

CITY OF PALO ALTO
TREE TECHNICAL MANUAL
STANDARDS AND SPECIFICATIONS

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SECTION 5.00 TREE MAINTENANCE GUIDELINES

INTRODUCTION

This chapter establishes the minimum standard of care and maintenance of Palo Alto's *Regulated Trees*. These standards apply to all persons who own or are engaged in the business of repairing, maintaining, or preserving these trees. The following standards of care are set forth for pruning (including utility, fire and traffic encroachment), planting, watering, soil and nutrient requirements, insect, disease and fruit control. Guidelines for selecting an arborist are also given. These standards and guidelines are based on sound arboricultural principles and are applicable to trees, shrubs and woody plants.

SECTION 5.05 CARE OF REGULATED TREES

All owners of *Regulated Trees* are to follow the required maintenance standards set forth in this *Manual*. If special pruning or situations require a variance from these Standards, it is the responsibility of the project arborist and property owner to clarify why the changes are needed and review them with the City Arborist.

Required Practices

SECTION 5.10 PROHIBITED ACTS

Improper maintenance may constitute a prohibited act as defined by the Palo Alto Municipal Code, Chapter 8.10.050 and a violation which may be subject to penalty. The following permitted and prohibited maintenance practices for *protected* and *designated trees* apply.

Required Practices

A. Excessive Pruning

Except for clearance pruning of utility lines, traffic or abating a *Public Nuisance*, *excessive pruning* (see *Excessive Pruning, Section 1.15*) shall be considered a prohibited act.

B. Topping

Topping shall be considered a prohibited act (see *Topping, Section 1.33*). Seek alternatives to topping (see *Crown Reduction, Section 5.20-A*).

C. Other prohibited actions

Taking any action foreseeably leading to the death of a tree or permanent damage to its health, including but not limited to excessive pruning, cutting, girdling, poisoning, over watering, unauthorized relocation or transportation of a tree, or trenching, excavating, altering the grade, or paving within the dripline area of a tree (see *Palo Alto Municipal Code Chapter 8.10.020, Appendix A*).

5.15 STANDARDS FOR PRUNING REGULATED TREES

The most compelling reason to prune trees is to develop a strong, safe framework. All work to be performed on *Regulated Trees* shall be in accordance with the following standards.

Required Practices

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Required Practices

A. Specifications

All specifications for working on *protected* and *designated trees* shall be written and shall be administered by a qualified arborist, and shall be designed to promote the preservation of tree structure and health.

B. Industry Standards

All work on *Regulated Trees* shall be in accordance with the most current edition of the following industry standards: (see *Performance Standards. Standard Practices for Tree Care Operations - ANSI A300-1995 Appendix G; Safety Standards, ANSI Z133.1-1994, Appendix F; and Tree Pruning Guidelines, Appendix E*).

Required Practices

5.20 PRUNING MATURE TREES

There are six types of pruning that may be required for use on mature *Regulated Trees* (see *ISA Tree Pruning Guidelines, Appendix E*). Prior to entering the tree, the tree worker is required to be familiar with these types of pruning as stated in the Performance Standards, ANSI, A300-1995. 'Species-specific' pruning promotes the natural shape of the tree (i.e. excurrent, decurrent, vase-shaped, fast growing, etc.).

A. Types of Pruning

- ▶ Crown Cleaning
- ▶ Crown Thinning
- ▶ Crown Raising
- ▶ Crown Restoration
- ▶ Crown Reduction
- ▶ Utility Pruning

B. Tree Injury

Climbing and pruning practices shall not injure the tree except for the pruning cuts.

C. Timing of Pruning

To reduce the probability of insect infestation, disease or infection, the following seasonal restrictions apply, except when public safety is a concern (see *Tree Pruning, Surgery and Removal, Section 2.15-F*):

- ▶ Pine (*Pinus spp.*) or Elm (*Ulmus spp.*): Do not prune May-October
- ▶ All species: Do not prune during the flush of spring shoot growth
- ▶ Trees with thin bark: Do not prune in summer when sun scald injury may be a factor
- ▶ Deciduous trees (leafless in winter): Best pruned November-February
- ▶ Hazardous trees of any species may be pruned any time of the year for abatement reasons

Recommended Practices

5.25 PRUNING DISTRESSED TREES

Distressed trees require as much leaf area as possible to overcome stressed conditions. To avoid additional injury, the following measures shall be followed for these trees.

