.2.7 Soil Sulfur.

Soil sulfur shall be a finely ground, commercial grade agricultural product, with 99% minimum elemental sulfur by volume.

212-1.2.8 Wetting Agent.

Wetting agent shall be a dry granular formulation of nonionic surfactants, neutral in reaction and biodegradable, or approved substitution.

212-1.3 Seed. Second paragraph replaced with the following:

Seed shall be furnished and delivered to site in original, sealed containers bearing producer's guaranteed analysis -- percentages of seed species, purity, germination, weed seed content, and inert materials.

212-1.4 Plants.

212-1.4.1 General. (Entire section replaced with the following paragraphs):

Plant Quantities and Species: Plant materials shall be furnished in quantities and spacing as shown or noted for each location, and shall be species, varieties, and sizes indicated on Plans. Contractor shall verify sizes and quantities indicated on planting Plans.

Substitution: Plant material shall be furnished by Contractor in accordance with Plans and Specifications. Substitutions of plants and container sizes shall not be made until Contractor is in receipt of written approval from the City. Requests for substitution shall be accompanied by verifiable written proof of non-availability for material originally specified, including timely ordering of plants.

Verification of Dimensions and Quantities: Scaled dimensions on Plans are approximate. Before proceeding with work, Contractor shall carefully review and verify dimensions and quantities. Immediately inform the City Engineer of discrepancies between construction documents and site conditions. No work shall be done in an area where there is a discrepancy before receipt of written approval to start work from the City.

Plants shall be in accordance with the following requirements:

(a) Nomenclature: Scientific and common names of plants shall conform to "Standardized Plant Names" by American Joint Committee on Horticultural Nomenclature, except in cases not covered therein. In these instances the custom of the nursery trade is followed. Label each container plant with securely attached waterproof tag bearing legible designation of scientific and common name.

(b) Quality: Plants shall be in accordance with the State of California "Grading Code of Nursery Stock," No. 1 grade. Provide first grade plants, of normal growth and size for species and variety, symmetrical form, healthy and vigorous, free from injury, disease, insect pests, and insect

eggs. Plants shall have healthy normal root systems, well-rooted in containers, but not root bound. Plants shall not be pruned prior to delivery, except as authorized by the City. Trees shall not be topped.

(c) Plant sizes shall be in accordance with normal standards for species and varieties of commercially available nursery stock, and as specified on Plans. The minimum acceptable plant sizes, measured before pruning with branches in position, shall meet the requirements specified in the plant legend. Plants larger in size than specified may be used with the approval of the City, but the use of larger plants shall make no change in contract price. Bare root planting in publicly maintained areas shall be performed only with special approval of the City.

Plant material shall be subject to inspection and acceptance by the City before planting. A representative number of plants shall be inspected for size and condition of root growth, insects, injuries and defects. Plants not approved shall be removed from the site immediately and replaced with acceptable plants. The City shall reserve the right to reject entire lots of plants represented by defective samples.

Only new materials of species, brands, and types noted on Plans and in Specifications, or approved substitutions, shall be furnished to the project.

The City may require samples of products and materials. Submittals for inspection shall be stored onsite until furnishing of material is complete. Delivery may begin after acceptance of samples by the City.

212-1.4.5 Sod and Stolons. First sentence replaced with the following:

Turf grass stolons shall be fresh, clean, living sections of runners of hybrid Bermuda grass, variety as specified on the Plans.

Second paragraph replaced with the following:

Stolons shall be planted by mechanical method as described in Subsection 308-4.8. Stolons shall have at least two living nodes capable of rooting.

Sod. Entire section replaced with the following:

Sod shall be a turf grass variety or blend as designated on the Plans. Contractor shall provide certification to the City that the specified material was delivered to the project (invoices, delivery slips, etc.). No substitutions by the contractor shall be permitted except with written approval of such requests from the City Engineer.

Sod shall be cut at a uniform thickness, width, and length. Sections of sod shall be strong enough to support their own weight when suspended vertically. Broken rolls or slabs of sod, and sections with torn or uneven edges, shall be rejected by the Engineer.

212-1.5 Headers, Stakes, and Ties.

212-1.5.3 Tree Stakes. The following added after first paragraph:

Tree stakes shall be 2-inch diameter, treated lodgepole pine, 10 feet long, free of splits, and sharpened at one end. Ties for holding trees to supports shall be flexible vinyl straps, Cinch-Tie or approved substitution. Nursery tape shall not be used to secure trees to support stakes.

212-1.6 Herbicide. Add the following paragraph:

Herbicide shall be a non-selective type for total control of undesirable vegetation, containing glyphosate as the active herbicidal ingredient, or approved substitution. Application shall be in accordance with precautions and rates suggested by the manufacturer.

212-1.7 Root Control Barrier.

Tree root control barrier shall be a multi-year control system consisting of extruded polyethylene or polypropylene plastic (.080-inch thick) with vertical molded ribs. Product shall be “Deep Root Corporation,” or approved substitution. Root control barrier shall be 20 feet long for each tree requiring root barrier, and 24 inches deep.

212-2 IRRIGATION SYSTEM MATERIALS:

Work included in these Specifications shall consist of the furnishing of labor, tools, materials, permits, fees, appliances, taxes and other costs necessary for the installation of an automatic irrigation system in an acceptable operational condition as specified and shown on the Plans.

Material List: Contractor shall furnish articles, equipment, materials, and processes specified by name in Contract Documents. No substitution shall be allowed without prior written approval by the City.

Complete material list shall be submitted prior to performing work. Material list shall include manufacturer, model number, and description of materials and equipment to be used.

Equipment and materials provided without prior approval of the City shall be rejected and Contractor required to remove such materials from the site at his own expense.

Acceptance of items, alternates and substitutes indicates only that the product(s) apparently meets requirements of Contract Documents based on information or samples submitted to the City.

Manufacturer's warranties shall not relieve Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

212-2.1 Pipe and Fittings.

212-2.1.1 General. Replace with the following:

Contractor shall furnish only new pipe and fittings of types designated on the Plans and in accordance with the Specifications.

212-2.1.2 Steel Pipe. (Not applicable)

212-2.1.3 Plastic Pipe for Use with Solvent Weld Socket or Threaded Fittings.

(Refer to Green Book Specification and replace entire section with the following):

PVC Pressure Main Line Pipe: Pressure main line piping for sizes 2-3 inches shall be Class 315 PVC 1120 (Type 1, Grade 1) with solvent welded joints. Pipe shall meet requirements of Federal Specification PS-22-70, with appropriate Standard Dimension Ratio (S.D.R.), and ASTM D2241.

Pressure main line piping for size 1-1/2 inches and smaller shall be PVC 1220 (Type 1, Grade 2) Schedule 40 with solvent welded joints. Pipe shall meet requirements of Federal Specification PS-21-70 for solvent welded pipe, and ASTM D1785.

PVC pipe shall be marked at intervals not to exceed 5 feet with the following information:

- Manufacturer's name or trademark.
- Size, class or schedule, and type of pipe.
- Working pressure at 73.4 degrees F.
- National Sanitation Foundation (N.S.F.) rating.
- Commercial standard designation: CS 256-63.
- Date of extrusion.
- UPC shield logo (IAPMO approval).

Solvent cement and primer for PVC solvent-welded pressure pipe and fittings shall be "Weld-On" 2711 medium set gray glue with P-68 or P-70 primer, or approved substitutions. Solvent from cans that have been opened overnight shall not be used.

PVC Non-Pressure Lateral Line Pipe: Non-pressure buried lateral line piping shall be PVC 1220 (Type 1, Grade 2) Schedule 40 with solvent welded joints. Pipe shall meet

requirements of Federal Specification PS-21-70 for solvent welded pipe, and ASTM D1785.

Solvent cement and primer shall be of the type recommended by pipe and solvent cement manufacturers.

PVC Fittings. Replace third paragraph with the following:

Plastic pipe fittings, nipples, and risers shall be PVC 1120 slip-fitted, tapered socket, solvent weld or threaded type (ASTM D 2464, 2466, 2467). Fittings for main and lateral piping shall be PVC Schedule 40. Connections between main line and remote control valves shall be Schedule 80 PVC fittings and nipples.

Handling of PVC Pipe and Fittings: Contractor shall exercise care in handling, loading and storing of PVC pipe and fittings. PVC pipe shall lie flat and not be subject to undue bending and concentrated external load at any point. Pipe that has been damaged shall be discarded and, if installed, shall be replaced with new piping. Pipe and fittings shall not be stored in direct sunlight.

