notes:

SECTION 3.00 - REMOVAL, REPLACEMENT AND PLANTING OF TREES

INTRODUCTION
A *Regulated Tree* may not be removed without City review and approval, except in certain emergencies. The purpose of City review is to verify that the removal is allowed under City law, and to prevent unnecessary tree removal. In some cases, a removed tree must be replaced by the property owner or, in the case of street trees, developer. This section describes the type and size of tree required, and the planting techniques to be used. It also describes how to determine the replacement value of a tree that cannot be replaced in its original location, and the circumstances in which the City may require a security deposit to assure the survival of trees during development projects.

3.05 TREE REMOVAL

A. Allowable Removal

A written permit is required to remove a *Regulated Tree*, except in emergency situations outlined in Hazardous Trees, Section 4.00. *Removal* of *Regulated Trees* is allowed if:

- A *Protected Tree* is determined to be dead, hazardous (*see Hazardous trees, Section 4.0*), a detriment to or crowding an adjacent *protected tree*, or a *Public Nuisance* (*see Section 1.00*).
- A *protected tree* trunk is touching or the basal flare is under the building footprint of an existing building (for example, uplifting foundation, contact or damage to eves, gutter, etc.).
- On projects other than a single family residence, a *Protected Tree* if it reduces the otherwise-permissible *Buildable Area* by more than 25%.
- Other specific circumstances exist, as described in Section 8.10.050, Appendix A.
- In the case of *street trees*, Public Works Operations issues a written approval.
- In the case of a *Designated Tree* shown on previously approved site or landscape plans, the Director approves the removal in writing.

B. Permit Application

Required Practices

Tree Removal Applications are available at the City of Palo Alto, Development Center, 285 Hamilton Avenue, Palo Alto, CA 94301, 650-617-3118. The following is a checklist of items necessary for City review for tree removal. Additional information may be required by the reviewing staff. Response will generally be mailed to the applicant within 10 days. The removal permit must be on site during the *removal*.

notes:

Tree Removal Checklist

- ❑ Completed City of Palo Alto Protected Tree Removal Application (available at the City of Palo Alto, Development Center, 285 Hamilton Avenue, Palo Alto, CA 94301. (650) 617-3118).
- ❑ Payment of $145.00 review process fee ($125 Schedule Fee and $20 Records Management)
- ❑ Arborist letter report from a *certified arborist* on company letterhead (*see Tips for Selecting an Arborist, Section 5.95, and Tree Reports, Section 6.10*) — to include the following information for each tree:
- ❑ A written narrative describing the tree species (common and scientific); location (in relation to street, structures and property line); size (DBH, height & crown spread); condition (foliage, vigor, structural integrity, etc.); life expectancy and prognosis (is the tree *hazardous*, severe decline, property damage, etc.?)

C. Hazard Trees

To remove a *protected* or *designated* tree that has been verified as *hazardous*, as defined within Chapter 8.10 of the Palo Alto Municipal Code and *Tree Technical Manual*, written approval from the *City Arborist* is required and must be available on site when the tree is being removed, unless emergency conditions exit (*see Emergency Removal Conditions, Section 4.00*).

Required Practices

3.10 WHEN TREE REPLACEMENT IS REQUIRED

Replacement Trees. Certain conditions determine whether or not a *protected* or *designated tree* must be replaced. In summary, they are:

PAMC 8.10.050

A. Protected Trees

If the City authorizes removal of a protected tree because it is dead, dangerous, or a nuisance, no tree replacement is required. In all other cases, the tree must be replaced.

B. Designated Trees

When authorizing removal of a *Designated Tree*, the Director or the Director's designee shall require tree replacement if it is necessary or desirable to implement the intent of the original site design. The number and nature of the replacement trees shall be determined by the Director or designee, taking into consideration the value of the tree removed and the site design.

PAMC 8.04.070

C. Street Trees

If the City authorizes removal of a street tree in connection with a development project, it shall specify the replacement requirements in the permit authorizing removal.

3.15 ALTERNATIVES WHEN TREES CANNOT BE REPLACED ON SITE

notes:

In some circumstances, crowding or other physical constraints make it impossible or undesirable to replace a tree of equal value in the same place. In that case, the value of the tree shall be computed under the Tree Value Replacement Standard in Section 3.25. Once the value has been determined, that sum of money shall be used in the following order of preference, as approved by the Director: (1) to provide additional trees elsewhere on the site; (2) to add or replace street trees or other public landscaping in the vicinity, or (3) to add trees or other landscaping to other City property.

