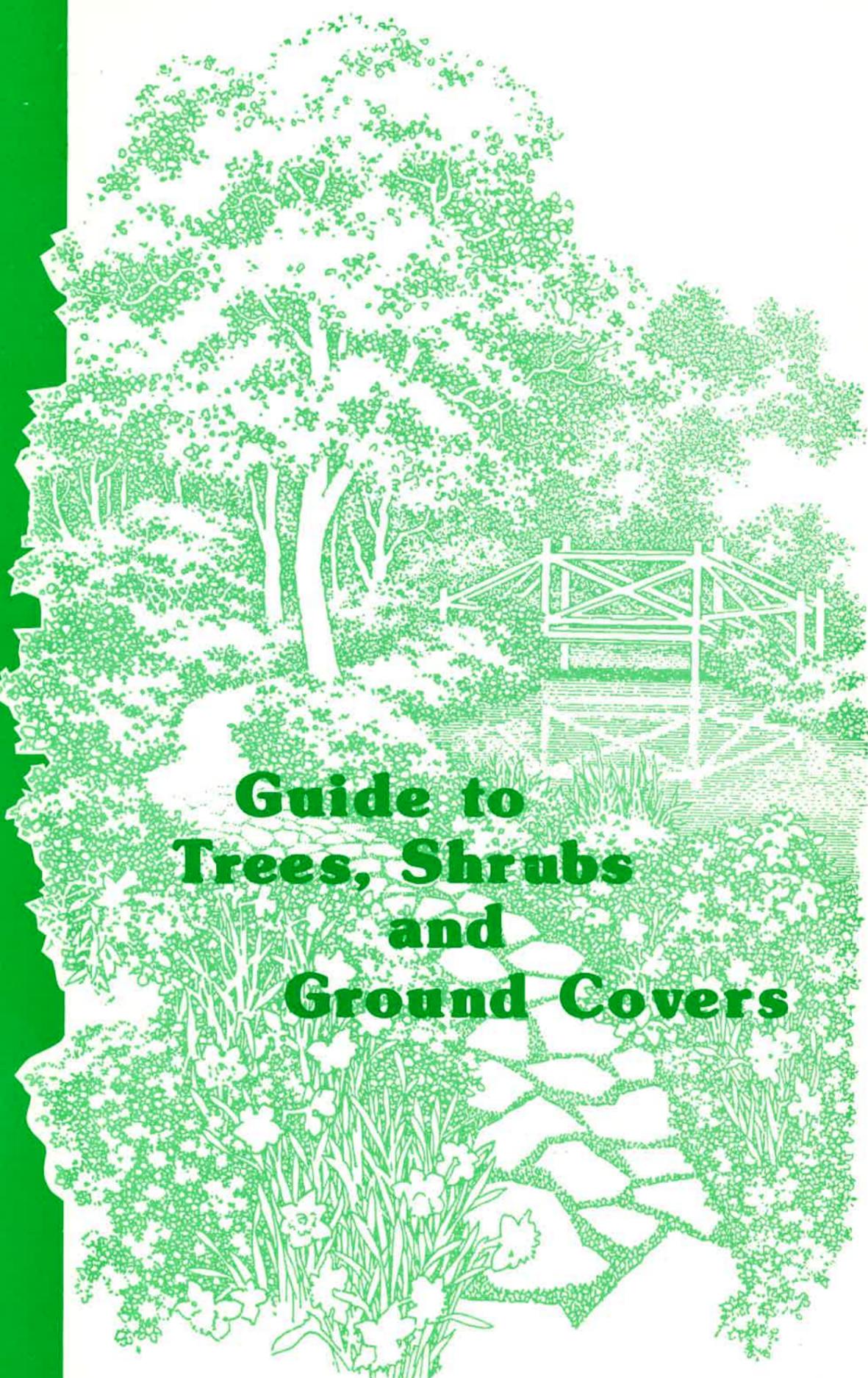


RIVERSIDE COUNTY



**Guide to
Trees, Shrubs
and
Ground Covers**

**THE RIVERSIDE COUNTY
GUIDE TO TREES, SHRUBS
AND GROUND COVERS**

April 1989

Price \$7.50

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INTRODUCTION

The purpose of this Manual is to serve as a complementary guide to Ordinance 348, Section 18.12, Parking and Landscaping.

This guide is designed to assist landscape architects, contractors, planners and the public in the proper selection of plant materials for parking lot shading, screening, and landscaping in general.

This material was compiled with the help of literature which is listed in the Bibliography. Also, the Planning Department conducted a survey of nurseries throughout Riverside County. The results of the survey was gathered and classified based on certain tree characteristics, such as spread of the crown, to aid in the selection of shade trees for parking lots. We also accompanied the tree list together with a climate zone map.

To promote water conservation practices we have included drought tolerant plants and low volume irrigation methods. A water conserving landscape does not consist only of cactus plants, sand, rocks, or pebbles; drought tolerant plants are usually attractive with lush foliage and showy flowers. A drought tolerant plant is a plant that can survive with little or no water other than available rainfall. It is important to remember that most plants, even drought tolerant ones, need water initially in order to become established. In addition, some drought tolerant plants need occasional watering, infrequent but deep soaking, to encourage a deep root system. This means that water efficient irrigation systems are mandatory. Each species that is drought-tolerant has been typed in bold face for your convenience. Also, a number of plants in this list can serve functional needs such as wind protection and erosion control.

This guide also contains information regarding landscaping for fire protection, plant selection guidelines, maintenance, and treatment of burned hillsides.

The species listed are not guaranteed for all situations. Consultation with a landscape architect, nurseryman, or Fire Department in the case of landscaping for fire protection is desirable before any selection is made. Professional guidance is recommended to assure that the optimal design is achieved to meet the need of each project. Proper planting, procedures, optional spacing, distance, soil, water requirements, and maintenance programs should be ascertained at the start of the landscape project. It is important to note that proper planting procedure may include digging past a hardpan layer to assure deep rooting and proper growth.

WATER CONSERVATION

Riverside County is one of the fastest growing jurisdictions in the nation. In January 1, 1985, the population of Riverside County was 794,800. This represented a 74 percent increase over the 1970 population of 456,914. High growth rates are expected to continue for the next 20 years.

Riverside County is generally located in a desert type of environment.

Since the population growth in Riverside County is expected to continue, the County supports programs that encourage water conservation. The Uniform Building Code requires installation of a number of water conserving devices in new homes. State law requires that water-saving toilets be used in replacement installations. The County also encourages water conservation in the use of home irrigation systems.

The following is a list of water saving technologies and methods of application that can help to maximize the use of water:

1. Tensiometers - These are devices placed in the ground to measure the amount of water moisture in the soil. If the amount of water in the soil is adequate, the tensiometer does not allow the irrigation system to come on. This avoids unnecessary watering.
2. Controllers - Controllers are the "brains" of the irrigation system. Located above ground, they transmit programmed messages out to the irrigation system and tell it when to come on. This eliminates many of the inconsistencies associated with a manual system.
3. Drip System - A drip system is an above or below ground network of water pipes which apply water directly to the root system of plants. Since the water is applied at a low pressure and low volume, the percentage of water wasted due to runoff and evaporation is much lower than compared to conventional systems.
4. Low Water Use Plants - This is a large group of plants which are able to grow and thrive in drier conditions than commonly used ornamental plants. Many of these plants are already used and are highly appreciated for their beauty, their pest resistance, and their low maintenance.
5. Reduction of Turf Areas - Since turf is the highest water user and needs more maintenance than any other portion of a landscape, it only makes sense to minimize its use wherever possible and increase the use of mulches, ground covers, and shrub areas.
6. Grouping of Compatible Water Uptake Plants - This seems obvious, but it is rarely done. Grouping plants with similar moisture requirements is essential to

saving water. Grouping a high water requiring plant with a low water requiring plant does nothing for minimizing water use and impairs the low water required by the high water user. No water is being saved by using the low water requiring plant. Plant groups must be specific and given only as much water as they need.

7. **Outdoor Water \$\$ Savers** - It's very easy to waste water outdoors. By using only what you need, you'll be saving on your water bills and helping to preserve our precious water supply. Here are twelve ways to save thousands of gallons of water:

Lawn:

Water your lawn only when it needs it. Don't follow a fixed schedule. To find out when to water, step on the grass, then remove your foot. If the grass springs back up, it does not need watering.

Water deeply, but not too much. Frequent light sprinkling wastes water through evaporation and promotes shallow root systems. Deep water gets moisture down into soil where it is better retained and will encourage strong deep roots. To minimize evaporation losses, use a coarse sprinkler spray rather than a fine one.

Water when it's coolest. Don't water in the heat of the day; water will be wasted as it evaporates. Watering in the early morning may be best, since evening water sometimes causes fungus growth.

Be careful how you aim the sprinkler. Don't water the street or sidewalk. It won't grow, and continual water may cause an algae buildup and attendant slippery surface.

Don't cut your lawn too short. Longer grass blades shade the roots and retard evaporation, and less watering will be needed.

Trees, Shrubs, Vegetables

Use trickle, drip or soaker irrigation methods. Water deeply and slowly right next to the roots to redirect moisture to where it's needed.

Put mulch around plants. Mulch slows evaporates, discourages weed growth and keeps roots cool and healthy.

Select plants, trees and grass varieties that need less water.

Car Washing

Use a bucket of sudsy water and a nozzle on the hose. Use the nozzle to turn off the hose while you're washing, and to produce an efficient spray for rinsing.

Children's Play

Put some time limits on water play. Playing with a hose and sprinkler is great fun, but when prolonged, it can waste a lot of water.

Cleanup

Use a broom instead of a hose. Hosing down driveways, walks, patios and decks can use a lot of water.

Drips and Leaks

Fix them. Fixing a faucet often takes just a few minutes, and a few cents for a washer. If a hose has split, tape it up or replace it. And make sure there's a rubber washer and a tight fit where the hose connects to the faucet or to another hose.

SEVEN COMMON MISCONCEPTIONS REGARDING DROUGHT TOLERANT PLANTS

1. All California Native Plants Are Drought Tolerant.

Many native plants grow well along streams and require no irrigation or rainfall. These plants draw a great deal of water from the stream and would not tolerate a drought if they were removed from their water source.

2. All Drought Tolerant Plants Are Native.

Many imported plants come from Mediterranean climates similar to California's and do very well here with minimal watering. Many of these reproduce and flourish with little or no assistance from people.