212-2.1.4 Plastic Pipe for Use with Rubber Ring Gaskets. (Not applicable)

212-2.1.5 Copper Pipe. (Refer to Green Book Specifications)

212-2.1.6 Asbestos Pipe. (Not applicable)

Add to following Subsections:

212-2.1.7 Brass Pipe.

Brass pipe and components shall be low-lead composition to conform to State of California AB1953 low-lead content standards.

212-2.1.8 Concrete Thrust Block and Supports. (Add the following Subsection to Green Book Specification):

Concrete thrust block and supports shall be 2,000 PSI minimum compressive strength at twenty-eight days, 5-sack mix, and tool finish on exposed surface. Thrust blocks shall be installed in accordance with Subsection 308-5.2.3

212-2.2. Valves and Valve Boxes.

212-2.2.1 General. (Refer to Green Book Specification):

212-2.2.2 Gate Valves. (Refer to Green Book Specification for 2-1/2 inch and larger gate valves):

212-2.2.3 Manual Control Valves. (Not applicable)

212-2.2.4 Remote Control Valves. (Refer to Green Book Specification and add the following):

Remote Control Valves shall be of the type, model and manufacturer as designated on Plans.

212-2.2.5 Garden Valves. (Not applicable)

212-2.2.6 Quick Coupling Valves and Assemblies. (Refer to Green Book Specification and add the following):

Quick coupling valves shall be equipped with locking vinyl covers, and shall be of type, size, and manufacturer as designated on Plans.

Quick coupler keys shall be brass or bronze with hose swivel assemblies.

212-2.2.7 Valve Boxes. Delete entire section and substitute with the following:

Valve boxes shall be molded structural plastic polymer construction with UV-inhibitors (Carson, Ametek, or approved substitution) in the following sizes:

(a) Quick coupling valves: Use 10-inch-diameter by 10-inch-depth round valve boxes with locking lids and compatible box extensions to provide adequate depth.

(b) Gate Valves and Ball Valves:

Two-inch size and smaller: Use 12-inch by 17-inch by 12-inch depth rectangular boxes with locking lids.

Three-inch size: Use 15-inch by 25-inch by 15-inch depth “jumbo” rectangular boxes with locking lids.

(c) Remote Control Valves: Use 12-inch by 17-inch by 12-inch depth rectangular boxes with locking lids.

AND/OR

(c or d) Low-volume (Drip) Control Assemblies: Use 15-inch by 25-inch by 12-inch depth jumbo rectangular boxes with locking lids.

(d or e) Low-volume (Drip) Filter Assemblies: Use 15-inch by 25-inch by 12-inch depth jumbo rectangular boxes with locking lids.

212-2.2.8 Ball Valves.

Ball valves, 3 inches and smaller, shall be of the type, model and manufacturer designated on Plans.

212-2.2.9 Anti-drain Valves.

Anti-drain valves shall be “CV” series (line size) as manufactured by King Bros. Industries, Inc. (KBI), or approved substitution.

212-2.3 Backflow Preventer Assembly. (Refer to Green Book Specification)

212-2.4 Sprinkler Equipment. (Refer to Green Book Specification and add the following):

Sprinkler heads shall be in accordance with the sizes, rates of precipitation, arcs, pressure ratings, and discharges as designated on the Plans (irrigation legend).

212-2.5 Low-volume (Drip) Irrigation Equipment. (Add the following to Green Book Specification):

212-2.5.1 Filters.

(a) Filters shall be disc cartridge type with a maximum operating pressure of 140 psi and a minimum flow of 1.0 gpm.

(b) Filters shall have minimum 120-mesh disc cartridges, removable for cleaning.

(c) Filters shall be equipped with pressure gauges (0-100 psi).

212-2.5.2 Remote Control Valves. (Refer to Green Book Specification Section 212-2.2.4 and add the following):

(a) Valves shall have an operating pressure range of 20-200 psi or greater, and minimum flow of 5 GPM.

(b) Valves shall have integral pressure-regulating modules for precise pressure control. Modules shall be capable of regulating pressure from 20-100 psi.

212-2.5.3 Pressure Regulators (*delete if specifying pressure-regulating remote control valves*).

(a) Pressure regulators shall be constructed of high-strength, ultraviolet and impact- resistant plastic, or heavy-duty bronze body with corrosion-resistant components.

(b) Pressure regulators shall be operable within a range from 0.5 gpm to 25 gpm.

(c) Pressure regulators shall maintain pre-set downstream pressure despite changes in volume and inlet pressure.

212-2.5.4 Emitters and Dripperline.

(a) Emitters shall be self-flushing and pressure-compensating, and shall be constructed of high-strength, ultraviolet and impact-resistant plastic.

(b) Dripperline shall be one-half inch nominal PE tubing, housing internal pressure-compensating, continuously self-flushing integral drip emitters.

212-2.6 Equipment to be Furnished. (Add the following to Green Book Specification):

Contractor shall provide the following to the City prior to final acceptance:

(a) Two (2) key sets for opening and locking the automatic controller enclosures. Provide batteries for controllers (if applicable).

(b) Two (2) sets of special tools required for removing, disassembling, and adjusting each type of sprinkler, emitter, and valve.

(c) Two (2) 5-foot valve keys for operation of ball and gate valves (if required).

(d) One (1) quick coupler key and matching hose swivel for every five of each type of quick coupling valve installed.

(e) Five of each type of sprinkler and emitter.

212-3 ELECTRICAL MATERIALS.

212-3.1 General. (Refer to Green Book Specification)

212-3.2 Conduit and Conductors.

212-3.2.1 Conduit. (Refer to Green Book Specification and replace with the following):

Conduit shall be gray Schedule 40 PVC pipe from the electric power source to the controller(s). Conduit shall conform to the applicable provisions of Subsection 212-2.1.3.

212-3.2.2 Control Conductors. (Refer to Green Book Specification and add the following):

Electric wiring from controllers to remote control valves shall be solid, single- conductor, copper wire, 4/64-inch insulation, 4/64-inch neoprene jacket, Style DB (Direct Burial) or approved substitution. Pilot wires shall be a different color for each valve station on a controller, and for each automatic controller. Neutral (common) wires shall be white with a different color stripe for each automatic controller. Spare wires shall be red.

Flow meter signal wires shall be in PVC Schedule 40 gray conduit.

Add the following sections:

212-3.2.2.1 Low-Voltage Control Conductors Size.

Wire sizes shall be provided as follows:

Neutral (common) Wire:	#12 AWG (min.)
Spare Wires:	#14 AWG (min.)
Pilot Wires:	#14 AWG (min.)

212-3.3 Controller Unit.

(Add the following paragraphs):

Field controller(s) shall be capable of fully automatic, semi-automatic, or manual operation using a keypad that is an integrated part of the controller. Each controller shall be capable of storing irrigation schedules, and monitoring and managing flow, without the Central Computer (i.e., if the Central Computer is turned off, removed, or if communication from/to the Central Computer fails, the field controllers will continue to perform weather and flow management functions).

The controller shall have the built-in capacity for sensing flow via flow meter input and utilizing a master valve without the addition of sensor boards, decoders, or other pieces of equipment.

There shall be a minimum of seven (7) regular irrigation programs with individual station “cycle and soak” watering, plus two additional syringe/propagation programs each with minimum of six (6) start times, adjustable station run times, and automatic programming

capability to specific scheduled dates. When a scheduled date is reached, the controller shall automatically cease irrigating the manual program.

The controller shall have a water budget feature that provides monthly water volume allotments proportionate to historical evapotranspiration (ET), which is interactive with all programs, and able to alert the user (via on-screen alarms) when the controllers' water usage is greater than the user set water budget.

A full year master schedule to allow twelve (12) month programming shall be a standard feature of the controller.

Programming shall be based on a seven (7), fourteen (14), twenty-one (21) or twenty-eight (28) day scheduling and shall be able to irrigate in minutes and as a % of ETo.

The controller shall have flow management capability as a standard feature. The controller shall automatically learn the expected flow rate (gpm) of each valve station over several irrigations, and use the pressure main line programmed flow capacity to operate up to four (4) valves simultaneously, plus the master valve, to shorten the watering window.

Users shall be able to process and respond to alerts at the field controller locations and the Central Computer location.

If an alert such as "High Flow" is indicated, then the controller shall continue to attempt operation of the station with the alert during each watering cycle and then shut off, rather than inactivate the station until the alert is cleared from the central computer or at the field controller.

The controller shall have built-in amperage metering to accurately measure and diagnose valve solenoid electrical problems such as "no current", "station short", "under current", "over current", etc.

The controller shall have an irrigation test program, or "walk-through" program, which has a delay time to allow a user to walk to a test area before the controller activates valve stations. The controller shall then run the test program through a sequence of predetermined stations for set program times. The programmable delay time shall be an integral part of the irrigation test program. The controller shall be capable of operating a test program without affecting the controller's normal program station times or terminating a regular watering schedule.