3.20 TREE CANOPY REPLACEMENT STANDARD FOR ONSITE TREE REPLACEMENT

Required Practices

When a *Protected* or *Designated Tree* is to be replaced on site, the following standards apply.

A. Species

The replacement trees shall be the same species unless the Director determines that another species would be more suitable for the location. Factors to be considered include the long term health of the tree in the location and its compatibility with the adjacent uses as well as design considerations.

B. Location

The location of the replacement tree on site shall be approved by the Director. If it is not possible or desirable to replace the tree on site, Section 3.15 shall apply.

notes:

C. Size and Number

Often it is not possible to replace a large, older tree with a single equivalent tree. In such cases, the following tree canopy replacement ratio shall be used:

TABLE 3-1
Tree Canopy - Replacement Standard

COLUMN 1	COLUMN 2	COLUMN 3
Canopy of the Removed Tree (Avg. dist. across the canopy*)	Replacement Trees	Alternative Tree
4'-9'	Two 24" Box Size (minimum)	One 36" Box Size
10'-27'	Three 24" Box Size	Two 36" Box Size
28'-40'	Four 24" Box Size	Two 48" Box Size
40'-56'	Six 24" Box Size	Two 48" Box & Two 36" Box Size
56'-60'	Two 24" Box & Two 36" Box + Two 48" Box Size	**
60'+	**	**

*Add half of the difference between the two to the narrowest measurement for the average canopy.
** Replace the tree with a combination of both Tree Canopy and Tree Value Standards.

Note: Basis of this table is determined by the growth of one 24" box size tree, growing at a rate equivalent to 9 feet of canopy over the course of ten years.

How to use Table 3-1, Tree Canopy Replacement Table.

- Column 1. Determine the leaf canopy of the removed tree by measuring the distance across the canopy at the widest point and narrowest point. Add half of the difference between the two to the narrowest measurement for the average canopy. The leaf canopy diameter of the tree (this information is typically supplied within the arborist report) is used to determine number and size of replacement trees in Column 2.
- Column 2. Determine the number of replacement trees. The planting of new trees should equal the leaf canopy of the removed tree within a period of ten years. The minimum replacement for removal of any *Protected or Designated Tree* shall be two 24-inch box trees.
- Column 3. Alternative size of trees may be desired. The property owner shall have the option to plant an alternative size tree to accommodate site specific landscape needs or constraints, such as space, design or soil volume limitations.

Example of Tree Canopy Replacement Ratio:

The removal of a tree with a 39' crown spread will require four 24-inch box trees to satisfy the criteria of this Section. Methodology- e.g. the average canopy of a new tree is 4' wide + the expected canopy growth of 6" per year x 10 years = a 9' net canopy of one replacement tree. Thus, four 9' trees = 36' of new canopy, and is a close approximate to the original 39' canopy tree.

3.25 TREE VALUE REPLACEMENT STANDARD

notes:

When the value of a tree needs to be determined for establishing the amount of security required, or for any other purpose, the value shall be determined by using the most recent edition of the *Guide for Plant Appraisal* published by the Council of Tree and Landscape Appraisers (*see Section 6.45.)*

3.26 SECURITY DEPOSITS

As a condition of a development approval, the Director may require that the developer post security of between 25% and 100% of the value of the trees to be preserved, as determined under Section 3.25. The security may be a cash deposit, letter of credit, or surety bond and shall be filed with the Finance Department. It shall be in a form satisfactory to the City Attorney. The security shall be posted before issuance of any grading or building permits. The guarantee period shall be specified; in general, it shall be at least two years after expected completion of construction. If the trees fail to survive, the developer shall replace them; if the developer fails to do so, the City may use the security to provide off site trees and/or landscaping as described in Section 3.15.

3.30 TREE AND SHRUB PLANTING SPECIFICATIONS

Required Practices

Planting specifications apply for trees and shrubs that are: 1) planted as a replacement for a *Regulated Tree*, 2) to be planted as a *street tree* within the City right-of-way or other public land; or 3) planted as part of a landscape plan subject to non-residential development approval (*see Discretionary Development Approval, Section 1.11*). Using the following specifications will result in consistent city-wide plantings, and superior tree growth and vitality. To achieve this, the landscape architect shall incorporate these items into their specifications.

3.35 PLANTING STOCK AND MATERIALS

A. Quality

Required Practices

It is the contractor's responsibility to supply stock that meets ANSI 760.1-1996 and City of Palo Alto *Tree Technical Manual Standards*.