3. Drought Tolerant Plants Never Need To Be Watered.

Even drought tolerant plants must be watered until their root system becomes established. After a drought tolerant plant becomes established (usually one to two years), it will require little watering.

4. Using Drought Tolerant Plants In Landscapes Is A New Idea.

Juniper, Rosemary shrubs, Cottoneaster, Bougainvillea and Pyracantha are just a few examples of plants that you can commonly find in your own yard or neighborhood that require little or no water once they are established.

5. Drought Tolerant Landscapes Consist of Sand, Rocks And Desert Plants.

There are probably some lush, green flowering drought resistant plants in your yard already. It is not necessary to give up a lush green yard in the interest of water conservation.

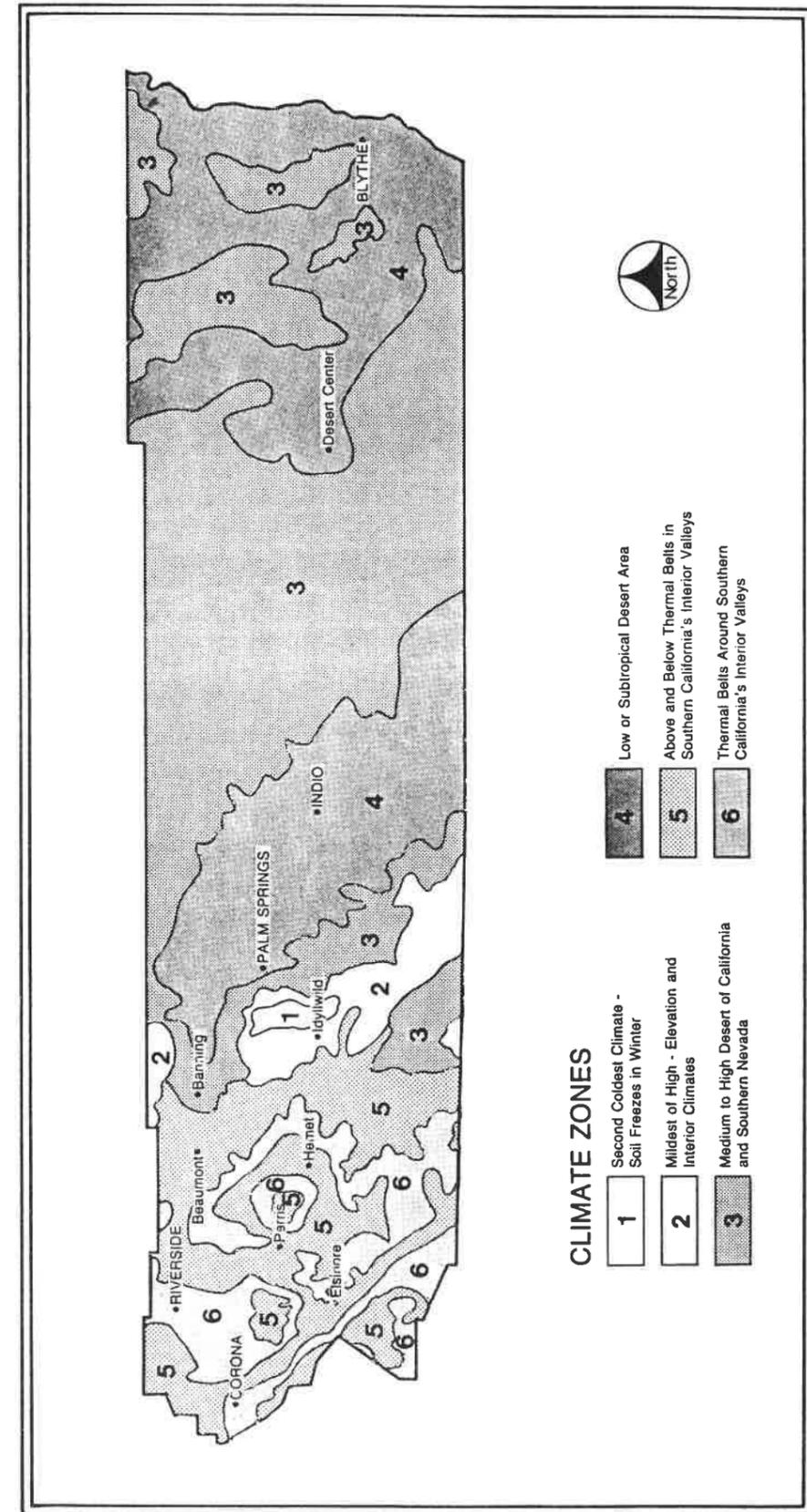
6. We Will Not Have The Same Landscaping Options As We Have Now If We Use Drought Tolerant Plants.

Water conserving ground covers, turf substitutes, hedges, shrubs, shade trees and flowering plants are all available in drought tolerant varieties. Some are even fire retardant.

7. Drought Tolerant Plants Can Be Successfully Combined With More Water Demanding Plants.

Drought tolerant plants should be grouped together in order to conserve water. Some drought tolerant plants are susceptible to diseases or root rot when over watered.

CLIMATE MAP: County of Riverside



TREE LIST BASED ON CROWN DIAMETERS

GROUND COVERS

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	SOIL	REMARKS
<i>Bacharis pilularis</i> Coyote Bush "Pigeon Point"	8"-24"	3,5,6	Moderate	Most soils	Broad leaf evergreen
<i>Bacharis pilularis</i> Dwarf Coyote Bush "Twin Peaks"	8"-24"	3,5,6	Fast	Most soils	Extremely drought tolerant . Good in desert environments.
<i>Carpobrotus</i> Ice Plant, Sea Fig Hotentot Fig	1'	4,5,6	Fast	Most soils drained	Evergreen. Avoid use on steep slopes. Not affected by diseases, insects, smog, fairly resistant to fires. Succulent.
<i>Cotoneaster glaucophyllus</i> Bright Bead Cotoneaster (<i>C. busifolius</i>)	4"-6"	3,4,5,6		Most soils drained	The best cotoneaster for the desert. Good for hedging or borders, foundation plant and space definer. Semi-evergreen or evergreen. Texas root rot. Good for erosion control.
<i>Drosanthemum floribundum</i> Rosea Ice Plant	6"	5,6	Fast	Most soils	Succulent perennial. Stems trail to considerable length or drape over rocks, walls. Best ice plant to control erosion on steep slopes.
<i>Drosanthemum hispidum</i> Ice Plant	18"	5,6		Most soils	Succulent perennial. Evergreen. Regular watering, however, live w/little or no water once established, fire resistant.

GROUND COVERS

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	SOIL	REMARKS
<i>Gazania</i> Spp. Gazania	6"-10"	3,4,5,6	Moderate	Most soils	Perennial. Fire retardant.
<i>Hedera Helix</i> English Ivy	6"-12"	All Zones	Moderate	Most soils	Evergreen. Good for small spaces. Moderate water.
<i>Juniperus Horizontalis Wiltonii</i> Blue Carpet Juniper	4"	All Zones	Moderate to slow	Most soils drained	Evergreen. Tolerant to heat and low humidity. Spreads 8' to 11' (feet).
<i>Juniperus Sabina</i> Buffalo	8"-12"	All Zones	Slow to moderate	Most soils drained	Evergreen. Soft, feathery, bright green foliage. Very wide spreading. Spread up to 8 feet.
<i>Lamprantus Spectabilis</i>	9"	5,6	Fast	Most soils	Evergreen. Seldom requires water, needs full sun. Gray-green foliage. Makes carpets of gleaming color.
<i>Malephora Crocea</i> <i>Purpureo-crocea</i> Ice Plant	12"	3,4,5,6	Fast	Most soils	Evergreen. Regular watering. Salmon flowers. Bluish-green foliage. Good for erosion control on moderately steep slopes. Hardest of trailing iceplants.
<i>Osteospermum Fruticosum</i> African Freeway Daisies	12"	4,5,6	Fast	Well drained	Evergreen. Good for slopes. Seldom requires water. Fire retardant when well watered.

3'-15' CROWN DIAMETER SHRUBS

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	SOIL	REMARKS
<i>Acer Palmatum</i> Japanese Maple	15'-20'	1,2,5,6	Slow	Moist drained	Deciduous shrub or tree. Resist oak root fungus. Drought tolerant , resists sun and wind. Makes good small street tree. <i>Small lawn tree. Shallow roots.</i>
<i>Buxus Microphylla</i> Japanese Boxwood Littleleaf Boxwood	3'-4'	3,4,5,6	Moderate	Well drained	Broad leaved evergreen. Will tolerate intense heat and humidity. Sun/part shade. Good for church & school, large institutional scale design. Low edge.
<i>Chaenomeles Speciosa</i> Common Flowering Quince	6'	1,2,3,4,5,6	Moderate	Wide range Well drained	Deciduous - mounding, rounded head, irregular, open. Blooms best in sun. Space 4 feet apart. Sun/part shade.
<i>Chamoerops Humilis</i> Mediterranean Fan Palm	4'-6'	3,4,5,6	Slow	Fertile, well drained	Palm. Space 4 feet apart. Prefer protection from north wind.
<i>Cortaderia Selloaria</i> Pampa Grass	8'-10'	3,4,5,6	Moderate to rapid	Well drained fertile to poor soil	Evergreen. Giant ornamental grass. Sun/part shade. Blooms best in sun. Female plants bloom best.
<i>Cotoneaster Franchetii</i> Franchet Cotoneaster	6'-8'	1,2,3,4	Slow to moderate	Well drained low fertility and moisture	Broad-leaved evergreen. Space 5 feet apart. Sun/part shade. Shrub border & screen. Do not plant to shear or clip.
<i>Cycas Revoluta</i> Sago Palm	4'-6'	3,4,5,6	Very slow	Fertile moist	Evergreen. Palm-like. Heavy crown of stiff leaves in a rosette pattern. Space 3 feet apart. Full sun best, but will grow in part shade. Glossy dark green foliage.

