



Petaluma Tree Handbook

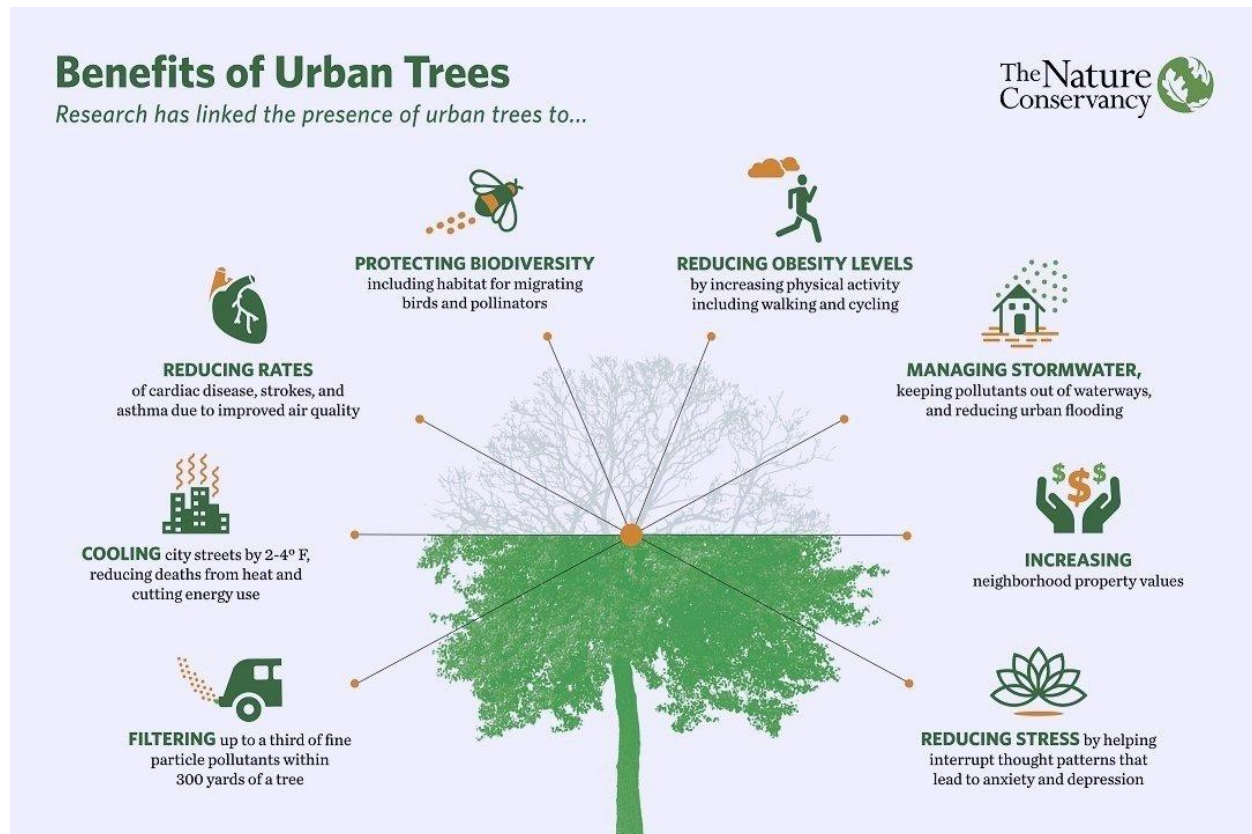
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Please enjoy this compendium of tree information for the public that I've come across. To dig deeper into topics please visit some of the reference links under Tree Resources.

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What are the Benefits of Trees?



[6 Ways Trees Benefit Us All - Nature Conservancy](#)

Economic Benefits

Trees, as part of a well maintained landscape, can add value to your home. Property values of landscaped homes are 3-15% higher than those of non-landscaped homes. Trees increase in value as they grow. ([Arbor Day Foundation](#))

Direct economic benefits are usually associated with energy costs. Air-conditioning costs are lower in a tree-shaded home. Heating costs are reduced when a home has a windbreak from cold winter winds. Asphalt and concrete streets and parking lots are known to increase urban temperatures 1-7 °F in daytime and 2-5 °F in night time ([US EPA](#)). These temperature increases significantly impact energy costs to homeowners and consumers. A properly shaded

neighborhood, provided by urban street trees, can reduce energy bills for a household by 15-35%.