The system shall be capable of allowing the user to change the irrigation program from either the Central Computer or the field controller without requiring the user to return to the Central Computer to accept program changes.

The controller shall allow users to set watering windows, which permits irrigation operation only between programmed start and end times. Remaining run-times shall be

carried in a holdover table and shall be applied at the next scheduled irrigation with the system prioritizing which valve to operate based on accumulated ET and the holdover time.

The system shall provide multi-level access control (up to four levels) to set user access for programming each controller. The controller shall have the ability to track and report on when an access code or "individual" user logged into the controller, what keys were pushed while there, and when an access code logged out of the controller. These shall be date and time stamped.

The controller shall be capable of displaying detailed water usage reports for each month during scheduled irrigation, test and manual key operation, and non-controller usage such as bleeding valves manually, use of quick coupling valves or hose bibbs, etc.

A radio remote receiver shall be built into the controller, and a handheld radio remote transmitter shall be provided to the City. The handheld transmitter shall display operational information such as valve on, flow rate (gpm), and electrical draw in amps.

The field controller(s) shall be capable of utilizing a single mode, or a combination of modes, including hardwire cable, standard telephone, Ethernet, point-to-point spread spectrum radio, local radio in the 450-470 MHz range, fiber optic modems, or GPRS wireless modem application as communication links to the central computer. The field controllers shall be capable of directly receiving, storing, and operating commands downloaded from the central computer.

The field controller(s) shall be compatible with the City's existing Central Control Software and weather station.

(Add the following Subsection):

212-3.4 Irrigation Pump and Drive System

Pumping systems shall be specifically designed and sized for the particular sites at which the systems will be utilized. System design shall include contact with the local electrical utility company to determine whether single- or three-phase power will be used.

Pumping systems shall be constructed entirely from stainless steel with the exception of plumbing components, which shall be copper or low lead brass.

Pumping systems shall incorporate a variable speed drive unit that is consistent with existing drive units installed at City facilities.

The variable speed drive shall provide an adjustable carrier frequency with IGBT power switching and utilize PWM technology. The drive shall provide noiseless operation of

the driving motor, short circuit and ground protection, and operate with controlled sinusoidal current synthesis and dynamic over current limitations.

The variable speed drive shall be one complete integrated unit, including the variable frequency drive and programmable pump-specific controls. Additional control panels, PLC's or other external devices, shall NOT be necessary to accomplish complete pump programming and variable speed control of pump and motor.

The variable speed drive shall provide a removable LCD display and programming keypad for data entry. The drive shall utilize user-friendly front panel programming that displays pump and motor language in clear text. The control panel shall have the ability to upload and download programming from drive to drive. The variable speed drive programming shall incorporate help "Wizards" and a real time clock for ease of programming centrifugal pump applications. Colored diodes shall signal 'power on', 'pump running' and 'fault'. Program settings shall be changeable and stored in non-volatile memory.

Program settings shall be retained in memory in the event of loss of power to the controller, without the use of a backup battery. System operating pressure shall be clearly displayed in PSI or feet of head for ease of use and to provide an operator friendly interface. Additional parameters, where applicable, shall be displayed in units consistent with pumping systems.

The settings and program, in whole or part, may be locked out with the use of an operator selectable password. Standard system hydraulic settings shall include, at a minimum, the following functions: loss of suction, lack of NPSHa, pump run-out protection, dead head protection, constant pressure setting with variable flow capability, constant flow with variable TDH (pressure) capability, quadratic differential flow calculation, system curve compensation, multiple pump operation with alternation, pump starting point with allowable adjustable pressure drop, minimum speed with time delay, pressure of flow sensor error, overpressure shutdown and low flow shutdown.

The control board unit shall contain analog and digital contacts for a host of sensors or dry relay terminals, which can be connected to external devices for operation of:

- Remote start and stop.
- Low-pressure protection switch.
- Across the line start pump relay.
- Pump run relay.
- Pump fault relay.
- Analog output signal shall have two (4 - 20mA) signals.
- Analog input (4 - 20mA) sensor.
- Secondary analog input (4 - 20mA or 0 - 10 Vdc) offset signal.
- Two pressure settings with one transducer (field programmable).

A stainless steel pressure transducer and cable assembly shall be included with the assembly. All hardware and appropriate range transducer shall be provided by the pump control manufacturer to ensure complete compatibility with controller.

The variable speed drive shall provide a programmable automatic error reset of the pump system that will provide automatic restart capability, with a programmable time delay between each start. The pump controller shall provide a fault history with at least five previous fault codes. The pump controller shall provide programmable automatic test run of pumps during periods of down time, based on operating hours. The pump controller shall incorporate motor thermal protection and drive temperature protection as standard equipment. The pump controller shall be capable of monitoring and displaying total operating hours, and total motor run hours. The pump controller shall protect the variable frequency drive and motor from:

- Over-voltage
- Under-voltage
- Input phase loss
- Phase imbalance
- Motor over-current
- Motor phase loss
- Ground fault and short circuit

The variable speed pump controller shall be UL-listed.

A complete variable speed drive pump controller instruction, operation, and programming manual shall be provided by the authorized supplier/distributor for the variable speed drive. The instruction manual shall include a typical system design layout, installation instructions, pump programming instructions, and troubleshooting assistance.

Variable speed pump control system shall include the following: variable frequency drive, microprocessor based PLC, pump-specific control logic, pump, motor, and transducer. The variable speed pump system and components shall be provided, installed and integrated by a single source entity.

Complete system integration, setup, programming and warranty shall be the responsibility of the factory-authorized representative, who shall also provide written certification of pump system installation to the City prior to final acceptance.

(Add the following Subsection):

212-3.4 Irrigation Equipment Enclosures.

Equipment enclosures such as utility services, pump housings, backflow prevention device cages, irrigation controllers, etc. shall be constructed of stainless steel or anodized aluminum.

(Add the following section):

212-4 RECLAIMED WATER IRRIGATION MATERIALS.

212-3.1 General. Irrigation equipment and appurtenances (pipe, valves and valve boxes, warning tape, dripperline, etc.) shall be color-coded (purple) in accordance with American Water Works Association (AWWA) guidelines, Section 116815 of the California Health and Safety Code, and water purveyor's Rules and Regulations.

SECTION 300—EARTHWORK

300-1 CLEARING AND GRUBBING (Refer to Green Book Specification):

300-1.2 Preservation of Property.

Maintain regular schedule of watering for existing plants, including those outside limits of work watered by irrigation systems supplied from within limits of work.

300-1.3 Removal and Disposal of Materials.

300-1.3.2 Requirements. (Add the following sections):

(a) Bituminous Pavement. (Revise second sentence to read):

Saw cut pavement edges to be joined.

(d) Turf Removal.

Turf removal shall consist of removal and disposal of turf and matted roots from the indicated removal areas. Excavate organic refuse, rocks, and debris to a minimum depth of four (4) inches below original soil surface in turf removal areas, and in areas of existing turf disturbed by construction under this Contract. Protect irrigation equipment to remain from damage during construction. Fill and compact depressions made by turf removal with suitable material in accordance with Section 308, LANDSCAPE AND IRRIGATION INSTALLATION. New surface shall conform to the existing adjacent ground surface.

(e) Irrigation Demolition.

Except for sprinkler heads, irrigation piping and equipment indicated on the Drawings to be "removed" shall be removed and disposed of according to Section 300-1.3.1. Existing irrigation pipes identified for demolition that are more than 12 inches below

finished grade may be abandoned in place, provided they do not interfere with the work specified elsewhere.

Irrigation pipes shall not be abandoned if pipes are less than 12 inches below finished grade.

Sprinkler heads indicated on the Drawings to be “removed” shall be removed and salvaged according to Section 300-1.4, where possible. Removal shall be accomplished prior to other work under this Contract that may damage the sprinkler heads.

(f) Miscellaneous. (Add the following paragraph):

The following items of work are included under Clearing and Grubbing unless otherwise covered by a specific bid item:

1) Maintain dust control at all times by watering as required. Dust control shall include obtaining a water supply and providing water required for work done in the contract. Obtaining, applying and controlling water shall be paid for by the Contractor.

2) Provide for traffic control, as indicated in Section 7- (Traffic Control) of this Specification, and signs, barricades and flashers necessary to maintain proper control. Barricades left onsite as traffic control for other than daylight use will have operational flashing warning lights.

3) Protect existing underground utilities, irrigation systems, trees, fences, walls, mail boxes, signs and other facilities to remain within the limits of construction, except those specifically directed by the Engineer to be removed or relocated.