3'-15' CROWN DIAMETER SHRUBS

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	SOIL	REMARKS
<i>Cytisus Scoparius</i> Scotch Broom	6'	5,6	Moderate to rapid	Well drained	Deciduous shrubs. Sun/part shade. Best grown in cool climate.
<i>Euonymus Alata</i> Winged Euonymus	8'-10'	1,2,5,6	Moderate to slow	Well drained	Deciduous shrub. Upright, dense branches. Dark green. Space 5 feet apart. Sun/part shade. All varieties good. Use as screen or unclipped hedge.
<i>Euonymus Japonica</i> Evergreen Euonymus	8'-10'	3,4,5,6	Moderate	Most soils	Evergreen shrub. Heat & drought tolerant. Landscape structure plants. Moderate water. Good as hedge or screen. To lessen risk of mildew, locate plants in full sun, where air drainage is good.
<i>Hibiscus Syriacus Althaea</i> Rose of Sharon	10'-12'	All zones	Moderate		Deciduous shrub. Tall, upright and compact when young. Moderate water. Established plants take some drought.
<i>Juniperus Chinenses</i> Keteleeri. Keteleer Juniper	20'	All zones	Moderate	Most soils	Evergreen. Space 8 feet apart. Bright green, broad pyramid with loose ascending branches.
<i>Juniper Chinenses</i> Pfitzerana Pfitzer Juniper	4'-6'	All zones	Moderate to rapid	Wide range of soils - well drained	Narrow leaved. Evergreen. Space 5 feet apart. Wide spreading, loose horizontal branching with drooping tips. Best in full sun.
<i>Lagerstroemia</i> <i>Indica</i> Crape Myrtle	20'-25'	4,5,6	Slow	Moist soils	Deciduous tree or shrub. Space 12 feet apart. Full sun. Water infrequently but deeply. Drought resistant.

3'-15' CROWN DIAMETER SHRUBS

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	SOIL	REMARKS
<i>Leucophillum</i> <i>Frutescens</i> Texas Ranger	5'-12'	3,4,5,6	Slow	Moist soils	Evergreen shrub. Does well in desert areas, taking any degree of heat and wind. Useful either as round headed gray mass, or clipped edge, or in mixed dry planting.
<i>Ligustrum Japonicum</i> Wax-leaf Privet Japanese Privet	6'-10'	3,4,5,6	Rapid	Wide range of soils. Medium drainage	Broad-leaved evergreen. Upright, wide spreading. Space 5 feet apart.
<i>Ligustrum Lucidum</i> Glossy Privet Tree Ligustrum	15'-20'	3,4,5,6	Rapid	Wide range of soils. Medium drainage	Broad-leaved shrub or small tree. Upright spreading. Sun/part shade. High screen windbreak. Large scale design. Space 6 feet apart.
<i>Nandina Domestica</i> Nandina or Heavenly Bamboo	4'-5'	3,4,5,6	Slow to moderate	Wide range of soils	Broad-leaved evergreen. Upright, multi-stem, compact. Space 2 feet apart.
<i>Nerium Oleander</i> Oleander	10'-12'	3,4,5,6	Rapid	Wide range of soils	Broad-leaved evergreen. Upright, rounded, ascending. Multi-stems. Space 8 feet apart. Sun/part shade. Blooms best in sun.
<i>Olea Europea</i> Olive	18'-25'	3,4,5,6	Slow to Medium	Tolerates all soils if deep & well drained	Evergreen tree. Requires minimum care. Drought tolerant.
<i>Photinia Fraseri</i> Fraser's Photinia	10'-12'	3,4,5,6	Moderate to rapid	Wide range of soils, well drained	Broad-leaved evergreen. Upright oval multi-stem. Space 5 feet apart. <i>Photinia Serrulata</i> has larger leaves.

3'-15' CROWN DIAMETER SHRUBS

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	SOIL	REMARKS
<i>Pittosporum Tobira</i> Pittosporum	8'-10'	3,4,5,6	Moderate to rapid	Wide range medium drainage	Broad-leaved evergreen. Space 6 feet apart. Broad spreading, large shrub, horizontal branching. Varieties - <i>Tobra Nana</i> .
<i>Pyrancaantha Coccinea</i> Scarlet Firethorn <i>Pyrancaantha</i>	15'	All zones	Rapid	Wide range of soils well drained	Broad-leaved evergreen. Upright spreading. Sun/part shade. Massive but light textured. Screening - relates well to slopes. Space 8 feet apart.
<i>Raphiolepis Indica</i> Indian Hawthorn	3'-4'	4,5,6	Slow	Medium drainage	Broad-leaved evergreen. Spreading, mounding, irregular, dense. Space 3 ft apart. Good for patio, terrace, espalier - downtown.
<i>Yucca Aloifolia</i> Spanish Bayonet	8'-10'	3,4,5,6	Moderate	Wide range low fertility & moisture - Well drained soils	Native evergreen. Erect, stiff. Tolerates intense heat and drought. Sun/part shade. Space 3 feet apart. Sculptural form. Year around accent plant. Dry arid soils.
<i>Yucca Filamentosa</i> Adam's Needle <i>Yucca</i>	3'-4'	All zones	Moderate	Wide range well drained	Native evergreen. Mounding, stemless, whirl of leaves. Rosette of gray-green foliage. Accent downtown paved areas. Space 3 feet apart.

15'-20' CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Acer Capillipes</i> Maple	25'	1,2,5,6	Moderate	Shallow	Moist, well drained	Deciduous. Needs water. Ample deep watering and periodic feeding will help keep roots down.
<i>Cercis Occidentalis</i> Western Redwood Palo Verde	20'	1,2,3,4, 5,6	Moderate	Medium	Moist soils	Deciduous. Excellent for dry seldom watered banks. Resistant to oak root fungus. Useful for street tree use.
<i>Maytenus Boaria</i> Mayten Tree	30'	5,6	Slow to moderate	Deep	Most soils well drained moist	Evergreen, weeping habit. Good lawn tree. Roots not invasive. Will take some drought when established.
<i>Pyrus Kawakamii</i> Evergreen Pear	30'	4,5,6	Moderate	Medium to deep	Most soils drained	Semi-evergreen. Tolerant of many soils. Easy to grow wherever it does not freeze. Fire blight.
<i>Rhus Lancea</i> African Sumac	25'	4,5,6	Slow	Medium	Most soils drained	Evergreen tree, popular tree in desert areas. Useful for screen, clipped edge or background plantings. Drought and heat resistant.

15'-20' CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Juniperus Virginiana</i> Eastern Red Cedar	30'-40'	All zones	Slow		Most soils	Conical dark green tree becoming reddish in cold weather. Space 15 feet apart. Drought resistant.
<i>Vitex</i> Chaste Tree	6'-25'	3,4,5,6	Slow in cold, fast in warmer areas		Most soils acid or alkaline	Deciduous and evergreen shrub or tree. Resistant to oak root fungus. Good summer flower color in shrub border. Trained high makes good small shade tree. Drought tolerant.
<i>Prunus Blireiana</i> Flowering Plum	25'	1,2,3,5,6	Moderate	Medium	Most soils	Deciduous. Purple leaves. Aphids. Fruit none or very few.
<i>Prunus C. Thundercloud</i> Flowering Plum	20'	1,2,3,4,5,6	Moderate	Medium	Most soils	Deciduous. Dark purple. Coppery leaves. Aphids.
<i>Prunus Serrulata</i> Japanese Flowering Cherry	20'-30'	1,2,5,6	Slow		Fast draining, aerated soil	Many varieties, "Amanagawa", "Beni-Hoshi", "Kwanzan". Moderate watering, ornamental tree. Good tree to garden under.

20'-25' CROWN DIAMETER TREE

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Carpinus Betulus</i> European Hornbeam	40'	5,6	Moderate	Medium	Most soils	Deciduous. Relatively small shade tree. Can be clipped into hedge or screen. Good street tree.
<i>Eucalyptus Sideroxylon</i> Red Iron Bark or Pink Iron Bark	20'-80'	3,4,5,6	Fast		Most soils	Evergreen. Use singly as screen or as street or highway tree. Wide variation in individuals. Dense, slender or squatly, weeping or upright. Tolerates wind, desert atmosphere, smog. Very successful in landscaping near buildings, in lawns, parks, and street tree planting.
<i>Eucalyptus Polyanthemos</i> Silver Dollar Gum	20'-60'	3,4,5,6	Fairly fast	Medium to deep	Most soil	Evergreen. Popular landscaping street tree. Grows almost anywhere. Not good in wet places.
<i>Eucalyptus Leucoxyton</i> White Iron Bark or Leucoxyton Rosea	20'-80'	3,4,5,6	Fast	Medium to deep	Most soils	Evergreen. Moderate sized tree that tolerates many adverse conditions including heavy soil, light rocky soil, heat, wind. Variable tree, usually slender, upright open with pendulous branches.
<i>Geijera Parvifolia</i> Australian Willow	30'	4,5,6	Moderate	Deep, noninvasive roots	Well drained	Evergreen, drought tolerant. Quite pest free. Full sun. Established tree resists drought but responds to ample water with faster growth. Casts light shade. Street tree.

20'-25' CROWN DIAMETER TREE

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Laurus Nobilis</i> Sweet Bay Grecian Laurel	40'	5,6	Slow	Deep	Moist sandy well drained	Evergreen tree. Good background screen, small tree. A classic for- mal container plant. Requires little water when established.
<i>Malus</i> ssp. Flowering Crabapple	15'-20'	3,5,6			Well drained	Deciduous tree. Space 15 feet apart. Flowering crabapple are the most useful and least troublesome of flowering trees. Good lawn, drive- way and walkway trees.
<i>Melia Azedarach</i> Chinaberry	30'-35'	3,4,5,6	Rapid		Most soils	Deciduous tree. Space 20 ft apart. Tolerates drought and extreme heat. Sun/part shade. Umbrella shaped. Lilac flowers.
<i>Melia A. Umbraculiformis</i> Texas Umbrella Tree	30'	3,5,6	Rapid		Most soils	Deciduous. A variety of <i>Melia</i> <i>Azedarach</i> . Shorter form. Dense, spreading dome shaped crown and drooping leaves. Dense shade in dry climate.
<i>Prunus Ceracifera</i> "Atropurpurea" (<i>P. Pissardii</i>) Purple Leaf Plum	30'	1,2,3, 4,5,6	Fast	Medium	Most soils	Deciduous purple leaves. Medium size flowering tree for lawn, patio, terrace, or small tree.
<i>Zizyphus Jujuba</i> Jujube - Chinese Date	30'	3,4,5,6	Moderate	Deep	Deep moist	Deciduous, drought tolerant . Saline and alkaline soils. Thrives in lawns. Handsome and durable plant that is used for park, open space, and specimen plant.