Indirect economic benefits of trees within a community are substantial. Customers pay lower electricity bills when power companies build fewer new facilities to meet peak demands, use reduced amounts of fossil fuel in their furnaces, and use fewer measures to control air pollution. Communities can also save money if fewer facilities must be built to control storm water.

Shade from urban street trees can add 40-60% more life to costly asphalt by reducing the expansion and contraction due to temperature fluctuations.

Businesses on treescaped streets show 20% higher income streams.

The i-Tree streets analysis in Palo Alto revealed that the Benefit-Investment Ratio (BIR), which compares the cost of tree planting and maintenance to the annual benefits it provides, is 3.22:1. This high BIR means that for every \$1 that the City spends on street trees, the City reaps \$3.22 in benefits plus tree values appreciated while other infrastructure depreciates.

Social and Psychological Benefits

Trees have a calming effect and reduce stress levels, fatigue, and even decrease the recovery time needed after surgery. We feel serene, peaceful, restful, and tranquil in a grove of trees.

Motorist road rage is diminished in green urban areas. Trees aesthetically improve our streets and neighborhoods, and are known to reduce blood pressure. Road trips feel shorter along tree-covered thoroughfares .

Trees can also reduce crime. Apartment buildings with high levels of greenspace have lower crime rates than nearby apartments without trees.

Because of their potential for long life, trees are frequently planted as living memorials.

Trees bring natural elements and wildlife habitats into urban surroundings, all of which increase the quality of life for residents of the community.

Communal Benefits

City trees often serve several architectural and engineering functions. They provide privacy, emphasize views, or screen out objectionable views. They reduce glare and reflection. They direct pedestrian traffic.

Trees also provide background to and soften, complement, or enhance architecture.

Drivers go slower in treed landscapes than treeless landscapes. Street safety comparisons show a reduction of run-off-the-road crashes and overall crash severity when treed street sections are compared with equivalent treeless streets.

Street trees make visual walls and physical barriers to sidewalks for greater pedestrian safety. They also soften and screen essential street features such as utility poles, light poles and other needed streetscaping. Trees are highly effective at screening vertical features on roadways that are needed for safety and functional reasons.

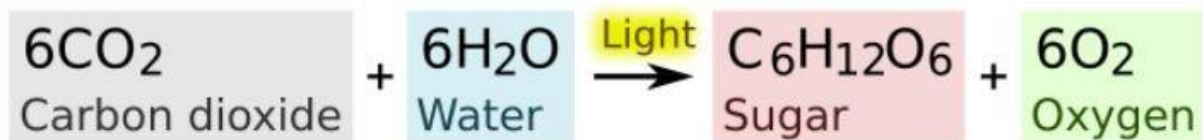
Trees create more pleasant walking environments along streets and in parks.

Trees along freeways and parkways reduce noise levels and create a physical barrier for dust and other particulate matter. They also absorb many tailpipe emissions.

Environmental Benefits

Trees alter the environment in which we live by moderating climate, improving air quality, reducing stormwater runoff, and harboring wildlife. Local climates are moderated from extreme sun, wind, and rain.

During photosynthesis a tree absorbs carbon dioxide (CO₂) from the air for making the organic compounds it needs and releases chemical products - oxygen (O₂) and water (H₂O).



Radiant energy from the sun is absorbed or reflected by leaves on deciduous trees in the summer and is filtered by branches of deciduous trees in winter. Trees transpire water to cool themselves and the surrounding air. Combined with natural shading, temperature differentials of 5-15 degrees are felt when walking under tree canopied streets.

By using trees in the cities, we can moderate the heat-island effect caused by pavement and buildings in commercial areas.

Trees absorb the first 30% of most precipitation through their leaves. Precipitation is absorbed into the ground and held onto by the root structure (up to 30%). Some of this water also naturally percolates into the groundwater and aquifer. Storm water runoff, erosion, and flooding potential to urban properties is therefore reduced.

Wind speed and direction is affected by trees. Rainfall, sleet, and hail are absorbed or slowed by trees, providing some protection for people, pets, and buildings. Trees in fencerows are used as windbreaks in many farms and ranches.