4) Protection of existing and relocated utility structures prior to and during construction of proposed improvements.

5) Maintenance of project appearance.

6) Control of water and dewatering during construction.

7) Cleanup of project area upon completion of work.

8) Existing plants shall be protected unless designated “to be removed.” Contractor shall prune or remove existing plants as designated on Plans and directed by the City Engineer. Tree pruning shall be conducted in accordance with industry standards to satisfaction of the City Engineer and according to Subsection 300-1.5, Tree Pruning.

9) Relocation of signs as shown on the Plans, including foundations and hardware as required.

10) Removal, relocation, maintenance, and installation of fences and gates, including footings and hardware. Permanent fences that are removed to allow construction of new improvements shall be relocated as directed by the Engineer. Work on fences shall be in accordance with the Regional Standard Drawings, if applicable.

11) Installation and removal of temporary fencing required during construction.

12) Saw cut, removal, and disposal of concrete.

13) Removal of objectionable materials from project area.

14) Protection of existing features as called out on Plans.

15) Contractor shall excavate test pit (potholing) as indicated on Plans to determine exact locations (horizontal and vertical) of underground utility lines adjacent to the work area. Pothole prior to start of construction. Adjustments shall not be considered as reason for additional compensation.

16) Subgrade preparation (subgrade scarification and recompaction).

17) Other items of work as directed in these Special Provisions.

300-1.4 Removal and Salvage of Materials. (Add the following section):

300-1.4.1 General.

[ ] shall claim as salvage the following items designated on the Plans for removal and salvage, including:

(a) Sprinklers (manuf. and model)

(b) Valves (manuf. and model)

300-1.4.2 Requirements.

Contractor shall contact [ ] at [*tel. #*] prior to start of demolition work. Items requested by [ ] to be salvaged shall be inventoried by the Engineer prior to their removal, and a copy of the inventory shall be furnished to the Contractor.

Contractor shall coordinate with [ ] as described above, and shall protect and preserve during removal those items requested for salvage by [ ].

After removal, salvage items shall be delivered by the Contractor to [ ]. Each item shall be clean and complete as removed. A list of items received, and signed by the [ ] and City's representative, shall be delivered to the City Engineer by the Contractor.

300-1.5 Tree Pruning. (Add the following section):

300-1.5.1 General.

(a) Scope of Work:

This section shall govern the preparation for and execution of pruning and maintenance of existing onsite trees to remain. Trees to be pruned are listed below:

- species (common name)
- species (common name)

(b) Related Documents:

"Best Management Practices, Tree Pruning," published by the Western Chapter International Society of Arboriculture (WCISA), latest edition.

(c) Quality Assurance:

Tree pruning shall only be performed by qualified tree workers familiar with the techniques and hazards of arboricultural work, including pruning, repairing, maintaining, and removing trees, and equipment used in such operations. An arborist certified by the Western Chapter International Society of Arboriculture shall supervise pruning of trees.

300-1.5.2 Materials. As selected by the Contractor and approved by the City.

300-1.5.3 Methods.

(a) Tree pruning work shall be performed in accordance with ANSI Z133.1 - 2000, *Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush -- Safety Requirements."* Adequate safety precautions for the protection of tree workers and the public shall be observed at all times.

(b) Tree pruning and maintenance work shall be performed in accordance with ANSI A300 (Part 1) - 2001, *"Tree, Shrub, and Other Woody Plant Maintenance -- Standard Practices."*

300-1.5.4 Payment for Tree Pruning and Maintenance.

Payment shall be included in the lump sum payment for clearing and grubbing.

300-1.6 Payment for Clearing and Grubbing.

The lump sum set forth in the Contract Documents for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in or appurtenant to, clearing and grubbing as described in the Contract Documents, and as directed by the Engineer, and no additional compensation shall be allowed. Payment shall include full compensation for clearing and grubbing, preservation of property, removal and disposal of materials, removal and salvage of materials, cobble removal, tree pruning, clean up, traffic control, fence removal, dust control, repairs and guarantees.

300-2 UNCLASSIFIED EXCAVATION.

300-2.1 General.

The following is a breakdown of the estimated earthwork quantities:

- Fill cubic yards
- Cut cubic yards

300-2.2 Unsuitable Material (Add Subsection 300-1.3.2 (a) “Bituminous Pavement” as Subsection 300-2.2.3 and amend as follows):

Bituminous pavement removals shall be saw cut at the designated lines of removal shown on the Plans, or as designated by the Engineer.

Unsuitable soils exposed at the face of cut slopes shall be removed to a minimum horizontal distance from the face of the slope equal to ten feet or firm natural ground, whichever is less, and replaced as compacted fill. This procedure shall be required unless directed otherwise by the Engineer.

SECTION 308—LANDSCAPE AND IRRIGATION INSTALLATION

308-1 GENERAL (Add the following section):

308-1.1 Other Underground Improvements.

Prior to work included in this Section, Contractor shall locate underground improvements and take proper precautions to avoid damage to such improvements. Notify the City Engineer in the event of conflicts between underground improvements and new improvements.

308-1.2 Inclement Weather.

If conditions are such, by reason of drought, high winds, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, then work shall be stopped. Resume work only when conditions are again favorable as approved by the Engineer. Delays due to weather may extend the Contract period in regard to liquidated damages upon written approval of the Engineer.

308-1.3 Ordinances and Regulations:

Local, municipal, and state laws, rules, and regulations governing, or relating to, the work shall be incorporated into and made part of the Contract Documents. Such provisions in the Contract Documents shall not be construed to conflict with the above laws, rules and regulations. If Contract Documents specify materials, workmanship, and construction of a better quality, higher standard, and larger size than is required by the above laws, rules and regulations, then provisions of the Contract Documents shall take precedence.

(Add the following paragraph):

308-1.3.1 Reclaimed Water:

Work shall be in accordance with City, County, and State rules and regulations for use of reclaimed water.

308-1.4 Explanation of Drawings:

Due to the scale of drawings it is not possible to indicate all offsets, fittings, and sleeves that may be required for work. Contractor shall carefully investigate structural and finished conditions affecting work, and plan accordingly. Furnish offsets, fittings, and sleeves required to meet such site conditions. Drawings are diagrammatic and indicative of the work to be installed. Work shall be installed so as to avoid conflicts between irrigation systems, planting, engineering, and architectural features.

Work called for on the drawings with notes and details shall be provided, whether or not specified in the Special Provisions.

Contractor shall not willfully install the irrigation system as shown on drawings if obstructions, grade differences, and discrepancies in area dimensions are evident in the field, which may not have been known previously. Contractor shall notify the Engineer in writing of such obstructions and differences. If written notification is not performed, Contractor shall take full responsibility for necessary changes to work, and shall provide such changes at no extra cost to the City.

308-1.5 Inspections:

Inspections specified below shall be made by the City. Contractor shall request inspections at least 48 hours in advance of the time inspections are required. Inspections that are requested, scheduled, and subsequently canceled by the Contractor, without at least 24 hours notice, shall be billed to the Contractor.

Inspections shall be required for the following work (these may be combined if possible):

1) Preconstruction meeting prior to beginning planting and irrigation work.

2) Trenching for irrigation main line and lateral pipe.

3) Installation of piping and pressure testing of main line pipe prior to backfilling trenches.

4) Installation and testing of backflow prevention devices, valves, control wires, and automatic controllers. Contractor shall provide certification of the backflow devices by an approved testing company.

5) Operational and sprinkler coverage test (prior to planting) after completion of irrigation system.

6) Soil preparation and incorporation of amendments (provide delivery slips and invoices).

7) Completion of finish grading prior to planting.

8) Acceptance of plant materials prior to planting.

9) Tree and shrub locations, before excavation of planting pits.

10) Acceptance of completed landscape installation, and start of maintenance period.

11) Final site inspection at completion of maintenance period-acceptance of work.

12) Additional inspections may be required as determined by the Engineer.

308-2 EARTHWORK AND TOPSOIL PLACEMENT.

308-2.1 General. (Add the following paragraph):

Moisture Content: Do not perform soil preparation and earthwork if soil moisture content is such that excessive soil compaction will result. Apply water to control dust, break up soil clods, and provide suitable moisture content for tilling and planting.

(Add the following section):

308-2.1.1 Equipment.

Equipment necessary for soil preparation, finish grading, and handling and placing of materials shall be available and in good working condition before starting work.

308-2.2 Trench Excavation and Backfill.