- All plants and trees installed within the City of Palo Alto shall conform with American Association of Standards, ANSI Z60.1, *Specifications for Acceptance of Nursery Trees at the Time of Delivery*, in all ways.
- Plants shall be sound, healthy, vigorous, and free of plant disease and insect pests and their eggs.
- Container stock shall be grown for at least 8-months in containers in which delivered and shall not be root bound or have girdling roots.
- Trees shall not have been topped or headed.
- Landscape Architect shall inspect and verify, in writing, that all plant material to be installed on the site meets the above standards and is acceptable.
    - The written verification shall be forwarded to the City Planning Department files within one week of acceptance (*see Inspections, Section 2.30 F)*.
    - Inspection shall occur after delivery of stock to the project site.

notes:

- Plants and trees with broken tops, branches or injured trunks shall be rejected.

Required Practices

B. Miscellaneous Materials

The following materials shall be used unless otherwise specified:

- Tree stakes. Support stakes shall be treated 2-inch diameter Lodgepole Pine, two stakes per tree or approved equivalent. No cross brace shall be used. After installation, stakes shall be trimmed so that the branches clear the top of the stake.
- Tree Ties. 'V.I.T' Tree Supports (recommended) or equivalent, twist brace, fabric-reinforced rubber (3/8-inch minimum), or equivalent approved by the City of Palo Alto shall be used and installed in a figure eight fashion to support the tree to the stakes.
- Mulch. Screened untreated wood chips 1/2- to 1-inch in size, spread to a 2-inch depth out to the edge of the root ball. The mulch should be kept at least two inches away from the trunk and shall be applied to each tree (*see Mulching, Section 3.45-G*).
- Root Control Barriers. Use along all public sidewalks, and indicate on approved plans and drawings. 18-inch Linear Barrier LB18-2 root control barrier shall be used. Unless specified otherwise, a 10-foot length shall be placed on center with the tree and on the sidewalk side only. Root barrier boxes are not approved.
- Mower guards. For trees in turf areas requiring regular mowing, the tree stem shall be protected with TreeGuard or equivalent.
- Tree Grates. Where sidewalk width is less than 8-feet and new trees will be installed in a tree well, metal tree grates shall be used and approved by Public Works. Minimum size grates shall be 4' x 4' unless specified otherwise. All tree grates shall be mounted in frames, frames inset into a concrete foundation within the sidewalk or surface material and shall be flush with the surrounding surface.

3.40 PLANTING SITE PREPARATION

Required Practices

A. Soil Preparation and Conditioning

- All debris, wood chips, pavement, concrete and rocks over 2-inches in diameter shall be removed from the planting pit to a minimum of 24-inch depth, unless specified otherwise (*see also Soil Improvement, Section 5.50*).

Required Practices

B. Planter Pit

- Trees in a confined planter pit or sidewalk area: The planting hole shall be excavated to a minimum of 30-inches deep x the width of the exposed area. Scarify the sides of the pit (*see Placing the Tree, Section 3.45 D*). Soil beneath the rootball shall be compacted to prevent settling.

- Trees in all other areas: Excavate the hole's width a minimum of three times the diameter of the container, and deep enough to allow the root ball of the container to rest on firm soil. Scarify the sides and the bottom of the pit.
- The height of the container root ball should be 1-2-inches higher than grade level (*see Placing the Tree, 3.50*), except when structural urban tree soil mix is used (*see Alternative Base Course Materials, Section 2.40 D*), in which case the tree may be planted at level grade.

notes:

C. Drainage

1. Poor drainage. For *discretionary development projects*, a percolation test is required to ensure there is adequate drainage for planting new trees. A minimum of one test per site shall be reviewed with the *project arborist* or Landscape Architect prior to plant installation. One or more of the following mitigations are required for locations with poor drainage.

Required Practices

2. Mitigation for locations with poor drainage:

Required Practices

- Install french drain. The trench shall radiate away from the tree and be a minimum of 18-inches in depth filled with drain rock. The grade shall fall away from the tree trunk.
- Install drain tiles or perforated pipe directing water away from the tree.
- Install a drain chimney at the bottom of the planting pit, a minimum of 4-inches in diameter and filled with medium sand or fine gravel to ensure percolation of all water from the filled planter pit. Auger bore drain holes to penetrate hard pan or cileechee clay a minimum of 12-inches into undisturbed pervious soil. Angle the boring as close to vertical as possible.