Air quality is improved through the use of trees, shrubs, and turf. Leaves filter the air we breathe by removing dust and other particulates. Rain then washes the pollutants to the ground.

Leaves absorb the greenhouse gas carbon dioxide during photosynthesis and store carbon as growth.

Leaves also absorb other air pollutants – such as ozone, carbon monoxide (CO), and sulfur dioxide–c, volatile organic compounds (VOC), nitrogen oxides (NOx).

By planting trees and shrubs, especially natives, we return developed areas to a more natural environment that is attractive to birds and wildlife and improves the urban ecosystem. Many ornamental trees are ecological deserts and do not contribute as much to the ecosystem as do native trees which provide food and shelter to local animals. Biodiversity is ultimately essential to human well-being.

Ecological cycles of plant growth, reproduction, and decomposition are present, both above and below ground. Tree roots are symbiotic with soil fungi that help absorb phosphorus and other nutrients and create a species-rich soil ecosystem with higher organic matter.

How do we reduce carbon dioxide and adapt to climate change using trees?

Trees absorb carbon dioxide (CO₂) and store and sequester carbon (C) in the wood both above and below ground during years of healthy growth. After trees die, C in wood is recycled in the air, animals, and soil. Long lived trees such as oaks and redwoods are best for C sequestering. Trees also can shade housing and streets to reduce urban temperatures overall as well as individual homes as measured in the Urban Heat Index and home thermostats. Low income housing areas typically have a higher heat index due to having fewer trees and more dense housing/hardscape so one of the goals of climate change social justice is to reduce local heat index by planting shade trees in low income areas which also provides jobs to locals.

What are some environmental risks?

Trees can harbor plant disease, insect pests, and animal pests. They can shade out other plants, compete for nutrients and water, and drip plant toxins (allelopathy) so plants under trees can become stressed and die. California Bay Trees and Tan Oaks can be carriers of Sudden Oak Death pathogen that can be transmitted to other oak species. Aphids, bees and wasps can make their homes in trees and you may encounter flying insects or have aphids drip sap onto your car. Possums, cats and rats can climb trees and use them to reach your roof top. Trees bring nature and the natural world to our immediate surroundings.

Trees near houses can be conduits of fire from house to house in our urban environment, but can also block windborne ash and embers. Trees or shrubs too close to street corners can block visibility for vehicular street traffic.

All of these potential issues caused by trees can be mitigated by choosing the right tree for the right planting site, and by adequate care and maintenance of the tree.

Planting a Tree

How do I decide what tree to plant and where to plant it?

TREES around your home can increase its value up to 15% or more. The trees you plant remove CO₂ from the air, produce oxygen, and give songbirds a home. Trees provide many other benefits:

A WINDBREAK can lower heating bills 10-20%.