(Refer to Green Book Specification and add the following to the second paragraph):

4) Sleeving (Irrigation & Electrical) 24 inches below top of subgrade

(Replace last paragraph with the following):

Trenches shall not be backfilled, except to anchor pipe, until required tests are completed and accepted by the City. Pipe joints shall remain exposed until satisfactory completion of testing. Lateral trenches, and main line trenches after initial sand backfill, shall be carefully backfilled with approved fine select material, consisting of loam, sandy clay, sand, and other approved materials -- free from large clods of earth and stones.

Backfill shall be mechanically compacted in landscaped areas to dry density equal to adjacent undisturbed soil in planting areas. Backfill shall conform to adjacent grades without settlement, sunken areas, humps, and other surface irregularities.

Pressure main line trenches shall be initially backfilled with clean sand placed at least three inches deep for bedding pipe. After pipe is laid in trenches, additional clean sand backfill shall be placed over main lines to minimum depth of six inches. Stones and other hard material larger than one-half inch in size shall not be permitted in initial backfill.

Flooding of trenches will be permitted only with approval of the City, in accordance with Subsection 306-1.3.3.

If trench settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, emitters and dripperlines, planting, and other installations are necessary, then Contractor shall make required adjustments at no extra cost to the City.

308-2.2.1 Trenching and Backfilling Under Paving. (Add Subsection):

PVC Schedule 40 sleeves shall be placed for irrigation pipe installed below paving.

Trenches located below paving (asphaltic concrete and concrete) shall be backfilled with sand (six inches above and below the pipe). Compact backfill in layers to 95% relative density (minimum) with manual or mechanical tamping devices.

Trenches shall be flush with adjoining subgrade. Contractor shall set in place, cap and pressure test piping under pavement prior to start of paving work.

Install piping under existing walks by jacking or boring. If cutting or breaking of sidewalks is necessary, then Contractor shall replace concrete walks at no extra cost to the City. Permission to cut or break sidewalks shall be obtained from the City Engineer. No hydraulic boring shall be permitted under concrete paving.

308-2.3 Topsoil Preparation and Conditioning.

308-2.3.1 General. (Add the following sentences to the second paragraph):

Grading and soil preparation work shall be performed only during periods when beneficial and optimum results may be obtained. If soil moisture content reaches a level so that working it would destroy soil structure, then soil preparation and grading operations shall be suspended. Resume work when soil moisture content is increased or reduced to acceptable levels and desired results of soil conditioning are likely to be obtained.

308-2.3.2 Fertilizing and Conditioning Procedures.

(Add the following to the second paragraph):

Prior to beginning work of this Section, Contractor shall obtain from Engineer a written list of adjusted soil amendments, quantities and methods of application as recommended by Contractor-provided agronomic soil analysis report (Section 211-5, Agronomic Soils Tests).

Unless otherwise directed, the following rates of soil conditioning materials shall be evenly and uniformly spread per 1,000 square feet (quantities shall be used for bidding purposes only):

Gypsum	200 pounds
Organic Soil Amendment	5 cubic yards
Soil Sulfur	10 pounds
Pre-Plant Commercial Fertilizer	25 pounds
Iron Sulfate	10 pounds
Wetting Agent	3 pounds

(Add after the last paragraph):

Weed Control: Remove existing weeds from planting areas. Contractor shall begin the weed abatement period after the irrigation system has been installed and tested. The weed abatement period may be waived or reduced with the Engineer's written approval.

Contractor shall irrigate planting areas four times daily for twenty-one consecutive days, or until weed seeds have germinated. Irrigation shall keep soil moist and not cause soil saturation, runoff, or erosion. Cease watering for three (3) days. Apply approved herbicide(s) in accordance with manufacturer's safety and application instructions to eradicate germinated weeds. Allow sufficient time to elapse for herbicide(s) to kill weeds. Remove dead weeds at soil surface. If weed eradication is not satisfactory, then repeat weed abatement period.

308-3 HEADER INSTALLATION. (Add the following paragraph):

308-3.1 Concrete Mowing Strip.

Concrete mowing strip shall be constructed as shown on Plans. Concrete for use in work constructed under this Section shall meet requirements of Subsection 201-1, Concrete Curb.

308-4 PLANTING.

308-4.1 General.

(Refer to Green Book Specification and replace with following):

1) Irrigation work shall be inspected and approved by the City prior to start of work of this Section.

2) Plant material quantities, species, and sizes shall be provided as designated on Plans. Plants shall be inspected and accepted by the City's representative before removal from containers and excavating soil for planting holes.

3) Planting areas shall be irrigated to a minimum depth of twelve (12) inches prior to planting installation.

4) Plant quantities on Plans are for Contractor's convenience only. Symbols shall take precedence over written numeric quantities.

5) Scarify sides of plant root balls with sharp tool to depth of one inch to girdle circular root growth prior to planting.

6) Planting shall be performed with materials, equipment, and procedures most favorable to establishment and growth of plants.

7) Containers shall be opened and removed so that plant root balls are not injured.

308-4.2 Protection and Storage.

(Refer to Green Book Specification and substitute the following after the first sentence):

Nursery stock in containers shall be watered regularly. Place plants in a sheltered area protected from sun and drying winds. Do not allow plants to dry out before and during planting. Keep exposed roots moist at all times during planting operations. Do not expose roots to the air except while being placed in the ground. Damaged and diseased plants will not be accepted, and shall be replaced at no extra cost to the City.

Place seed containers in a sheltered area protected from weather. Contractor shall not allow seed to get wet before planting. Damaged seed shall be removed from the job site and replaced with fresh seed as designated on the Plans.

308-4.3 Layout and Plant Location.

(Refer to Green Book Specification and add the following):

If underground construction work and obstructions are encountered during the planting operations, alternate locations for plant material will be selected by the City. Plant relocation shall be performed at no extra cost to the City.

308-4.4 Specimen Planting.

(Add before first paragraph):

Planting pits for trees 24-inch box size and larger shall be excavated at least 12 inches larger than the original plant container. Scarify soil at sides and bottom of planting pit.

308-4.5 Tree, Shrub and Vine Planting.

(Refer to Green Book Specification and replace entire Section with the following):

Handling and planting of container stock shall be performed without injury and breakage of plant root balls. Plants with root balls broken and damaged during planting shall be replaced at no extra cost to the City.

1) Planting pits for trees and shrubs shall be excavated with scarified sides and bottoms. Width of holes shall be at least two times the diameter of plant root balls, and slightly less deep than the height of the root balls (minus one inch minimum). Planting pits shall be backfilled with prepared backfill mix.

2) Planting backfill shall be adjusted according to soils report, but shall be no less than the specified rate per cubic yard:

Organic soil amendment -- one part by volume
Native rock-free soil -- three parts by volume
Pre-plant fertilizer (5-3-1) -- 18 pounds
Bone meal (2-12-0) -- 2 pounds
Iron sulfate -- 1 pound

Backfill materials shall be thoroughly mixed after delivery to site.

3) Set plant in center of pit (on slopes, place plant on down slope side) in plumb vertical position with the crown of the root ball approximately one inch above surrounding grade. Root crown shall be slightly above finish grade after watering and settling. Final level of the root crown shall be the same, or slightly higher, relative to surrounding finish grade as to soil surface in container.

4) Place fertilizer tablets in containers on top of plant root balls prior to planting to verify required quantity of tablets. Install fertilizer tablets in accordance with schedule below and manufacturer's instructions.

1 -- 5 gram tablet per individual liner and flatted plant.
1 -- 21 gram tablet per 1-gallon container.
2 -- 21 gram tablets per 5-gallon container.
4 -- 21 gram tablets per 15-gallon container.
1 -- 21 gram tablet per each 4-inch tree box size.

City's representative shall conduct random testing after planting to verify fertilizer tablet installation.

5) Fill pit one-half full and lightly tamp planting backfill around root ball. Water thoroughly when half full, then completely backfill planting pit to finish grade. Lightly compact backfill again and water thoroughly.

6) Plants shall be watered immediately after planting.

7) Construct circular watering basins around each plant, slightly larger than the planting holes. The bottom of the basin shall be at approximate finish grade.

308-4.6 Plant Staking and Guying.

308-4.6.1 Method A Tree Staking.

(Delete entire Section and add the following):

Five-gallon, 15-gallon, and 24-inch box size trees shall be staked in accordance with Plans and City standard details. Trees 36-inch box size and larger shall not be staked or guyed unless directed otherwise by the City. Tree stakes shall not be placed through plant root balls.

308-4.6.2 Method B Tree Staking. (Not applicable)

308-4.7 Ground Cover and Vine Planting. Refer to Green Book Specification)

308-4.8 Turf Planting. (Refer to Green Book Specification)

308-4.8.3 Sod. (Add following paragraph after first sentence):

Sod shall be harvested, delivered, and installed within a 24-hour period. Sod left remaining on pallets 24 hours after harvesting shall be removed from the job site, unless an acceptable preservation method is approved by the Engineer prior to delivery of the sod.