25'-30' CROWN DIAMETER TREE

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Alnus Cordata</i> Italian Alder	40'	5,6	Rapid	Shallow invasive	Wet boggy	Deciduous. Roots more restrained than <i>Alnus Rhombifolia</i> . Least troublesome if deep watering practices are followed.
<i>Alnus Glutinosa</i> Black Alder	50'	5,6	Moderate	Shallow invasive	Wet boggy	Deciduous, makes dense mass. Good for screen.
<i>Ceratonia Siliqua</i> Carob Tree	40'	4,5,6	Moderate	Surface to shallow	Most soils	Evergreen. Use male tree only. Not good as street tree because roots will break sidewalks.
<i>Eucalyptus Nicholii</i> Willow Leafed	40'	3,4,5,6	Fast	Shallow invasive	Light drained	Evergreen. Drought tolerant . Thin top to prevent toppling. Garden or street tree. Spreading crown.
<i>Fraxinus Velutina</i> Arizona Ash	50'	3,4,5,6	Fast		Most soils dry condi- tions	Deciduous. Tree withstands hot, and cold to about -10° F. Pyramidal when young, spreading, more open when mature. Shade tree, lawn tree.
<i>Fraxinus Velutina</i> Modesto Ash	50'	2,3,4, 5,6	Fairly fast		Most soils	Deciduous. Leaves turn bright yellow in fall. Resistant to oak root fungus.
<i>Fraxinus Ornus</i> Raywood	30'	2,3,4, 5,6	Fast		Most soils	Deciduous trees. Compact, round- headed. Produce no seeds. Purple red fall color. Good as street tree, shade tree.

25'-30' CROWN DIAMETER TREE

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Jacaranda</i> <i>Mimosifolia</i>	40'	4,5,6	Moderate	Deep	Most soils	Deciduous to semi-evergreen tree. Resistant to oak root fungus.
<i>Koelreuteria</i> <i>Paniculata</i> Golden Raintree	35'	1,2,3, 4,5,6	Slow to moderate	Deep	Most soils drained	Deciduous. Takes drought , cold, heat, wind, alkaline soils. Valuable as street tree, lawn. Space 20 feet apart.
<i>Liquidambar</i> <i>Styraciflua</i> American Sweet Gum	40'-60'	1,2,5,6	Moderate	Shallow surface	Deep moist	Deciduous. Good street trees. Surface roots can be a nuisance in lawn and parking strips, and can break pavement. Litter, burrs, cork, twigs. Site clearance problem.
<i>Morus Alba</i> White Mulberry Silkworm Mulberry	30'-40'	All zones	Rapid	Heavy surface roots	Wide range	Deciduous tree. Excellent desert shade. Broad spreading, round top. Drought resistant. Varieties: Fruitless chaparral, Pendula. Grows faster with watering.
<i>Nyssa Sylvatica</i> Tupelo or Sour Gum	60'	5,6	Moderate	Deep	Most soils wet	Deciduous. Takes much or little water. Tolerates poor drainage. One of the best trees for fall color.
<i>Pinus Brutia</i> Calabrian Pine	30'-80'	3,4,5	Rapid	Deep	Most soils	Thrives in heat, drought, wind, indifferent soil. Dense, close to classic pine tree shape. Related to <i>Pinus Halepensis</i> . Can't take below 0° F.
<i>Pinus Canariensis</i> Canary Is. Pine	60'-80'	5,6	Rapid	Deep	Poor, sandy	Evergreen, conifer. Blue green needles. Drought tolerant.

25'-30' CROWN DIAMETER TREE

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Pinus Densiflora</i> Japanese Red Pine	80'	5,6	Rapid	Deep	Poor, sandy	Evergreen, conifer. Will not tolerate hot, dry, or cold wind.
<i>Pinus Eiderica</i> Mondell Pine	80'	All zones	Fast	Deep	Most soils dry	Evergreen, conifer. One of the best desert pines. Thrives in heat, drought , wind, indifferent soil.
<i>Pinus Halepensis</i> Aleppo Pine	60'	All zones	Rapid	Deep	Most dry	Evergreen, conifer. Semi-hardy. Thrives in desert heat, drought , and wind, good at seashore. Useful in poor soils and difficult arid desert climate.
<i>Pinus Ponderosa</i> Ponderosa Pine	50'	All zones	Moderate Deep	Deep	Most soils	Evergreen, conifer, drought tolerant. Very hardy, but not good in desert heat and wind. Site clearance problem.
<i>Pinus Sylvestris</i> Scotch Pine	70'	5,6	Moderate	Deep	Poor sandy	Evergreen conifer. Very hardy. Not for desert areas. Wind resistant.
<i>Pinus Thumbergiana</i> Japanese Black Pine	80'	All zones	Moderate	Deep	Any soil	Evergreen conifer. Needs watering in desert areas.
<i>Pyrus Calleryana</i> Bradford Pear	30'-40'	1,2,5,6	Moderate to fast	Deep	Most soils moist	Deciduous. Resist fireblight, wind damage. Grows well in most soils. Ornamental and shade. Space 20 feet apart.

25'-30' CROWN DIAMETER TREE

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Populus Alba</i> White Poplar	40'-60'	All zones		Invasive	Wide range	Deciduous trees. Low maintenance. Not for city streets, lawn or small garden. Good tree for desert. Good for windbreak.
<i>Prunus Cerasifera</i> Cherry Plum (Flowering Plum) Myrobalan	20'-30'	2,3,4, 5,6			Most soils	Leaves dark green. Good for lawn, patio, or terrace.
<i>Prunus Serrulata</i> Japanese Flowering Cherry	20'-25'	2,5,6			Fast draining, well aerated soils	Full sun. Drought tolerant but best with moderate watering during summer.
<i>Prunus Yedoensis</i> Yoshino-Flowering Cherry	40'	2,5,6	Rapid			Space 20 feet apart. Good shade tree.
<i>Quercus Palustris</i> Pin Oak	50'-80'	All zones	Rapid	Shallow fibrous	Rich, most drained	Deciduous. No alkali soil. Brown leaves hang on during winter. Good tree for lawns.
<i>Sequoia Sempervirens</i> Coast Redwood	90'	5,6	Rapid	Shallow	Deep moist	Evergreen conifer. Fine landscaping tree. Resistant to oak root fungus. Needs water.

30'-40' OR GREATER CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Acacia Baileyana</i> Baily Acacia (Often called Mimosa as cut flowers)	20'-30'	4,5,6	Rapid		Most soils	Evergreen. Most commonly planted and one of the hardiest. Good for banks when grown as multi-trunked tree shrub.
<i>Ailanthus Altissima</i> <i>Erythrocarpa</i> Tree of Heaven	50'		Very rapid		Tolerant of any soil	Excellent for city and shore planting. Very stark winter silhouette.
<i>Brachychitum Populneus</i>	30'-50'	4,5,6	Moderate			Evergreen. Drought tolerant. Good for desert environment. Use a screen or high, wide wind breaks. Susceptible to Texas root rot.
<i>Calocedrus Decurrens</i> Incense Cedar	50'-90'	1,2,3, 5,6	Slow	Deep lateral	Most soils poor	Evergreen. Drought tolerant. Foliage is aromatic. Good to make green wall, high screen wind break.
<i>Casuarina Cunninghamiana</i>	70'	4,5,6			Most soils	Evergreen, tolerates many tough conditions, dry or wet soil, salinity, heat, wind. Useful in desert areas.
<i>Cedrus Deodora</i> Deodar Cedar	40'-50'	1,2,3, 5,6	Fast	Deep	Well drained	Evergreen. Prefers sun, heat, and periodic watering. Does well in Western Riverside County. Good for parks. Space 30 feet apart.

30'-40' OR GREATER CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Celtis Australis</i> European Hackberry	80'	3,4,5,6	Moderate	Deep	Most soils	Deciduous, when established will take desert heat, wind, much drought , and alkaline soil. Street or lawn tree. Good in windy places.
<i>Celtis Occidentalis</i> Chinese Hackberry or Common Hackberry	60'	All zones	Moderate	Medium to deep	Most soils	Deciduous, resistant to oak root fungus.
<i>Cinnamomum Camphora</i> Camphor Tree	50'	4,5,6	Slow	Surface to shallow competitive root system	Most soils	Evergreen, root problems. Turns yellow-green in winter, prone to verticillium wilt. Thrive in hot summer areas.
<i>Eucalyptus Camaldulensis</i> Red Gum (<i>E. Rostrata</i>)	80'-120'	3,4,5,6	Fast		All soils	Evergreen, mighty Eucalyptus for highways, broad streets, parks, skylines. Grows in lawns. Good in valleys and deserts. Spreading crown, gracefully weeping branches.
<i>Eucalyptus Citriodora</i> Lemon-Scented Gum	75'	3,4,5,6	Fast		All soils	Evergreen, graceful tree, slender tall. Designer's tree. Can grow close to wall, walks. Roots don't heave. Tolerates much or little water.
<i>Eucalyptus Rudis</i> Desert Gum Swamp Gum	60'	3,4,5,6	Fast		All soils	Evergreen, good, large shade tree. Street tree. Tolerates desert, valleys, beach.

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30'-40' OR GREATER CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Eucalyptus Rudis</i> Red Gum Eucalyptus	60'-80'	3,4,5,6	Fast		All soils	Evergreen, good, large shade tree, street tree. Tolerates desert, valleys, beach, windy places. Much or little water (but best w/irrigation). Any soil, including saline.
<i>Fraxinus Moraine</i> Moraine Ash	40'	3,4,5,6	Moderate to fast	Shallow	Most soils	Deciduous, prone to insect and disease damage. Tolerates hot summers, cold winters. Street trees, shade trees, lawn trees, patio shelter trees.
<i>Fraxinus Raywoodi</i> Raywood Ash	35'	4,5,6	Fast	Medium	Most soils	Deciduous, prone to insect and disease damage. Purple-red fall color.
<i>Fraxinus Uhdei</i> Evergreen Ash	70'	4,5,6	Fast	Medium	Most soils deep drained	Evergreen, prone to insect and disease damage.
<i>Ginkgo Biloba</i> Maidenhair Tree	50'	1,2,5,6	Slow	Deep	Most soils	Deciduous, "Autumn Gold", good fall color. Space 25 ft apart.
<i>Liriodendron Tulipifera</i> Tulip Tree	60'-80'	1,2,5,6	Moderate	Deep spreading	Deep moist drained	Deciduous, unusual lyre shaped leaves turn yellow in fall. Has scale, aphids. Good large shade roadside lawn, one of the best deciduous trees of Southern Calif. Space 40 feet apart.