A. Injury or Disturbance

If a tree has been damaged by injury or disturbance, delay pruning until deadwood becomes evident (typically 1-3 years after injury). Crown cleaning is then recommended.

B. Neglect

Trees that have received little or no care or maintenance may need moderate crown thinning, reduction of end weights or entire crown restoration.

5.30 PRUNING YOUNG TREES

The average life expectancy for trees growing in harsh urban conditions is 7-10 years. By pruning trees early, it will improve life expectancy and is a proven, cost-effective measure. Added benefits are also reflected in safer trees with fewer branch failures. For trees that serve as a replacement for a *protected* or *designated trees*, they shall be pruned in the following way:

- ▶ Young trees should be pruned during the second year after planting to improve their structure, and only minor crown cleaning every 3-7 years thereafter. Refer to *ISA Tree Pruning Guidelines (see Appendix E)*.
- ▶ Do not top the main leader except to position the lowest main branch. Other main branches should be spaced at least 18-inches apart to alleviate a tight grouping branches.
- ▶ Select permanent branching and allow temporary low branching on the lowest part of the trunk to remain.

5.40 FERTILIZING STANDARDS

This section outlines performance standards for fertilizing and apply only if fertilizing is specified. Fertilizing mature trees is generally not necessary. Fertilizing may be specified for trees that will be impacted by upcoming disturbance, grade changes or a modified environment. Benefits gained from the increase stored resources may aid the tree to overcome the stress caused by disturbance.

A. Specifications

Fertilizing, if specified, shall be performed to the following standards:

- ▶ Method of application: The method shall be subsurface injection, on approximate 3-foot centers (within the root ball on young trees; 2-feet out on older trees) and out to the approximate dripline perimeter. Specific situations may justify other variations such as vertical mulch, soil-fracture or surface-broadcast methods.
- ▶ Material and Rates: Unless specified otherwise, fertilizer formula shall be a slow-release, complete fertilizer with chelate trace elements (e.g. 22-14-14 or 20-20-20) and mixed at label rates not to exceed 4-pounds nitrogen per 100-gallons of water. Extraordinary cases may require soil and tissue sampling to correct target deficiencies.

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Recommended Practices

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- ▶ Amount: Unless specified otherwise, volume shall be determined by mixing 10-gallons of water per inch of trunk diameter when measured at 54-inches above natural grade.
- ▶ Timing: Timing should not be detrimental to tree health. Best results are derived from applications made during the prior growing season. Apply fertilizer between May through September for best results.

Required Practices

5.45 WATERING SCHEDULE

Newly installed trees planted, including drought tolerant species, are dependent upon supplemental irrigation until established, typically for two years. Periods of extreme heat, wind or drought may require more or less water than recommended in these specifications. The method and amount that is applied may vary depending upon soil composition, heat, wind, planted in turf or ground cover, periods of abnormal rainfall or in poorly drained soils (see *Drainage, Section 3.40-C*). The watering of *protected* or *designated trees* or their replacements shall follow these standards:

A. New trees

During the establishment period (1-2 years) trees should be watered thoroughly to their root depth as frequently as needed. A watering schedule is to be submitted at the preconstruction meeting. The schedule is to include watering frequency and quantity. The minimum standards shall be as follows:

- ▶ 1-3 months in the ground: 4 times per month or as necessary
- ▶ 4-6 months in the ground: 2 times per month or as necessary
- ▶ 7-12 months in the ground: 1 time per month or as necessary

B. Mature trees

- ▶ Most species: 1 time per month during irrigation season (usually March through September)
- ▶ Coast Live Oak, Valley Oak and Blue Oak: deep water in May and September — do not water during other months. For oaks already in the vicinity of irrigated conditions, automatic sprinklers or regular watering shall not be allowed to spray on or within three feet of the trunk. The water shall not be allowed to pool or drain towards the trunk.