(Delete remainder of Section and add the following):

Prior to placement of sod, turf areas shall leached, soil rototilled to incorporate soil conditioners, and all surface rock, clods, and debris removed. Remove weeds, including roots, or treat with approved weed control herbicide prior to sodding. Finish grade shall be uniform and level with no local depressions or high spots. Turf subgrade shall be 1.5 inches below adjacent walks, curbs, and other paving surfaces. Contractor shall obtain approval of finish grades from Engineer prior to placement of sod. Soil shall be lightly moistened immediately before laying sod. Contractor shall not operate heavy equipment over turf after finish grading is completed.

Starter Strip: The first row of turf grass sod shall be laid in a straight line with subsequent rows placed parallel to and tightly against each other. Lateral joints shall be staggered. Contractor shall place sod so that pieces are not stretched or overlapped. Sod joints shall be butted tightly to eliminate voids.

Watering and Rolling: Contractor shall lightly irrigate turf areas immediately after installation of sod and before rolling. After sod is placed in a section, the area shall be lightly rolled. After rolling, Contractor shall thoroughly irrigate turf to a depth of eight inches minimum. Contractor shall have adequate water available for irrigation at the site prior to and during installation of sod.

Re-sodding: Turf areas that do not show acceptable growth of grass within 10 days after sod installation shall be re-sodded.

Contractor shall protect turf areas from foot traffic until the end of the maintenance period.

308-4.8.4 Stolon.

(Delete last sentence of third paragraph and replace with following):

Stolons shall be worked into soil to a depth 1/2 to 1-1/2 inches by an approved mechanical planter. Stolons shall be planted at the rate of 450 bushels per acre.

(Add the following paragraph):

Stolons shall only be planted between April 1st and September 15th. No other seeding shall be done with stolon planting.

308-4.9 Erosion Control Planting. (Refer to Green Book Specification and replace with the following):

308-4.9.3 Seeding and Mulching. (Refer to Green Book Section 308-4.8 Lawn Planting):

308-4.8.1 General. (Not applicable)
308-4.8.2 Seed. (Replace with the following):

Hydroseed planting shall be accomplished by Method B (hydraulic method). Seeding shall not be performed when the wind velocity exceeds 5 miles per hour, or is detrimental to the uniform distribution of seed.

(a) Method A. (Not applicable)
(b) Method B. (Refer to Green Book)

308-4.10 Root Control Barrier. (Add to Green Book Specification):

Install root control barriers adjacent to hardscape as designated on Plans, and in accordance with manufacturer's instructions.

308-4.11 Mulching. (Add to Green Book Specification):

Spread mulch uniformly in planting areas as designated on Plans, to a minimum depth of two inches.

308-5 IRRIGATION SYSTEM INSTALLATION.

308-5.1 General. (Insert the following between second and third paragraph):

Existing Trees: If excavating adjacent to existing trees, Contractor shall exercise caution to avoid injury to trees and tree roots. Excavation near roots 1-1/2 inches and larger shall be done by hand. Tunnel under roots 1-1/2 inches and larger in diameter except directly in the path of pipe and conduit. Roots shall be heavily wrapped with burlap to prevent scarring and excessive drying. If a trenching machine is run close to trees with roots smaller than 1-1/2 inches in diameter, wall of the trench adjacent to tree shall be hand trimmed, making clean cuts through roots. Trenches adjacent to trees should be closed within twenty-four hours; if not possible, side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.

(Replace last paragraph with the following):

Record and As-Built Plans: Contractor shall provide and keep current complete "as-built" record set of prints. Record set shall be corrected daily and show every change from original Plans and Specifications and precise locations, sizes, and kinds of equipment. Prints for this purpose may be obtained at cost from the City. Plans shall be kept onsite and shall be used only as a record set.

Plans shall also serve as daily work progress sheets, and Contractor shall make neat and legible annotations as work proceeds, showing work as installed. Plans shall be available at all times for inspection, and shall be kept in a location onsite designated by the City.

Contractor shall provide Engineer with "as-built" record set of prints (marked in red) prior to final acceptance. Contractor shall prepare final mylar as-built plans after review and approval of redlined record set.

Contractor shall dimension from two (2) permanent points of reference (building corners, sidewalk, road intersections, etc.) locations of the following items:

(a) Remote control valves
(b) Routing of control wiring
(c) Quick coupling valves
(d) Ball valves and gate valves
(e) Connection to existing water lines/water meter location
(f) Connection to existing electrical power/automatic controller location
(g) Other related equipment as directed by the City
(h) Significant changes in routing of lateral lines from those indicated on the Plans
(i) Routing of pressure main line piping (dimension every 100 feet along route)

On or before the date of final inspection, Contractor shall deliver corrected and completed as-builts to the City. Delivery of final as-builts shall not relieve Contractor of the responsibility of providing required information that may be omitted from the prints.

Controller Charts: As-built record plans shall be approved by the Engineer before Contractor prepares controller charts.

Provide one controller chart for each controller installed. If existing controller is utilized, then Contractor shall prepare new controller chart.

Controller charts shall show irrigation zones controlled by automatic controllers, and shall be maximum size that controller doors will allow.

Charts shall be reduced Plans of as-built systems. If control circuits are not legible when Plans are reduced, then they shall be enlarged to a size that will be readable when reduced. Different colors shall be used to indicate area of coverage for each station.

After approval by the City, charts shall be hermetically sealed between two pieces of plastic -- minimum 10 mils. thick each.

Charts shall be completed and approved by the City prior to final inspection of irrigation system.

Operation and Maintenance Manuals: Prepare and deliver to the City within ten calendar days prior to completion of construction, two hard cover binders with three rings containing the following information:

(a) Index sheet stating Contractor's address and telephone number, list of equipment with name and address of local manufacturers' representatives.

(b) Catalog and parts sheets on material and equipment installed under this contract.

(c) Guarantee statement (refer to Subsection 308-7, Guarantee).

(d) Complete operating and maintenance instruction manuals on major equipment.

In addition to required maintenance manuals, provide the City's maintenance personnel with instructions for major equipment and show evidence in writing to the City at the conclusion of the project that this service has been rendered.

308-5.2 Irrigation Pipeline Installation.

308-5.2.1 General. (Refer to Green Book Specification and add the following before the first paragraph):

Site Conditions: Scaled dimensions are approximate. Contractor shall check and verify dimensions, and receive City's approval, prior to proceeding with work under this Section.

Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities. Check utilities record drawings for existing utility locations.

Coordinate installation of irrigation materials to avoid interference with utilities, other construction, and planting.

Contractor shall carefully check elevations and grades to ensure that work on the irrigation system may safely proceed without conflicts.

Water Supply: Irrigation system shall be connected to water supply points-of-connection as indicated on the drawings.

Connections shall be made at approximate locations shown on drawings. Contractor shall be responsible for minor changes caused by actual site conditions.

(Delete third paragraph, and add the following paragraphs at the end of the Subsection):

Routing of sprinkler irrigation lines as indicated on the drawings is diagrammatic. Install lines (and various assemblies) in accordance with irrigation details and Plans. Markings on PVC pipe shall be installed face up in the trench, and visible and readable by the Engineer.

Contractor shall not install multiple assemblies on plastic lines. Provide each assembly with its own outlet.

Install assemblies specified herein in accordance with respective details. In absence of detail drawings and Specifications pertaining to specific items required to complete work, perform such work in accordance with best standard industry practice and with prior approval of City.

PVC pipe and fittings shall be thoroughly cleaned of dirt, debris, and moisture before installation. Installation and solvent welding methods shall be as recommended by pipe and fitting manufacturers.

On PVC to metal connections, Contractor shall work metal connections first. PVC to metal connections shall only be accomplished by PVC male adapters screwed into

metal fittings. Teflon tape, or approved substitution, shall be used on threaded PVC to PVC, and on threaded PVC to metal joints. Use only light wrench pressure to tighten joints. If threaded PVC connections are required, then use threaded PVC adapters, into which pipe may be welded.

Temporary Repairs: The City reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the City shall not relieve Contractor of responsibilities under terms of the guarantee in accordance with Section 308-7.

(Add to fourth paragraph, after the last sentence):

Lines for other trades shall not be laid in irrigation trenches, but shall be installed in separate trenches.

308-5.2.2 Steel Pipeline. (Not applicable)

308-5.2.3 Plastic Pipeline. (Refer to Green Book Specification)

(Delete the second sentence, third paragraph, and replace with the following):

The solvent cement and installation methods recommended by pipe and solvent manufacturers shall be used. Pressure main line pipe shall be solvent-welded utilizing a two-step process with medium-set gray cement and primer.