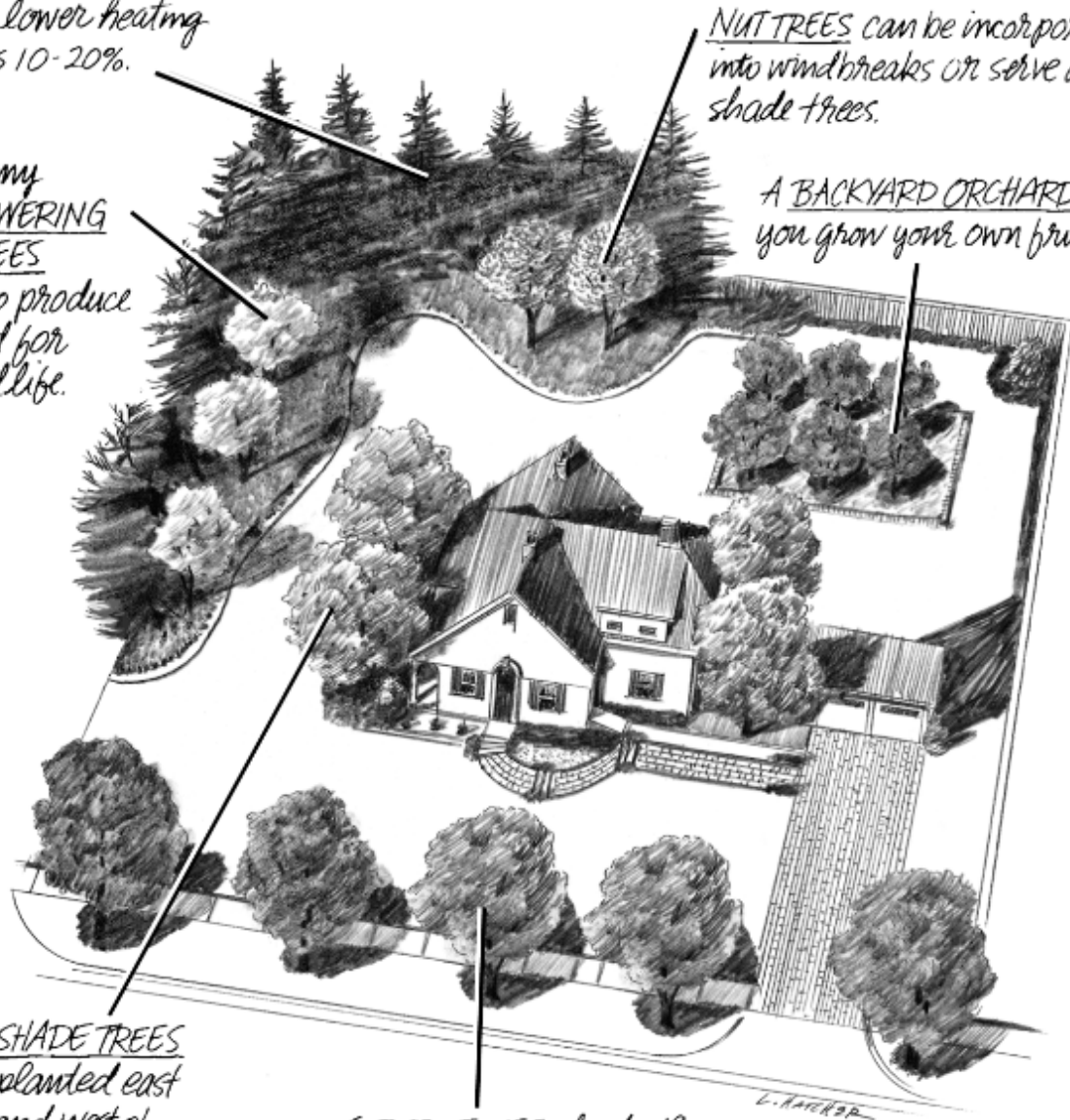
Many FLOWERING TREES also produce food for wildlife.

NUT TREES can be incorporated into windbreaks or serve as shade trees.

A BACKYARD ORCHARD lets you grow your own fruit.

SHADE TREES planted east and west of your home can cut cooling costs 15-35%.

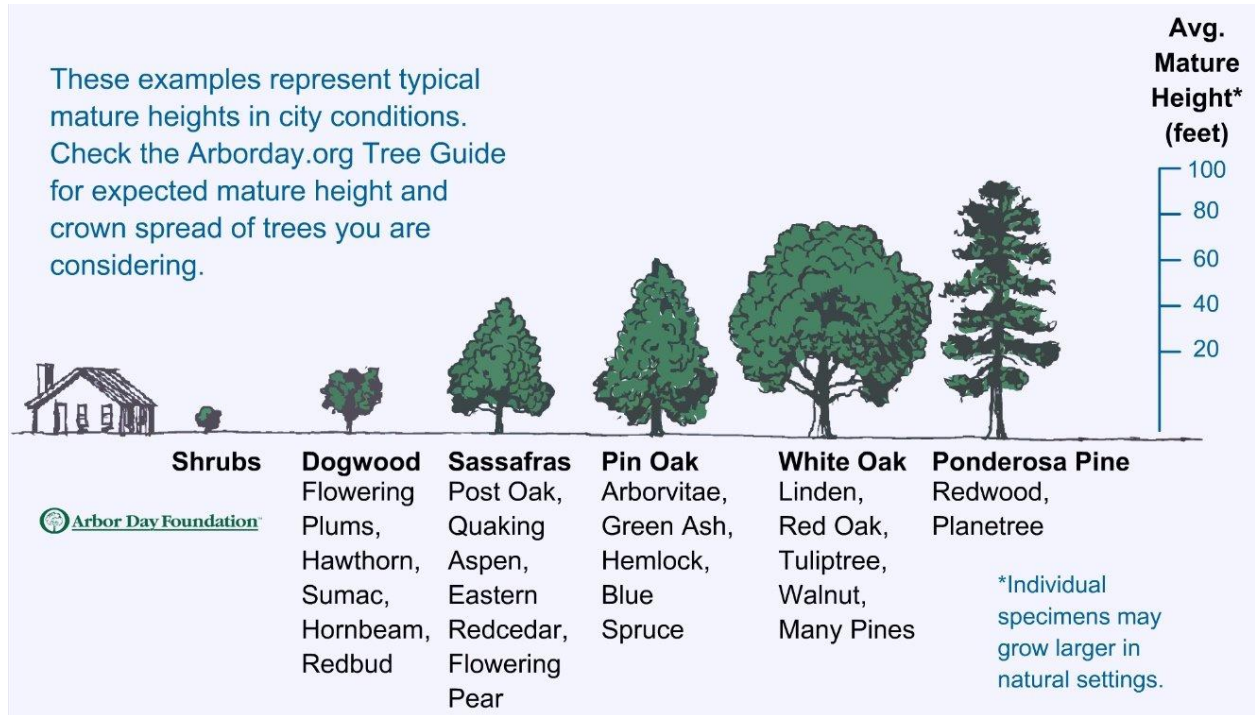
STREET TREES shade the concrete and help cool the entire neighborhood.