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30'-40' OR GREATER CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Magnolia Grandiflora</i> Southern Magnolia	60'	3,5,6	Slow	Deep	Deep moist	Evergreen, does well in desert heat if out of wind.
<i>Pistache Chinensis</i> Chinese Pistache	60'	3,4	Slow	Deep	Most soils	Deciduous. Street tree or lawn, patio or garden corner planting.
<i>Plantanus Acerifolia</i> London Planetree	40'-80'	1,2,3, 4,5,6	Rapid	Shallow spreading	Most soils	Deciduous. Stand up beautifully under city smog, soot, dust, reflect heat. Good street, park or lawn tree. Used in lines and blocks for formal planting avenues, screens, masses. Red Spider, Powdery Mildew, Anthracnose.
<i>Platanus Racemosa</i> California Sycamore	50'-100'					
<i>Quercus Agrifolia</i> Coast Live Oak	70'	5,6	Moderate	Deep	Most dry or moist	Most common in California. Uses include street trees, park, individual specimen and mass planting. Has caterpillars in Spring.
<i>Quercus Coccinea</i> Scarlet Oak	60'-80'	All zones	Rapid	Deep spreading	Dry, rocky sandy	Deciduous. Good street or lawn tree. Fine to garden under.

30'-40' OR GREATER CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Quercus Ilex</i> Holly Oak	40'-70'	3,4,5,6	Moderate	Deep	Most soils	Evergreen. Tolerates wind, good street or lawn tree. Has caterpillars. Takes pruning.
<i>Quercus Lobata</i> Valley Oak	70'	1,2,3, 4,5,6	Moderate	Deep	Deep	Deciduous. California's mightiest oak with equal spread. Extremely good shade tree. Has oak balls.
<i>Quercus Rubra</i> Red Oak	50'	3,5,6	Fast	Deep	Deep moist	Deciduous tree. Good tree for big lawn, park, avenues. The best of oaks for city conditions , clean, handsome, upright. Turns brilliant red in the Fall.
<i>Quercus Suber</i> Cork Oak	70'-100'	3,4,5,6	Moderate	Deep	Most drained	Evergreen. Takes considerable drought. One of the best oaks for the desert.
<i>Quercus Virginiana</i> Southern Live Oak	40'-50'	3,4,5,6	Moderate to rapid	Deep	Most soils moist	Evergreen. In hot interior is most attractive of all evergreen oaks. Best oak for lawn planting in low desert.
<i>Robinia Pseudoacacia</i> Black Locust	30'	All zones	Rapid	Aggressive	Most soils	Deciduous. Very drought tolerant. Trees difficult to prune out where not wanted. Space 15 feet apart.
<i>Sapinum Sebiferum</i> Chinese Tallow Tree	35'	5,6	Moderate	Medium	Most soils mildly acid	Good lawn or street tree, patio or terrace shade. Good for screening. Give moderate shade. Resistant to oak root fungus.

30'-40' OR GREATER CROWN DIAMETER TREES

BOTANICAL NAME COMMON NAME	HEIGHT	ZONE	GROWTH	ROOTS	SOIL	REMARKS
<i>Schinus Molle</i> California Pepper Tree	40'	4,5,6	Rapid invasive	Shallow	Most soils	Evergreen. Tolerates drought. Don't plant between sidewalk and curb, near house foundations, patio paving or entrances, lawn sewer or rain. Do plant them along highway, rustic street without curb.
<i>Tilia Americana</i> American Linden	40'-60'	1,2,3,4	Rapid	Deep	Fertile moist	Deciduous. Street tree and park tree.
<i>Tilia Cordata</i> European Little Leaf Linden	40'-50'	1,2,3,4	Slow to moderate		Most soils	Not tolerant of drought. Small lawn area. Very fragrant. Space 30 feet apart.
<i>Ulmus Parvifolia</i> Chinese Elm	50'-60'	5,6	Rapid	Medium	Most soils	Evergreen. Deciduous. With pruning useful for street tree. This tree has 50 to 70 foot spread. Good for shade. Space 40 feet apart.
<i>Ulmus Pumila</i> Siberian Elm	50'	All Zones	Rapid	Shallow invasive	All soils	Deciduous. Endures cold, heat, drought and poor soil. Suitable for windbreaks or shelter beds. Root system troublesome in gardens. Hold soil against erosive wind.
<i>Umbellularia California</i> California Bay California Laurel	70'	5,6	Rapid	Medium	Most moist	Evergreen. Drought tolerant. Always neat. Good for screening, background planting or tall edges. Often multi-trunked. Good patio or street tree when thinned to one or fewer trunks.
<i>Zelkova Serrata</i> Sowleaf Zelkova	50'-60'	2,3,4, 5,6	Rapid to moderate	Shallow surface	Well drained	Deciduous tree. Good shade tree. Susceptible to Dutch Elm Disease. Can be top heavy, requires pruning. Drought resistant. Quick dense shade, pest free. Space 40 feet apart.

TREES FOR FAST SHADE IN DRY CLIMATES

The following list includes only a sampling of fast growing trees for shade.

E = Evergreen

D = Deciduous

Name	Height	Spread of Crown
<i>Acacia farnesiana</i> (E)	15 to 20 feet	15'-25'
<i>Casuarina species</i> (E)	20 to 80 feet	30'-40'
<i>Celtis reticulata</i> (D)	25 to 30 feet	25'-30'
<i>Eucalyptus microtheca</i> (E)	to 40 feet	30'-40'
<i>Fraxinus velutina</i> (D)	30 to 50 feet	20'-30'
<i>Grevillea robusta</i> (E)	to 60 feet	30'-40'
<i>Morus alba</i> (D)	to 40 feet	25'-30'
<i>Pinus halepensis</i> (E)	30 to 50 feet	25'-30'
<i>Prosopis species</i> (E)	25 to 30 feet	40'
<i>Rhus lancea</i> (E)	15 to 20 feet	15'-20'
<i>Ulmus pumila</i> (D)	to 50 feet	40'-50'

ALTERNATIVES TO NERIUM OLEANDER

The following is a list of drought tolerant plants or shrubs that can be used as a substitute for Nerium Oleander. We are not advocating to do away completely with Nerium Oleander; however, some discretion should be used when reviewing landscaping plans due to the fact that this plant is poisonous.

Oleander should never be allowed on residential developments, parks, lakes or any recreational areas, and only occasionally in some industrial and commercial areas.

If a planner is considering recommending approval of landscaping plans that proposes Oleanders as part of the landscaping plans for industrial or commercial projects, be sure to include different varieties of Oleander such as Sister Agnes, Rosy Red, Mr. Roeding, or compact varieties such as Petite Pink or Petite Salmon or dwarf varieties.

1. **Arizona Cypress** (*Cupressus Glabra*). Best in high desert and hot interiors. Good for wind break, tall screen. Unusually drought resistant when established. Up to 40 feet high, spreading 20 feet.
2. **Chinese Photinia** (*Photinia Serrulata*). Evergreen. Grows up to 35 feet. New growth bright copper, scattered crimson leaves in fall, winter. It is more hardy than Photinia Fraseri. Useful as background or screen plant. Subject to Texas root rot and mildew.
3. (*Euonymus Kiautschovica*). Evergreen. Spreading shrub to nine feet tall. Good for hedge and screen. Takes desert conditions if watered.
4. **Glossy Privet** (*Ligustrum Lucidum*). Evergreen. Grows up to 30-40 feet. Fast growing. Somewhat drought resistant. Useful as windbreak.
5. **Heavenly Bamboo** (*Nandina Domestica*). Evergreen or semi-deciduous. Use as screen and hedge. Slow to moderate growth to six to eight feet. Resistant to oak root fungus.
6. (*Pittosporum Eugenioides*). Excellent hedge plant or free standing shade tree. Up to 40 feet high. Good for hedge and screen. Another similar shrub to P. Eugenioides is P. Tenuifolium (P. Nigricans).
7. **Purple Hop Bush, Hopseed Bush** (*Dodonaea viscosa*). Fast growing. Can be pruned as hedge or espalier or planted six to eight feet apart and left established but will also take ample water.
8. (*Photinia Fraseri*). Evergreen. Up to 10 feet tall. Use as screen, background. Good espalier. Subject to Texas root rot.
9. **Sumac** (*Rhus Lancea*). Evergreen or deciduous shrub or tree. Needs some water. Low growing, up to 25 feet. Popular tree in desert. Takes high summer heat. Drought resistant. Useful for screens, clipped hedges, or background plantings. Subject to Texas root rot especially in desert areas of Palm Springs, Indio and Blythe.
10. **Tobira** (*Pittosporum Tobira*). Evergreen shrub or tree, 6 to 15 feet tall. Good for screen. Not good for hedges. Foliage clean looking, dense. Fairly drought resistant. All Pittosporum varieties are susceptible to scale insects and aphids.

DROUGHT TOLERANT GARDENS

- 1.) Rancho Santa Ana Botanic Garden, 1500 North College Avenue, Claremont.
- 2.) University of California Botanic Garden, University of California, Riverside.
- 3.) El Modena High School Xeriscape Garden, Esplanade Street, Orange.
- 4.) Irvine Ranch Water District Water Conservation Garden, San Joaquin Road, Irvine.
- 5.) South Coast Field Station, U.C. Cooperative Extension, Anaheim.
- 6.) Desert Water Agency, 1200 South Bogie Road, Palm Springs.

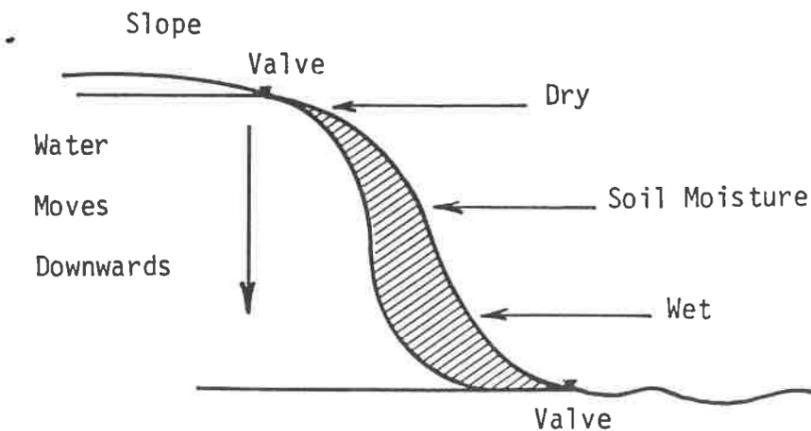
LANDSCAPING DESIGN REVIEW

When reviewing a landscaping plan in addition to all the requirements indicated in Section 18.12, Parking and Landscaping, the following items need special consideration:

Sun Exposure: North and east side of buildings tend to be cooler and wetter than the south and west sides. The west and south sides of buildings receive the greatest amount of sun exposure in the northern hemisphere. On the west or south side, a deciduous tree (a tree that drops its leaves in winter) can provide shade in the summer yet allow extra sun in winter. This is important also when planting drought tolerant plants and regular plants that need water. A drought tolerant plant will do well on the west and south sides of a building while a plant with a high water requirement will do well on the east and north sides of a building with morning sun and afternoon shade.