C. Watering Methods

The following options shall fulfill the watering requirements. One or more of the following may be utilized dependent upon unique circumstances subject to the *City Arborist* determination. The options are as follows:

1. Automated Watering Systems. All new *street trees* planted within the right-of-way and *designated trees* shall be provided with one of the following automatic watering systems. All tree irrigation is to be consistent with current *Landscape Water Efficiency Standards for the City of Palo Alto*. Other city maintained systems shall be per Parks Department specifications.

PAMC 12.32.040

- ▶ Bubbler heads (Preferred). One or two bubbler heads mounted on flexible tubing are to be placed adjacent to or on top of the root ball. The placement of bubbler within an aeration tube is not allowed.
- ▶ Drip Loop system. A continuous loop of drip tubing circling around the trunk at a point two-thirds out from the trunk to the edge of the root ball (for new trees 36-inch box size and greater, a second loop of drip tubing is required at a point just beyond the root ball on native soil).
- ▶ Hand watering systems. Recommended for trees that are part of a development project that must be watered to insure tree survival during the course of construction until automatic irrigation is installed.
- ▶ Flood watering. Newly installed trees must be 'flood or basin-watered' on top of the root ball to allow the water to infiltrate through the root zone.
- ▶ Subsurface injections using a hydraulic spray pump (practical for use in hard, compacted soils or steep hillsides).
- ▶ Soaker hose. Slow, deep watering using a garden type soaker hose.
- ▶ Wetting agent. A root ball that has been allowed to dry out beyond the wilting point shall require the addition of a wetting agent to the water (such as Aqua-grow or equivalent).

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D. Amount

Unless otherwise specified, the volume of water applied at each irrigation should be in the range of 10-gallons per inch of trunk diameter when measured at 54-inches above natural grade. The final decision of whether to water or not should be based on accurate soil probe samples that are taken from the root ball.

5.50 SOIL IMPROVEMENT

During development, compaction of the soil is the largest single factor responsible for the decline of oaks and older trees. Ninety percent of the damage to the upper eighteen inches of soil occurs during the first pass of heavy equipment - and cannot be reversed. Every effort to avoid compaction of soil porosity within the tree protection zone shall be taken at all times (*see Soil Compaction, Section 1.29*). When required by the conditions of *Discretionary Development Approval* for a project or as mitigation for injury or a prohibited action, the following performance standards for improvement of compacted or damaged soil shall be implemented:

Required Practices

A. Aeration

Soil that is damaged or compacted within the dripline of *protected* or *designated trees* shall be loosened or aerated to promote root growth and enhance tree vitality. One of the following aeration methods shall be specified in an effort to correct compacted soil conditions:

Required Practices

- ▶ *Vertical Mulching*: auger holes 2 to 4-inch diameter, 2 to 3-feet deep, on 4-foot centers and backfilled with porous material such as perlite, vermiculite or volcanic rock (*see Definitions, Section 1.41*)

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- ▶ Radial Trenching: with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the dripline area. The trenches shall radiate out from one foot apart at the closest point.
- ▶ *Soil-fracturing* with a pneumatic air-driven device (see *Definitions, Section 1.30*)
- ▶ Subsurface injections under moderate hydraulic pressure using a three foot probe and applied on 3-foot centers under the dripline

Required Practices

B. Drainage

Adequate drainage must be provided to the surrounding soil for the planting of new trees. If the trees are to be planted in impermeable or infertile soil, and water infiltration rates are less than 2-inches an hour, then one of the following drainage systems or other approved measures must be implemented (see *Drainage, Section 3.40-C*).

- ▶ French drain, a minimum of three feet in depth
- ▶ Drain tiles or lines beneath the trees
- ▶ Auger six drain holes at the bottom perimeter of the planting pit, a minimum of 4-inches in diameter, 24-inches deep and filled with medium sand or fine gravel

5.60 INSECT AND DISEASE CONTROL

Generally, insect populations do not threaten tree health to the point of mortality. More often, when their populations become too great they create a nuisance. For example, scale on tulips or aphids feeding on purple leaf plums produce sticky honeydew that may be a nuisance if dripping on cars or at a storefront entry. Occasionally, however, pests such as Oak or Tussock Moth larvae can defoliate and severely damage a tree. If action is warranted, Integrated Pest Management (I.P.M.) suggests that the pest source be identified and targeted with a specific and timely treatment. If insects or disease can lead to the death of a *protected* or *designated tree*, then it is the responsibility of the property owner to evaluate the condition according to the following guidelines and treat the problem in a timely fashion to prevent further deterioration of the tree

Recommended Practices

A. Insects

For treatment, consult a pest control operator that is licensed by the California Department of Pesticide Regulation. Accurate timing is critical for success.