(Add the following paragraph at the end of the Subsection):

Concrete Thrust Blocks: Thrust blocks shall be installed for pressure main line piping as indicated on the Plans. Thrust blocks shall be constructed with sufficient bearing area to resist the thrust of water, and shall be placed against undisturbed earth at all changes of direction exceeding 45 degrees. Thrust blocks shall not completely cover pipe connections and fittings.

308-5.2.4 Copper Pipeline. (Refer to Green Book Specification)

(Add the following paragraph):

308-5.2.5 Pipeline Joint Restraint System

Pipeline joint restraint shall be installed as shown on Plans and details. Joint restraint system shall be manufactured by Leemco, Inc., or approved substitution. Installation shall conform to Leemco, Inc. *"Installation Guide,"* current edition.

Contractor shall arrange a pre-installation meeting onsite with City's Representative and the equipment manufacturer's representative prior to installation of joint restraint system.

308-5.3 Installation of Valves, Valve Boxes and Special Equipment.

(Refer to Green Book Specification and replace with the following:)

(Insert paragraph between first and second paragraphs):

Remote Control Valves: Install as shown on Plans and details. Where grouped together, allow at least twelve inches between valves. Install each remote control valve in a separate valve box. Testing of pressure main lines shall occur prior to installation of remote control valves.

(Delete the second sentence of the second paragraph)

(Delete the third paragraph, and substitute the following):

Valves shall be the size as designated on the Plans.

(Delete the second sentence of the fourth and fifth paragraphs, and substitute the following):

Valves shall be installed in plastic valve boxes per Subsection 212-2.2.7 herein, one valve in each valve box.

(Add the following sentences to the sixth paragraph):

Valve boxes and extensions shall be set on brick (standard size) base supports to prevent settling of boxes. Valve boxes shall be set parallel with each other, and perpendicular with edge of paving. Install valve boxes with a minimum one-inch clearance between top of pipes and valve box knock-outs. Valve boxes shall not be cut to enlarge knock-outs for piping.

308-5.3.1 Valve Installation.

Quick Coupling Valves, Check Valves, Gate Valves, Remote Control Valves, Ball Valves, Flush and Air Release Valves, and Filter and Fertilizer Injector Assembly shall be installed one per box as designated on Plans and as detailed.

308-5.3.2 Quick Coupling and Check Valves.

Quick Coupling Valves and Inline Check Valves shall be installed as designated on Plans and as detailed.

308-5.4 Sprinkler Head and Emitter Installation and Adjustment.

308-5.4.1 General. (Refer to Green Book Specification)

308-5.4.2 Location, Elevation and Spacing. (Refer to Green Book Specification and delete first sentence of the second paragraph, and first sentence of the last paragraph)

308-5.4.3 Riser Installation. (Refer to Green Book Specification)

(Delete second paragraph and substitute with the following):

Risers and nipples shall be threaded Schedule 80 PVC.

(Delete the last two paragraphs)

308-5.4.4 Sprinkler Head and Emitter (Dripperline) Adjustment. (Refer to Green Book Specification)

(Add the following sentence to the first paragraph):

Flow control and pressure-regulating modules on individual valves shall be adjusted so that uniform distribution of water is applied by sprinkler heads and low-volume dripperline to planting areas covered by each individual valve circuit.

(Delete last paragraph)

308-5.5 Automatic Control System Installation.

(Delete the second sentence of the third paragraph, and substitute the following):

When the valve is to be housed in a valve box, it shall be installed with three (3) inches minimum clearance between the bottom of the valve box lid and the top of the valve key or handle.

(Delete the following from the first sentence of the fourth paragraph and substitute as noted):

Delete—”galvanized steel conduit...”

Substitute—“gray schedule 40 PVC conduit”

(Add the following to the sixth paragraph):

Wire colors shall be provided as follows:

Neutral Wires:	White
Spare Wires:	Red
Master Valve:	Green

Pilot Wires:

Valve No. 1	Yellow
Valve No. 2	Orange
Valve No. 3	Blue
Valve No. 4	Black
Valve No. 5	Brown
Valve No. 6	Purple
Valve No. 7	Yellow with Black Stripe
Valve No. 8	Orange with Black Stripe
Valve No. 9	Red with Black Stripe
Valve No. 10	White with Black Stripe
Valve No. 11	Yellow with Red Stripe
Valve No. 12	White with Red Stripe
Valve No. 13	Red with White Stripe
Valve No. 14	Yellow with White Stripe
Valve No. 15	Orange with White Stripe
Valve No. 16	Blue with White Stripe

If installation varies from above assigned color scheme, Contractor shall make note of changes on “As-built” drawings. Contractor shall not assign same colored wire to more than one valve.

(Add the following sentences to the seventh paragraph):

Insulation resistance to ground shall be fifty (50) megohms, minimum. Wiring not meeting this requirement shall be replaced.

(Add the following paragraphs):

Existing control wires that run through the limit of work and supply areas outside the limit of work, shall be replaced with control wires identical in color to those removed. New control wire shall be installed in accordance with the National Electrical Code most recently adopted by City of Poway.

Expansion curls shall be provided within three (3) feet of each wire connection and at least every one hundred (100) feet of wire length on runs more than one hundred (100) feet in length, and also at each change of direction. Expansion curls shall be formed by wrapping at least eight (8) turns of wire around a one-inch diameter pipe, then withdrawing the pipe.

Install two spare pilot wires and one spare neutral (common) wire from controller to furthest remote control valve on each main line run. Verify total number and location of spare wires with City representative prior to wire installation.

Splices shall be made with Spears #DS-100 “Dri-Splice” waterproof splice kits, and #DS-300 blue sealer, or approved substitution. Field splices between automatic controllers and electrical control valves shall not be installed without prior approval of the Engineer.

(Add the following sections):

308-5.5.1 Automatic Controller. (Refer to Green Book Specification and add the following):

Prior to control system installation, Contractor shall verify electric power source, telephone line connection (if designated on Plans), and location of the automatic controller with the Engineer. Automatic controller shall be installed with on/off GFI switch and 110 VAC grounded outlet inside enclosure. Provide lightning protection in accordance with manufacturer’s instructions and Contract Documents.

308-5.5.1.1 Controller Set-up:

The area of each irrigation zone (valve circuit) shall be measured in the field to verify the design quantities. As-built irrigation plans and quantities programmed into the controller(s) shall reflect actual field measurements.

The flow (gpm) and pressure (psi) of each irrigation zone shall be measured in the field to verify design calculations. Actual flow shall match design/as-built flow to within 10%.

The controller(s) shall communicate with the City’s Central Control software prior to start of planting.

The area designation, area quantity, and flow for each irrigation zone shall be programmed into the field controller prior to start of planting.

308-5.5.2 Flow Sensor.

Install flow sensor as shown on Plans and details. Install each sensor in a separate valve box. Flow sensor signal wires shall be installed in a one-inch conduit between the sensor and controller enclosure.

308-5.6 Flushing and Testing.

308-5.6.1 General. (Refer to Green Book Specification)

308-5.6.2 Pipeline Pressure Test. (Refer to Green Book Specification and replace with the following):

1) Test shall be observed and accepted by the Engineer prior to trench backfill. Request presence of the Engineer in writing at least 48 hours (2 working days) in advance of test.

2) No testing shall take place, nor water allowed into pipe system, before the solvent manufacturer's recommended curing time has elapsed.

3) Main line pressure piping shall be tested under hydrostatic pressure of 150 pounds per square inch and proved watertight prior to backfilling. Test non-pressure lines under existing static pressure to prove watertight. No irrigation trenches shall be backfilled until piping has been inspected, tested, and approved.

4) Sustain pressure in pipe for not less than four (4) hours. If leaks develop, then replace leaking portions and repeat test until entire system is proven watertight.

5) Testing for main line and lateral pipe shall be completed and accepted prior to planting.

6) Testing of the system shall be performed after completion of each section, or completion of the entire installation. Necessary repairs to put the system in good working order shall be made by the Contractor before final payment by the City.

7) Sprinklers and dripperlines shall be installed only after flushing and testing of the irrigation piping has been accepted in writing by the Engineer.

8) Testing of pressure main lines shall occur prior to installation of remote control valves.

308-5.6.3 Sprinkler Coverage Test. (Refer to Green Book Specification and add the following):

After completion of irrigation spray system, and prior to planting, Contractor shall perform a coverage test in the presence of the Engineer to determine whether coverage is complete and adequate. Contractor shall correct inadequate sprinkler coverage.

Adjustment of the System: Contractor shall flush and adjust sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings.