 **Arbor Day Foundation®**

Right Tree, Right Size, Right Placement

The City of Petaluma keeps a list of [Approved Street Trees](#). This is a good place to begin if you want to add or replace a tree. Trees need adequate space for trunk expansion and space to develop woody structural roots for support. Plant 5-10 feet away from the building depending on the mature size of the tree species. Don't plant over an underground service so call Underground Service Alert (USA) to identify services. Stay 10 feet away from a sewer lateral line and 5 feet away from a water meter.



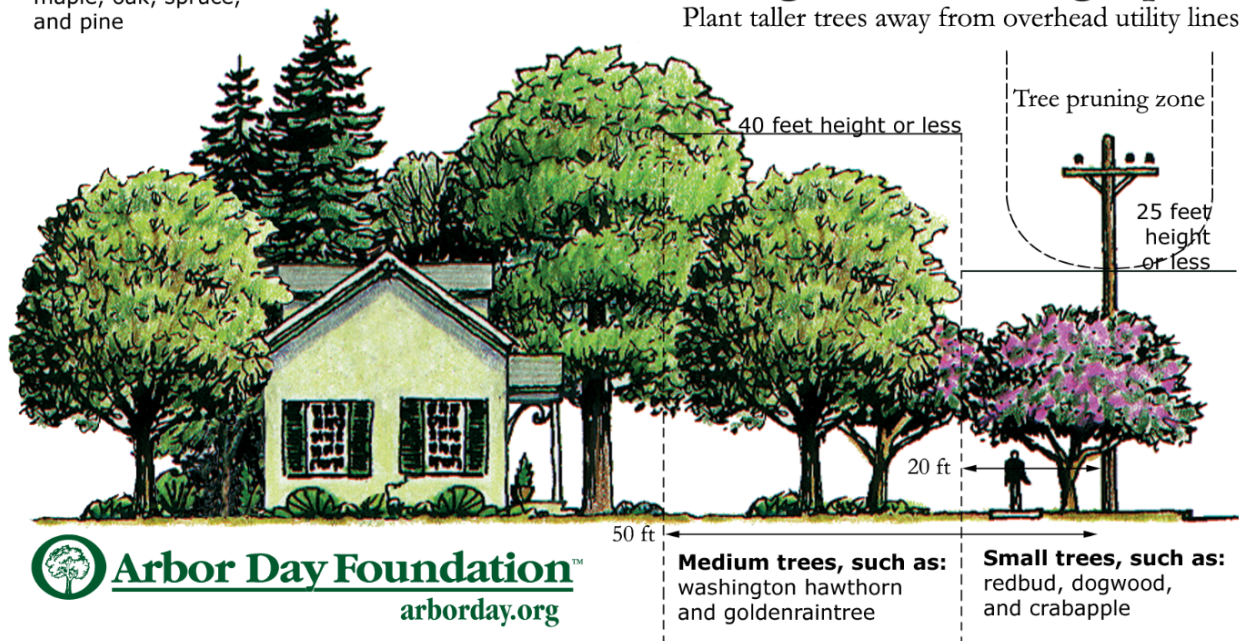
Look at the PGE brochure to find more examples of trees by size and placement: [Power Wise Tree Maintenance Guide](#).