- ▶ Nontoxic materials should be used whenever possible to control leaf-chewing insects

Required Practices

B. Disease and Decay - above ground

Disease such as heart-rot decay that erodes the health or weakens the structure of a *protected* or *designated tree* may compromise the safety of people or property (see *Hazardous Tree Determination, Section 4.0*). It is the property owner's responsibility to correct a known hazardous condition in a timely fashion.

- ▶ Consult with a *certified arborist* for remedy possibilities, for example, pruning out infected branches, thinning, or the spray application of a chemical treatment.

C. Disease - below ground

Soilborne diseases, such as Oak Root Fungus (*Armillaria mellea*) or Root Rot (*Phytophthora sp.*), are present in Palo Alto soils. Often, a poor landscape design surrounding old trees encourages harmful, and often lethal diseases. The following conditions that favor a disease environment must be avoided.

- ▶ Conditions to avoid: Compacting of the soil within the tree's dripline, adding fill dirt, rototilling, trenching, removing soil from the tree root area, and excessive or regular watering on or near the tree trunk area and planting incompatible water-loving plants within the tree's dripline. Combined with poorly-drained soil, these factors often activate normally dormant fungi to become opportunistic and infect the tree to cause the decline and eventual death of the tree. This decline can be slow and may not be evident for many years.
- ▶ Landscape Design
When planning landscaping around a *protected* or *designated tree*, an evaluation of the tree and soil must be performed to determine if there is a disease present. If the tree is diseased and landscaping will contribute to decline, permanent damage or render it hazardous, it is the obligation of the property owner to take reasonable measures to reduce or eliminate the conditions that may cause the decline of the protected or designated tree.
- ▶ To identify cultural conditions that may lead to diseases such as Oak Root Fungus, Verticillium, Phytophthora or other soilborne fungi, review the *Sunset Western Garden Book* or consult with a *Certified Arborist* (see *Certified Arborist, Section 1.4*).
- ▶ Use plants under oaks that have low to moderate water needs. Refer to a list of these plants (see *Plant List for Use Under Oaks, Appendix L*), *Sunset Western Garden Guide* or call Canopy: Trees For Palo Alto at (650) 964-6110.
- ▶ Plants selected for use under an oak should not need water more than once a month. Use a drip system to irrigate around an oak so that runoff does not flood the area.

D. Foliar disease

Leaf spot or galls may be chronic or reoccur with specific seasons. Though many of these diseases destroy leaf tissue and become unsightly, they may not significantly reduce the trees health and therefore need not be treated.

5.80 FRUIT CONTROL

While all trees produce flowers or fruit of some kind, some trees can be considered a nuisance if the use area is not compatible with the litter generated by the tree. For example, the dropping fruit of the European Olive (*Olea europaea*), American Sweet Gum (*Liquidamber styraciflua*), or acorn drip of a Holly Oak (*Quercus ilex*) may be a safety hazard if it is in the proximity of a handicap ramp or other high pedestrian area and will thus justify control measures. Control can only be successful if materials are applied carefully at optimum timing. For treatment to control the situation, consult a pest control operator that is licensed by the California Department of Pesticide Regulation.

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5.90 FIRE PROTECTION: KEEPING THE OPEN SPACE, PARKS & COMMUNITY SAFE

The following measures are recommended but not required. If followed, they may help avoid a catastrophic and irreplaceable fire loss to persons, houses, hillsides and mature trees that are centuries old.