Group Planting: There are four main landscaping plant material groups: Trees, shrubs, ground covers and turf areas. Turf areas have the highest water requirements, so the less turf area the more water savings. Turf areas are appropriate for children's play areas in rear or back yards. Front and side yards can be a combination of trees, shrubs, ground covers and "hardscape" (structural - non-plant items such as rocks, brick, fountains, etc.). A good landscaping plan shows consideration for soil, water and sun exposure. Plants should be grouped according to their needs and placed where those needs are met. A cactus does not grow well with ferns, and most ferns do not grow well in full sun. For more information about group planting, please see page five of this Manual.

Slope Planting: When landscaping on a slope, the water from irrigation tends by gravity to move downwards. The soil at the top of the slope is more exposed to climatic elements such as wind and sun and dries faster than the soil at the bottom of the slope.



To compensate it is important that the top of the slope is watered adequately. Where there is a small slope, for example five feet in height, only one system may be necessary, placed at the top of the slope where the water will move by capillary action to the bottom of the slope. To achieve adequate water "coverage" over a larger slope with a greater elevation change, two systems connected directly to the pressure mainline or more should be used at the top and toe of slope and in between, if necessary.

Static water pressure is the pressure of water when it is not moving. Landscaping plans need to provide the static water pressure to insure that proper water pressure will be available for irrigation.

As a rule of thumb, the static water pressure should be twice that of the operational pressure of the irrigation heads used. To compensate for too much or too little pressure, reducers or boosters should be used. When in doubt, request from the irrigation designer his computed pressure calculations to verify adequacy of the design.

Controllers: The controller is a timing mechanism and its mounting box. The controller signals the automatic valves to open and close in a preset program. There are three types of program flexibility in controllers: single program, multi-schedule program and individual station programmable from least to most flexible. A single program controller may be appropriate in a small project where similar conditions exist throughout such as a south facing backyard slope of gazanias, where plant materials have similar water needs and the same sun exposure. Generally there is much more variation in a site, with more systems which have different types of planting material and exposures, and therefore many needs. A multi-schedule controller is necessary for these situations. Individual station programmable controllers are a more recent development which can allow each system its own schedule, allowing even more flexibility than provided by the two or three schedules available on the multi-schedule controllers.

The flexibility of the controller is important because of the variety of watering needs due to sun exposure, seasonal variation, and individual plants' watering needs. For example, turf areas have a high water need and require daily watering for about three minutes. A group planting of Lampranthus or Ice Plant, Pittosporum and Rosmarinus may need to be irrigated three times a week for three minutes once established, that is, when plants are more than two years old. A group of mature drought tolerant trees may need to be irrigated once a week for six minutes. The single controller will not adapt to these multi-schedule programs while the multi-schedule controller does.

GUIDE FOR PROTECTING EXISTING TREES

1. Protect trees with fencing and armoring during the entire construction period. The fence should enclose an area 10 feet square with the tree at the center.
2. Avoid compaction of the soil around existing trees due to heavy equipment. Do not pile dirt or other materials beneath the crown of the tree.
3. Keep fires or other sources of extreme heat well clear of existing trees.
4. Repair damaged roots and branches immediately. Exposed roots should be covered with topsoil. Severed limbs and roots should be painted. Whenever roots are destroyed, a proportional amount of branches must be pruned so the tree doesn't transpire more water than it takes in. Injured trees must be thoroughly watered during the ensuing growing year.
5. Prune all existing trees that will be surrounded by paving to prevent dehydration.

GUIDE FOR PLANTING TREES

All trees must receive a certain degree of care, especially during and immediately after planting. To protect an investment in new trees, the developer should ensure that the following guidelines are followed when planting:

1. The best times for planting are early spring and early fall. Trees planted in the summer run the risk of dehydration.
2. Plant all trees at least three and one-half feet from the end of head-in parking spaces to prevent damage from car overhangs.
2. Dig the tree pit at least one foot wide than the root ball and at least six inches deeper than the ball's vertical dimension.
4. Especially in areas where construction activity has compacted the soil, the bottom of the pit should be scarified or loosened with a pick axe or shovel.
5. After the pit is dug, observe subsurface drainage conditions. Where poor drainage exists, the tree pit should be dug at least an additional 12 inches and the bottom should be filled with coarse gravel.
6. Backfill should include a proper mix of soil, peat moss, and nutrients. All roots must be completely covered. Backfill should be thoroughly watered as it is placed around the roots.
7. Immediately after it is planted, the tree should be supported with stakes and guy wires to hold it firmly in place as its root system begins to develop. Staked trees will become stronger more quickly. Remove stakes and ties after one year.
8. Spread at least three inches of mulch over the entire excavation in order to retain moisture and keep down weeds. An additional three-inch saucer of mulch should be provided to form a basin around the trunk of the tree. This saucer helps catch and retain moisture.
9. The lower trunk of new trees should be wrapped with burlap or paper to prevent evaporation and sun scald. The wrapping should remain on the tree for at least one year.
10. Conscientious postplanting care, especially watering, pruning and fertilizing, is a must for street and parking lot trees. Branches of new trees may be reduced by as much as a third to prevent excessive evaporation.

SLOPE GUIDELINES

by Bob Perry

Summarized below are a series of recommendations for planting on slopes. The goal of these efforts is to optimize soil coverage and slope stabilization. In addition, a healthy mix of plants for viable and aesthetic character is intended.

1. *Plant Sizes:* Use of small plant sizes (seeds, liners and one gallon) often produces best growth and adaptation. Root development is often more vigorous and acclimation to exposure and soil conditions is more quickly determined. Root development on larger specimen trees can be very slow, causing plants to be unstable and dependent on frequent watering programs.
2. *Plant Variety:* Any slope planting effort has better hope for success if plant diversity is practiced. By varying ground covers, shrubs and trees, plant performance can give and take with the site conditions. Problems with pest and disease are often limited or restricted to only part of the plant palette. A more balanced and flexible plant association is the desired outcome.
3. *Plant Form:* The use of spreading shrubs and trees is encouraged as a means to improve slope stabilization results. While slopes must be engineered and constructed correctly, plants with broad spreading branch structures will offer high levels of soil protection from excessive irrigation or rainfall. Spreading plants will also lead to reduced long term weed abatement needs. A recommended concept is to achieve 60 percent (60%) soil coverage through spreading trees and shrubs. Low ground covers should be limited to a smaller percentage of the soil area.

The most successful ground covers are often the types which intertwine and have a vine-like habit. Mixing ground cover species is also encouraged for better flexibility and performance under varying site conditions and different seasons of the year.
4. *Natural Spacing:* The placement of plants in natural or random spacing patterns often contends best with varying site conditions, plant die out, and plant maturity. Regimented plant placement looks artificial and unnatural. Location of larger and denser plantings at the lower portions of slopes takes advantage of greater moisture availability.
5. *Deep Irrigation:* During plant establishment and long term survival, deep irrigation practices are encouraged. Time clocks should be set to apply numerous short applications of water during each watering cycle. Runoff is reduced and percolation increased. Deeper root development is encouraged, and less soil erosion occurs. The soil surface should be allowed to dry out between watering cycles to discourage surface root development.

LANDSCAPING FOR FIRE PROTECTION

Development in Southern California's brush covered foothills has increased dramatically in recent years, and undoubtedly this trend will continue. Where the terrain is relatively flat and open, development usually presents no great problem. However, when development is surrounded by steep brush covered slopes, this situation has all too often resulted in loss of life and property through wildfire and the after effects of flooding and mudslides.

To reside in a wildland area with relative safety requires certain environmental accommodations. Residents must come to understand that these hazards are part of the foothill's nature, and with this understanding, take the appropriate steps to provide protection for themselves and their property.

For a homeowner in a wildland setting, management of the vegetation on and around his property is one of the best means for providing protection against wildfire and erosion. This requires special attention to landscape design, selection of plant species, and overall vegetation maintenance.

One important point must be made before addressing fire protection through proper landscaping. **ALL PLANTS CAN BURN DURING EXTREME FIRE WEATHER CONDITIONS**, specifically, during high temperatures, strong winds, and low relative humidity which are all common during Santa Ana conditions. The labeling of plants as fire retardant or fire resistant is, therefore, somewhat misleading.

The fire resistance of any plant is directly dependent on fuel moisture and the amount of dead fuel available to burn. Generally, a low growing plant has less fuel volume than a taller one and, therefore, making it less likely to encourage the spread of fire. Two key factors are related to low fuel volume: reduction in plant over density, whereby the continuity of any vegetation cover is broken up; and an overall reduction in the amount of plant material available to burn, whereby plants are properly maintained through pruning and removal of flammable dead material.

The first step in proper vegetation management for fire safety has been outlined in numerous State and local fire ordinances. These require removal of all flammable vegetation within a minimum of 30 feet around any structure. Single trees, shrub specimens, and ground cover are allowed if they will not transmit fire to structures. Local authorities may require this safety zone to be widened if the 30 foot clearance is not sufficient, especially in areas surrounded by steep, brush covered slopes. Representatives from your local fire department are available to advise you of the proper clearance requirements.

PLANT SELECTION GUIDELINES AND RECOMMENDATIONS

A major consideration that needs to be addressed when selecting plant species is the compatibility between native and non-native plants, especially when addressing irrigation needs. Generally, native plants, which are commonly called "chaparral" and adapted to Southern California's climate of hot, dry summers and wet, moderate winters, cannot effectively mix with non-native plants that require ample irrigation. Over-watering natives at the wrong time of year, usually during the summer months when many natives are dormant, could result in plant injury or even plant die back. If the special growing conditions are maintained, many of Southern California's native plants can be successfully used in a fire protection landscape.

The following low-growing plant species (ground cover and shrubs) and trees represent only a few of the many plants available for fire protection landscaping. Additional information and assistance can be provided through the California Department of Forestry, County Agricultural Commissioner, and your local fire department.

Low-Growing Plant Species (ground cover and shrubs): Ideally, low-growing plants should be selected for these qualities: (1) low growth habit, (2) drought tolerance, (3) fire resistance, (4) deep rooting characteristics, (5) aesthetically pleasing effect, and (6) compatibility among different plants.