If adjustments to irrigation equipment will provide better coverage and operation, then Contractor shall make such adjustments prior to planting. Adjustments may include

changes in sprinkler nozzle sizes and degrees of arc. Adjustments to irrigation system equipment shall be made at no extra cost to the City.

Lowering raised sprinkler heads by the Contractor shall be accomplished within ten (10) days after notification by the Engineer.

Sprinkler heads shall be set perpendicular to finished grades unless otherwise designated on the Plans.

308-5.6.4 Operational Test. (Refer to Green Book Specification and add the following):

Low-volume irrigation dripperlines shall be observed by the City for proper function and operation prior to backfilling lateral pipes and subsurface dripperlines.

Prior to final acceptance, the irrigation system shall be inspected by the City, and deficiencies shall be corrected by the Contractor.

The entire irrigation system shall be under full automatic operation for a period of seven (7) days prior to planting work.

The City reserves the right to waive or shorten the operation period.

308-6 MAINTENANCE AND PLANT ESTABLISHMENT. (Delete entire section and substitute the following):

308-6.1 General.

Plant establishment period shall not begin until entire landscape and irrigation installation, in accordance with Contract Documents, is accepted in writing by the City's representative.

Plant establishment period shall be for the following duration: **Two (2) years**, or until plants are established and irrigation system is operating properly as determined by Engineer, whichever period is longer.

Irrigation and planting maintenance schedules outlining proposed activities and task frequencies shall be submitted to the City for approval prior to start of the plant establishment period.

Prior to final acceptance, the City shall be given controller enclosure keys, quick coupler keys, operational manuals, and other turnover items specified in Contract Documents.

Rodents, insects, and other pests shall be controlled as necessary and by approved means. Restoration and repair of work areas disturbed by pest control shall be made by Contractor at no additional cost to the City.

Contractor shall replace dead and damaged plants, seed, and sod with specified plant material and repair damage caused by replanting work at no extra cost to City.

Contractor shall immediately establish a program of pest, fungus, and weed control. Applications of pesticides, fungicides, and herbicides shall be made by operators licensed by the State of California Department of Food and Agriculture to perform such work. Materials used in this work shall be approved by State of California Department of Food and Agriculture and other agencies with jurisdiction.

308-6.1.1 Scope.

The following maintenance work shall be performed during the plant establishment period:

(a) Maintenance shall include, but is not limited to: watering, mowing, fertilizing, weeding, applying anti-desiccants, cultivation, pest control, pruning, irrigation repair, plant replacement.

(b) Pickup and removal of trash from work areas, washing and brooming of walks and paving, and removal of unused materials from the job site.

308-6.1.2 Personnel.

Contractor shall furnish sufficient supervisory and working personnel capable of accomplishing work required under this Section on schedule and in accordance with Contract Documents. Maintenance personnel shall conduct themselves in a proper and efficient manner at all times. Personnel shall be fully clothed in suitable work clothing.

308-6.1.3 Supervision.

Contractor shall have competent supervisors, who may be working supervisors, on the job while work is being performed. Supervisors shall have a minimum of three (3) years field experience and possess adequate technical knowledge to supervise work in accordance with Contract Documents.

A supervisor shall inspect job site regularly (at least two times each week) to ensure work is performed in accordance with Contract Documents.

308-6.2 Landscape Maintenance.

308-6.2.1 General Quality of Landscape Maintenance.

Contractor shall provide complete landscape maintenance including, but not limited to: irrigation, fertilization, weed control, control of plant pests and diseases, mowing, cleanup, maintenance of drainage systems, and other work required to maintain job site

in safe, attractive and usable condition. Maintain turf in good condition with horticulturally acceptable growth and color.

308-6.2.2 Post-planting Fertilization.

No later than 10 days after the start of the plant establishment period, and at 30 days, 90 days, and completion of the plant establishment period (prior to final inspection), apply post-plant commercial fertilizer to turf and planting areas at the following rates:

- 16-6-8 formulation at six (6) pounds per 1,000 square feet
- 21-0-0 formulation at five (5) pounds per 1,000 square feet

308-6.3 Irrigation Maintenance.

308-6.3.1 Scope of Work.

Provide labor, materials, equipment, and services necessary to properly maintain, operate, adjust, and perform minor repairs to irrigation system during plant establishment period. Contractor shall have tools and spare parts for irrigation repairs on the job site at all times. Ground cover and shrub growth may require rising of heads to clear plant material.

308-6.3.2 General.

Irrigation materials shall be best available quality and as specified unless otherwise approved. Materials shall include: pipe fittings, heads, emitters, valves, cocks, stops, and solvent cement.

Contractor shall provide adequate garden hoses, quick coupler keys, and other equipment and tools necessary for the execution of maintenance work.

At least once each week during the plant establishment period, maintenance personnel shall manually operate each remote control valve, and inspect each sprinkler head or emitter in that valve circuit, to determine proper and adequate operation.

308-6.3.3 Operation.

Contractor shall adjust irrigation timing and frequency to avoid overwatering and runoff, and maintain optimum soil moisture for healthy plant growth.

308-6.4 Maintenance Report. (Add the following paragraph):

Contractor shall submit biweekly maintenance reports to the Engineer. Reports shall outline maintenance work performed in the preceding two weeks, and planned maintenance work for the following two-week period. Failure to submit reports shall be

deemed an interruption of the plant establishment period, and shall extend the completion date of the plant establishment period accordingly.

End of the plant establishment period shall occur only on receipt by Contractor of written final acceptance of work from the Engineer.

308-6.5 Closeout Schedule and Procedure.

Prior to final inspection, Contractor shall provide a written request to the City's representative to perform preliminary review of work to determine whether work has been completed in accordance with Contract Documents. Contractor shall notify the City at least five (5) working days in advance of requested date of review. Information gathered from this review will be used by City's representative to prepare a "punch list" of work to be performed, corrected, or completed. Punch list shall be completed by Contractor prior to final inspection.

Temporary facilities shall be removed from the job site.

Job site shall be thoroughly cleaned as specified in Section 308-6.1.1(b).

Irrigation equipment shall operate in accordance with Contract Documents and manufacturers' Specifications. Adjust, repair, balance, and replace equipment not operating properly.

Record drawings shall be completed and submitted to the City. Review and approval of record drawings by the Engineer is required prior to final acceptance.

Required material and equipment turnover items according to Section 212-2.6, and equipment maintenance instructions, shall be submitted to the City.

Guarantees and warranties shall be submitted to the City.

308-6.6 Final Inspection.

After punch list items noted at preliminary review of work have been completed, Contractor shall notify the City to request final inspection. Notice shall be given in writing at least five (5) working days in advance of the time the final inspection is to be performed.

Contractor, or principal superintendent authorized to act on behalf of Contractor, shall accompany the City's representative during the final inspection, as well as principal subcontractors that the City may request to be present.

If the work has been completed in accordance with Contract Documents and no further corrective measures are required, the City will accept the project and will file for the Notice of Completion.

If the work has been substantially completed in accordance with the Contract Documents, and only minor corrective measures are required, the City will conditionally accept the project and will file for the Notice of Completion based upon the Contractor's assurance that the corrective measures will be completed within a specified time period agreed to by the City.

308-7 GUARANTEE (Refer to Green Book Specification and replace with the following):

308-7.1 Irrigation Guarantee.

Guarantee for the irrigation system shall be made in accordance with the form below. General Conditions and Supplementary Special Provisions of these Specifications shall be filed with the City prior to acceptance of the irrigation system.

A copy of the guarantee form shall be included in the operations and maintenance manual according to Section 308-5.1.

Guarantee form shall be retyped onto Contractor's letterhead as follows:

GUARANTEE FOR IRRIGATION SYSTEM

We hereby guarantee that the irrigation system we have provided is free from defects in materials and workmanship, and that work has been completed in accordance with Contract Documents, ordinary wear and tear excepted. We agree to repair and replace defects in materials and workmanship, including settling of backfilled areas below finish grade that may develop during the period of one year from date of acceptance, and also to repair damage resulting from repairing and replacing such defects at no additional cost to the City. We shall make such repairs and replacements within 72 hours after receipt of written notice. If we fail to make such repairs after written notice from the City, we authorize the City to make said repairs and replacements at our expense, and we shall pay the costs and charges therefore upon demand.

PROJECT: _____

LOCATION: _____

SIGNED: _____

(Contractor)

ADDRESS: _____

_____

PHONE: _____

DATE OF ACCEPTANCE: _____

308-7.2 Plant Guarantee.

Contractor shall guarantee plants to be in a healthy, thriving condition for two (2) years beginning on the first day of the maintenance and plant establishment period.

308-8 MEASUREMENT AND PAYMENT. (Refer to Green Book Specification)