Checklist:

- Keep dry grass mowed below 6-inches.
- A 30-foot defensible space should be obtained.
- No vegetation growing or combustible storage under decking.
- No tree canopy within 10-feet of chimney spark arrester.
- Break up solid areas of continuous plant growth which create a 'fire-ladder'.
- Ask nursery professionals about fire-resistant shrubs to use in landscaping.
- Keep tree well watered, regularly pruned and in healthy condition.
- Prevent build-up of leaves and old branches.
- No firewood storage within 10-feet of structures.
- Make sure your driveway, road and bridges allow access for fire equipment (13-foot vehicle clearance needed).
- Homes adjacent to slopes over 30% will need additional clearing of vegetation from the structure 100-200 feet to protect against radiant and convective heat currents and flame reach.

5.95 TIPS FOR SELECTING AN ARBORIST

A. Who should you look for?

Hiring a tree care provider deserves careful consideration and caution. A mistake can be expensive and long-lasting, while the right choice can assure health, beauty and longer life for your trees and landscape. The following suggestions will help you select an arborist:

- ▶ Check the phone directory, usually under trees or tree care service. Listings in the directory should indicate some degree of permanence. Look for professional membership affiliations. Membership does not guarantee quality, but a lack of it may cast doubt on the company's commitment to professionalism.
- ▶ Beware of door-knockers. Most reputable companies have all the work they can handle without going door-to-door.
- ▶ Request that the sales person be an arborist or tree worker that has been certified through a program of the International Society of Arboriculture (ISA). This program is the standard of performance for appropriate training, experience and knowledge about tree care. Additionally, it is best to use an arborist who is familiar with the trees and ordinances of the City of Palo Alto.

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- ▶ Require a certificate of insurance, including liability for personal injury and property damage (such as your house and your neighbor's), and workers compensation. Phone their insurance company to make certain each policy is current. Under some circumstances, the property owner may be held financially responsible if an uninsured worker is hurt on your property, or if damage is done to a neighbor's property!
- ▶ Ask for local references and other jobs the company or individual has done in Palo Alto. Experience, education and good reputation are signs of a good arborist.
- ▶ Have more than one arborist look at your job and give you a written estimate that clearly states their scope of work. Don't expect a company to lower its bid to match another's bid. Be willing to pay for the estimate if necessary. Two or more opinions and estimates are worth the extra effort.
- ▶ A good arborist will offer a wide range of services including removal, pruning, fertilizing, cabling, pest control, etc.
- ▶ A good arborist will not recommend topping (Section 1.32) except in rare circumstances (such as; crown restoration after severe physical or wind damage, or for a formal setting in a restricted space).
- ▶ A knowledgeable arborist will not use climbing spikes if the tree is to remain in the landscape. These should be used only for tree removal.
- ▶ Beware of an arborist who is eager to remove a living tree. Removal clearly should be a last resort.

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B. The Contract for Services

To be assured of having your work performed to the standards you expect, a contract should include all the necessary assurances. Most companies will provide their own contract and should include the following basics:

- ▶ Dates that work will begin and end.
- ▶ List exactly what will be done (*see Types of Pruning, Section 5.20*). If your tree is to be sprayed, get a written statement detailing the insect or disease to be treated, the chemical to be used and what precautions you need to take (cover patio furniture, keep pets inside, etc.). If fertilizer, how many pounds of fertilizer per inch of trunk diameter will be applied and by what method.
- ▶ Cleanup procedures should be listed and whether firewood will need to be cut (and into what lengths) should both be mentioned.
- ▶ Clarify if a tree removal includes grinding the stump and surface roots and if so, how deep?
- ▶ Will they remove grindings and backfill the hole?
- ▶ The total dollar amount you will be charged.
- ▶ Work is usually priced in one of two ways: (a) as a single price for the job, or (b) on an hourly basis plus materials. When using the latter, be sure to include the wording, "...but not to exceed..."

Recommended Practices

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C. Using Arborists for Preventative Care

- ▶ A proactive tree and plant health care program can assure that minor, early pruning will prevent major, corrective pruning later on. An annual inspection will likely help you develop the landscape relatively hazard-free and display attractive curb appeal.
- ▶ Consulting arborists also offer advice and appraisals, diagnosis of problems and recommend treatment. They also can serve as a 'second opinion', if needed.



END OF SECTION