GROUND COVERS

Baccharis Pilularis Prostratus (Dwarf Coyote Bush) - Deep-rooted and good soil binder plant that needs some supplemental irrigation. Grows to 18 inches high. Likes full sun. Flowers are not showy.

Hedera Canariensis (Algerian Ivy) - Widely used ground cover with large glossy leaves, widely spaced on the stem. Once established, grows rapidly and will not carry fire easily if kept clean and well irrigated. It prefers heat and sun but must have water, since the leaves burn in hot weather if allowed to dry out. Plant on 18 to 24 inch squares. Rooted cuttings obtained from nurserymen or from existing plantings will soon spread to cover intervening spaces.

Helianthemum Nummularium (Sunrose) - Grows to 1 foot high and flowers in the spring in several colors. Plants are available in flats and gallon cans.

Mesembryanthemum Spp. (Iceplant). - Not as adaptable for soil erosion control as some other plants because of their limited root systems. Plant weight may also actually cause a bank to slip if the grade is too steep. They are sun-loving, heat and drought tolerant, but will stand little traffic. These plants root easily from pieces taken from

established plantings. They grow well on a hillside if kept moist until a root system develops. In recent fires, they did well as barriers to flame when well irrigated and free from weeds and litter. Some of the best available types suitable for replanting slopes are:

Fig Marigold	Croceum Iceplant
Red Spike Iceplant	Bush Type Iceplant
White Iceplant	Purple Iceplant
Rose Iceplant	Trailing Iceplant
Yellow Iceplant	Redondo Creeper

Osteospermum Fruticosum (African Creeping Daisy) - Good hardy cover for banks and erosion control. It has a vigorous trailing growth habit and attractive light green foliage the year round. Plants grow 12 to 18 inches high and bloom profusely in early spring with rose-lavender daisy flowers about two inches in diameter, adapted to the seashore as well as inland valleys. Plants are available through local nurseries.

Rosmarinus Officinalis Prostrata (Creeping Rosemary) - Gives a quick drought resistant cover. Root system not as deep as some other species. Produces blue flowers which are very attractive to bees. Readily available at nurseries.

SHRUBS

Ceanothus Griseus Horizontalis (Carmel Creeper) - Low growing drought resistant evergreen shrub with thick leathery leaves and bright blue flowers in the spring. It is used as individual specimens or in clumps of two or three plants. A single plant will spread 5-15 feet wide, 18-30 inches tall. Most nurseries have it.

Cistus Villosus (Rockrose) - Low spreading evergreen shrub, drought resistant, attractive purple flowers, 3-5 feet tall, equally wide.

Heteromeles Arbutifolia (Toyon, California Holly) - One of the best California natives. This drought resistant plant bears masses of brilliant red berries that remain for many months. It should be used as a large specimen shrub or tree and is available from most nurseries. Fire retardant if kept moist.

Rhamnus Alaternus (Italian Buckthorn) - Large evergreen shrub or small tree with dark green leaves. It bears deep blue berries in the fall and is extremely drought tolerant.

Rhus Integrifolia (Lemonade Berry) - Native shrub that is very drought tolerant once established, generally 3-10 feet high and as wide, rarely tree like to 30 feet. A limited quantity is being produced.

Trees (Conifer and Deciduous) - As a group, conifers, due to high resin content and low fuel moisture found in their "needles" foliage can be considered more flammable when compared with "broadleaf" deciduous trees. However, conifers can still be used for hillside landscaping with relative safety if they are properly irrigated; dead plant material and litter is not allowed to accumulate; they are used as specimen trees; and are not placed adjacent to any structures. If planted a safe distance from a home, both conifers and broadleaf trees can serve an important function during a wildfire. Proper placement, especially down slope from a structure, can serve as a temporary buffer, channelling the heat generated by a wildfire away from a structure and thereby perhaps saving it (assuming, of course, that the flames from the burning trees can be extinguished or controlled before they have the opportunity to ignite nearby structures). Some of the tree species that can be used for hillside landscaping includes:

CONIFERS

<i>Cupressus Forbesii</i> (Forbes Cypress)	<i>Cupressus Glabra</i> (Arizona Cypress)
<i>Cedrus Deodara</i> (Deodar Cedar)	<i>Cupressus Sempervirens</i> (Italian Cypress)
<i>Pinus Canariensis</i> (Canary Island Pine)	<i>Pinus Halepensis</i> (Aleppo Pine)
<i>Pinus Thunbergii</i> (Japanese Black Pine)	<i>Pinus Pinea</i> (Italian Stone Pine)
<i>Pinus Attenuata</i> (Knobcone Pine)	<i>Pinus Coulteri</i> (Coulter Pine)
<i>Juniperus Californica</i> (California Juniper)	<i>Pinus Eldarica</i> (Eldarica Pine)

Note: Providing the heat generated from wildfire does not kill the tree, Canary Island Pines have the ability to resprout new growth after a fire.

DECIDUOUS

Numerous species are acceptable for hillside landscaping provided they are adaptable to the area, receive proper watering and are regularly maintained. Contact your local nursery or State Forester representative for species recommendations that directly apply to local conditions.

Caution: Like the conifers, eucalyptuses are considered highly flammable because of the high content of oils and low moisture found in their leaves. Some eucalyptus shed their bark and build up large amounts of ground litter. ***Eucalyptus Globulus*** (Blue Gum Eucalyptus) is notorious for all of these conditions and should not be used in hillside landscaping. An alternative species for use in landscaping other than eucalyptus is ***Casuarina Cunninghamiana*** (Beefwood).

MAINTENANCE GUIDELINES

To insure long term benefits from a fire protection landscape requires routine maintenance which can be summarized as follows:

1. *Irrigation:* Proper watering is a key to maintaining a healthy and functional landscape, especially when dealing with non-native plant species. Watering must be done in strict accordance with the need and tolerance of the individual plants. Highly drought tolerant plants, especially natives, can be seriously injured or even killed if improperly watered. Over-watering can result in unwanted vegetation growth to occur and encourage the growth of undesirable grasses. Whenever it is determined that watering is required, it should be done to allow deep watering, thus encouraging root growth deep into the soil. Very frequent, light watering should be avoided. It is important to strive for a proper balance with regard to watering.

For both initial establishment and later maintenance, overhead impact sprinklers and drip irrigation systems are recommended. They are easy to install, maintain and inspect. In addressing efficient water usage, drip irrigation is the more effective system to use.

2. *Sanitation:* Landscape sanitation requires that dead and low hanging branches be periodically pruned from trees and shrubs. Ground cover can also generate dead plant material which requires removal, otherwise fire can burn through them although usually not with the same intensity as the larger plants.

Dry needles, leaves, and other debris must not be allowed to accumulate. Such material can ignite from firebrands, burn intensely, and potentially spread fire to adjacent structures and vegetation. Fire spreads more rapidly in dry grass and can support intense fire. Grass should be removed in accordance to local fire ordinances and for protection to the remaining landscape.

3. *Competition Reduction:* As the landscape develops, undesirable grass and shrub species will continually attempt to reinvade the area unless control measures are used. Numerous mechanical and chemical control methods can be used to accomplish this result. Of the available methods, chemical applications (herbicides) have proven to be the least expensive and most effective form of competition control. When properly applied, herbicides will provide selective control that does not physically damage the site and provides a positive effect on the overall condition of the landscape stressed by competing undesirable vegetation.

CAUTION: Improper selection and use of herbicides can result in long term damage to the landscape and impose a serious health hazard to both people and wildlife. Professional advice, such as the County Agricultural Commissioner, should always be sought before any chemical treatment is done to insure compliance with current restrictions and permit requirements.

TREATMENT OF BURNED HILLSIDES

Immediate Erosion Control Measures:

When a wildfire has occurred in a residential hillside area, immediate steps should be taken to insure that erosion is kept to a minimum. The most effective immediate control is the use of materials (sandbags, boards, etc.) that will act as deflectors and help control surface runoff. Numerous methods are able to accomplish this purpose, and if properly used, can be extremely effective. Two erosion control methods that serve this need and are very compatible with planting are listed below:

Jute Matting: Heavy woven jute mesh can be rolled over the slope and fastened to the ground. When properly installed, it will stay in place and will not be lifted by flowing water, wind, or growing vegetation. The one-inch openings between the strands act as "check dams". Regular planting procedures can be followed before laying the jute matting since it will not interfere with establishing a plant cover on the hillside. The material will eventually decompose but remains long enough for the vegetation to become sufficiently established.

Straw Mulch: Straw applied thickly to the soil surface may be substituted for jute matting. Punch the straw in the soil surface at frequent intervals to prevent it from being blown away, or cover with wire mesh. Straw will help hold surface soil and moisture on the hillside.

Erosion Control by Direct Seeding:

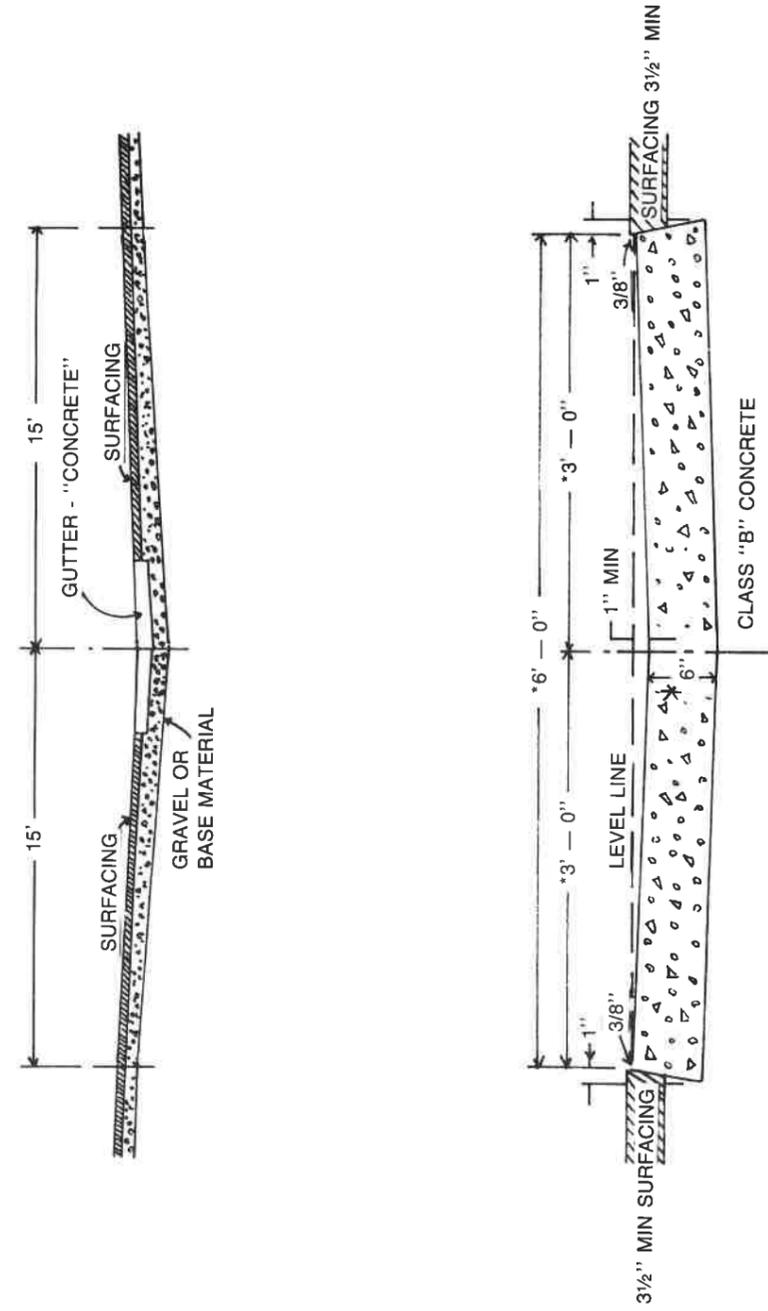
When replanting burned hillsides, one of the first concerns is the establishment of a minimum hazard plant cover that is capable of controlling erosion. Seeding with selected grasses (ryegrass and barley) can help fulfill this need. Before seeding is considered, an evaluation should be made for the presence of native grass seed. Resident grass seed, when present, germinate more quickly, especially when watering occurs.

Annual Ryegrass: When ryegrass is used, the best method is to seed the area by hand at the rate of 15 to 30 pounds per acre, preferable raking the seed into the soil, and then watering the area to encourage rapid growth. Before planting, ryegrass seed should be pretreated (soaked for 24 hours) to insure rapid germination. If the slope is to be planted immediately with landscape plants, ryegrass needs to be seeded in the contours, or it will adversely affect the newly planted vegetation. Ryegrass should be viewed as only a temporary emergency erosion control measure with removal of grasses occurring before they are allowed to naturally reseed the area. Spring and summer annual grass will become dry flash fuels. Perennial ryegrass should not be used as it can become a weedy pest.

Barley: Hand planting of barley seed in contours spaced about three feet apart has proved very effective in minimizing erosion, especially on the steeper slopes. Broadcast seeding is less effective with barley than with ryegrass seed. For seeding barley, recommended rates area about 150 pounds per acre with about an equal amount of diammonium phosphate fertilizer added to the rows during planting. Barley seed is readily available from local feed stores. However, care should be taken to order only recleaned barley as rolled barley (used for feed) will not germinate. Barley should be cut before it goes to seed in the spring. Barley is an annual plant and becomes a flashy fuel after it dies in the late spring or early summer.

CONCRETE RIBBON GUTTER

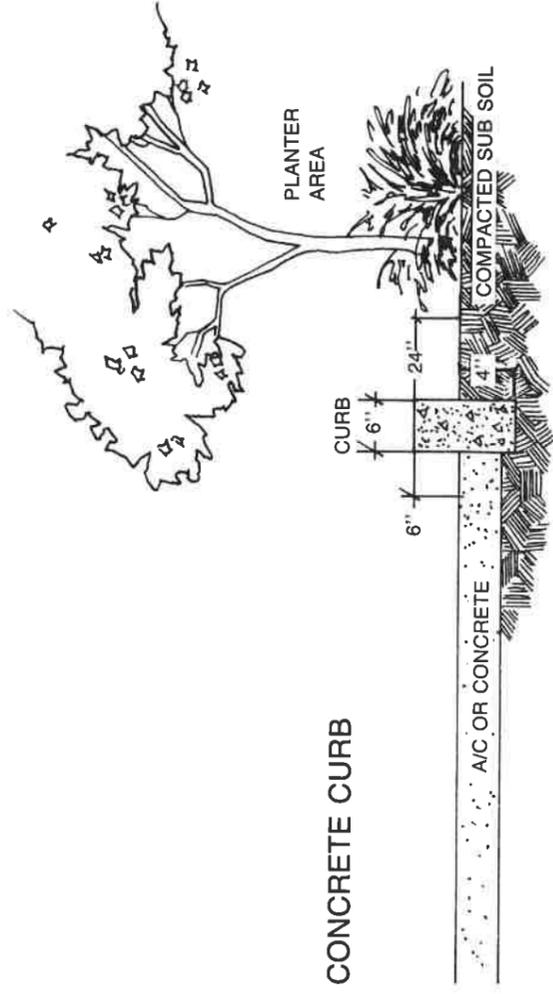
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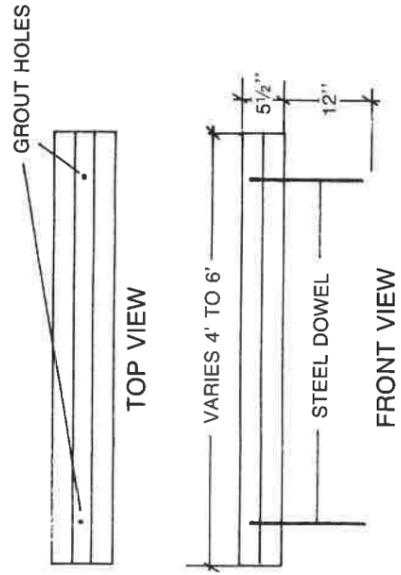
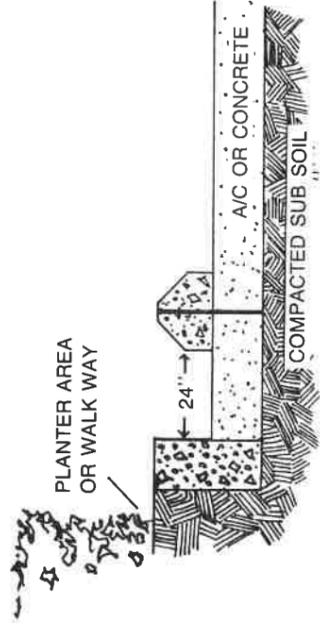
*Unless otherwise specified by the Road Commissioner

CONCRETE CURBS, AND WHEEL STOPS

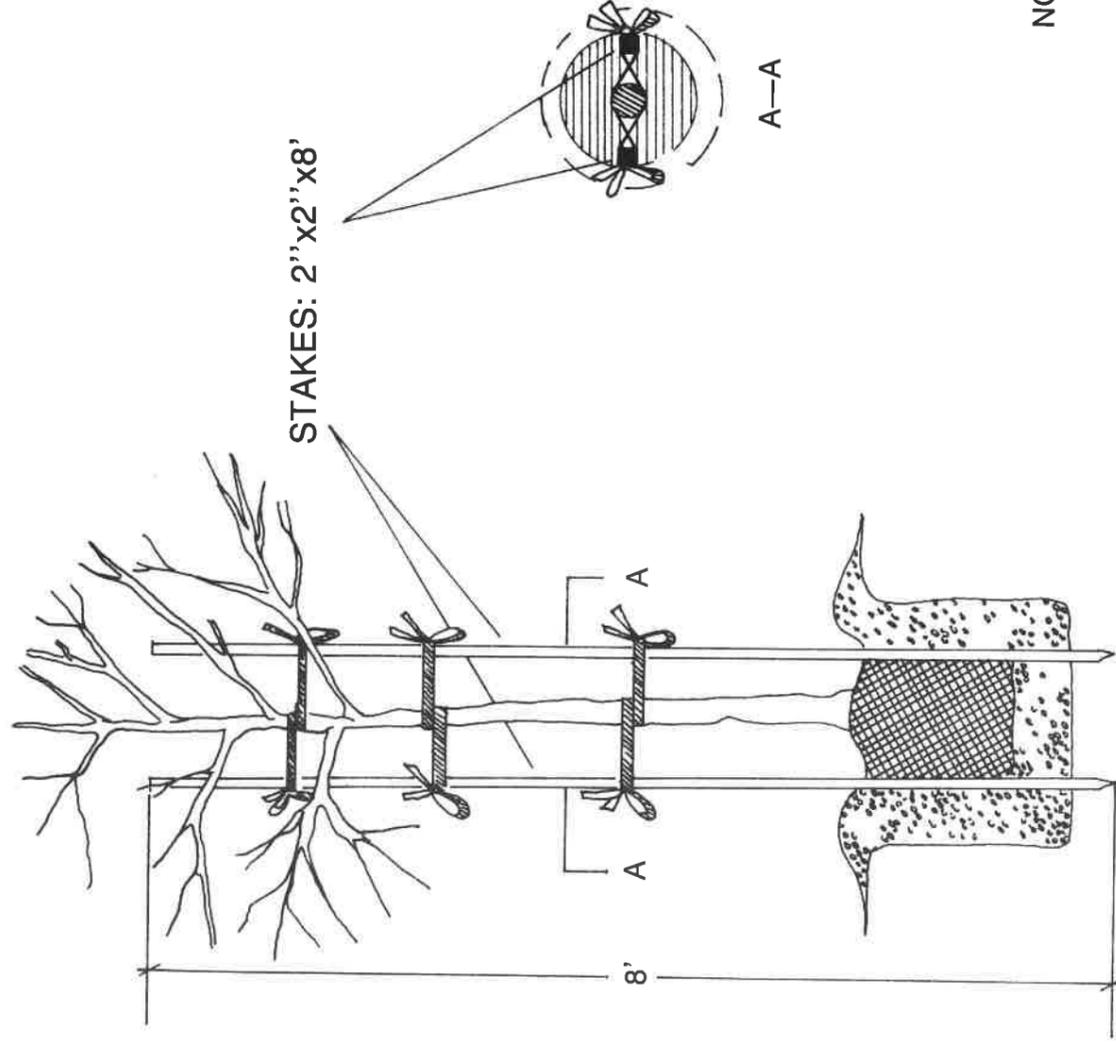
ILLUSTRATIONS NOT TO SCALE



WHEEL STOPS (TYPICAL CONCRETE WHEEL STOP)



TREE STAKES



NOTE: Remove Side
Branches Below
8' as Tree Grows

ILLUSTRATIONS NOT TO SCALE