3. Planting Percolation Test. A minimum of one test per development site is required. Additional tests may be needed as required by Landscape Architect or *City Arborist*. Fill planting hole with water, provide drainage that is greater than 2-inches per hour. If percolation is less, one or more of the following mitigation measures must be implemented for tree planting *(see Soil Improvement, Section 5.50)*.

Required Practices

D. Aeration tubes for trees

Required Practices

- *Street trees* planted in the City right-of-way, sidewalk planter pits, planting strip, medians or *designated trees* when specifically required in development plans, shall use 4-inch diameter perforated aeration piping (rigid or flexible), circling the bottom of the planter connected to a 'T' fitting to two riser tubes with grated caps and wrapped with filter fabric, per Public Works Planting Detail #503 for tree wells or #504 for planter strip planting (*see Appendix H*). This detail shall be shown on the approved landscape plans.
- All other trees (*see Aeration TubeTable, 3-2*) shall be planted with 4-inch diameter perforated aeration tubes with grated plastic caps placed at the edge of the root ball to the bottom of the pit per Table 3-2, Aeration Tubes. Irrigation heads shall not be installed inside the aeration pipes.

notes:

- Any of the above holes, pipes, grates or fixtures shall include the installation of Filter Fabric wrap over the side openings and secured as recommended by manufacturer when connected to an approved aeration system.

TABLE 3-2
Aeration Tubes

AERATION TUBE TABLE	
TREE SIZE	NUMBER OF TUBES
15 gallon trees	one tube
24' box trees	two tubes
36' box trees	two tubes
48' box trees or larger	four tubes or as needed

3.45 PLANTING THE TREE

Required Practices

A. Perform percolation test

If the soil is dry, add a few inches of water in the hole. Let it drain before planting the tree (*see Percolation Test, Section 3.40 C*).

B. Depth

To check the proper depth of the rootball, place the tree in the hole and lay a pole or shovel across the original grade - the top of the root ball should be 1 to 2-inches higher (*see notes on depth, Section 3.40 B*).

C. Container and Roots

Remove tree from the container and trim the root ball in the following way:

- Thick circling roots: straighten and/or cut cleanly
- Thin roots: make three to four vertical cuts 1/2-inch deep around root ball, spread the bottom out if necessary

D. Placing the Tree

Locate the tree in the hole, and rotate the tree to direct the main branches away from the street side, if possible.

E. Filling the Hole

Place the aeration tubes, fill the hole halfway up with original soil (amended soil only when approved), and gently tamp out air pockets with a pole or shovel handle. Add about 1-inch of water, and let drain. Fill the rest of the hole to grade, water the fill soil, and let drain.

F. Staking

Place the stakes at the edge of the root ball (drive them 2-feet into undisturbed ground), and avoid contact with the branches. If in a windy area, set the stakes in a plane at right angles to the wind. Remove the nursery stake. Loosely place two ties in a figure eight around the trunk, as low as needed to hold the tree upright and nail to the stake. Stakes shall be trimmed so that the branches clear the top of the stake. Do not install a cross-brace.

G. Berm, Mulch and Water

In non-turf areas, form a soil berm 3 to 4-inches high at the outermost edge of the root ball. Place 1 to 2-inches of mulch or bark over root ball and berm, keeping the mulch away from the trunk a minimum of 2-inches. Fill the berm with water to capacity (*see Watering 5.45, Section A*).

notes:

3.50 PLANTING IN DIFFICULT SOIL CONDITIONS

Recommended Practices

A. Turf Areas

In turf areas that receive regular watering, the watering berm may be eliminated. The turf shall be maintained a minimum of one foot from the new tree stem, and mulch placed on top of the rootball. The mulch shall not be touching the tree stem. In turf areas, install tree guard (*see Mower Guards, Section 3.35 B*).

B. Alternate Specifications

Occasionally, tree planting must occur in poor or difficult soil where standard planting techniques will result in poor-to-average performance or mortality (such as unique or unusual regional geology, slope, soil volume, restrictive physical or chemical properties, poor drainage, etc.). In this case, the responsible party must investigate alternative solutions to enable long term tree growth. Alternative planting specifications or plans that vary from the native or typical soil conditions shall be submitted to the *City Arborist* for approval prior to installation.

- Alternative or specified soils, such as engineered, amended or structural urban tree soil mix, including written specifications and physical samples, shall be submitted for approval from the *City Arborist* and/or Landscape Architect (*see Alternative Base Course Materials, Section 2.40 D*).

END OF SECTION

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