PG&E also has a very good full color publication available on the Internet for tree selection by location and planting: [Power Wise Tree Planting for California](#)

Tall trees, such as:
maple, oak, spruce,
and pine

Plant the right tree in the right place

Plant taller trees away from overhead utility lines



How Do You Plant a Tree?

At least a week before you dig, call the National PGE 811 hotline to make sure you are not hitting underground electrical lines or gas pipes. Check out the [PGE webinar on their 811 service](#).

Tree Planting Basics

Below is standard practice for planting a tree. For differential treatment for bare root, ball and burlap, and containerized trees see the [Arbor Day Foundation Guide](#) to plant trees.

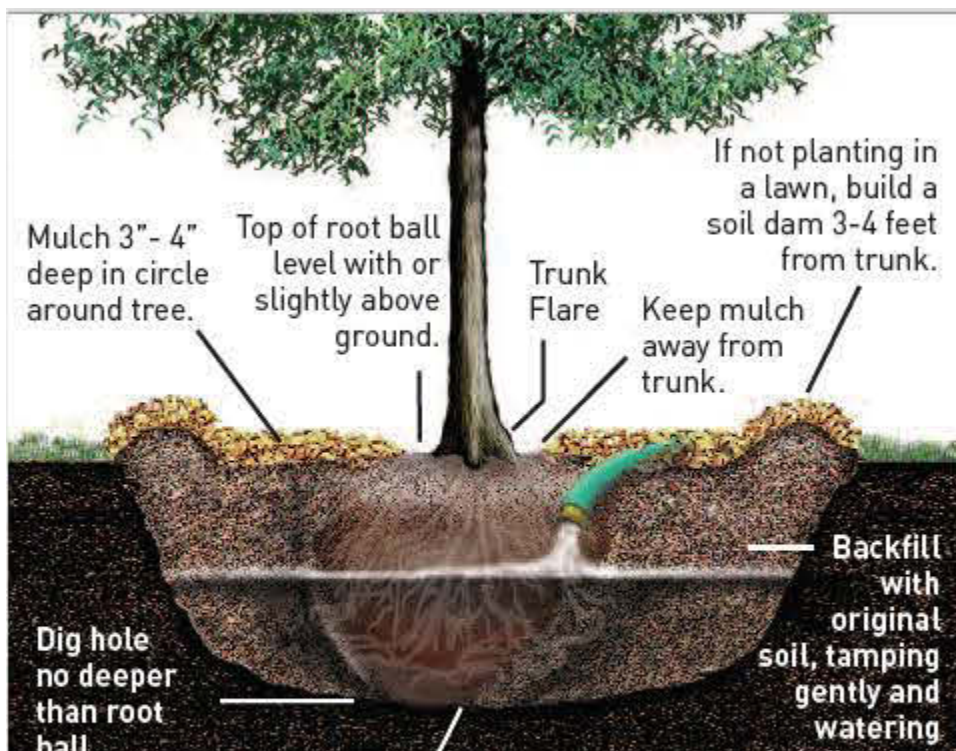


Image Credit : [PGE PowerWise Tree Planting Guide](#)

Prepare the planting area, marking an area several times wider than the root ball diameter. All debris, wood chips, pavement, concrete and rocks over 2-inches in diameter shall be removed from the planting pit. Loosen this area to about the depth of the root ball. This will enable the tiny roots of your tree to extend well into the soil in the first several weeks. Scarify (rough up or put in slits) the sides and the bottom of the pit so roots grow into the native soil instead of growing in a circle at the edge of the pit. This is especially important in heavy clay soils. Note: For trees in a confined planter pit or sidewalk excavate the planting hole to a minimum of 30-inches deep x the width of the exposed area to maximize the root growing zone. Soil beneath the root ball shall be compacted to prevent settling.

Dig the hole in the center of the loosened area, no deeper than the depth of the root ball and 2-3 times the diameter of the root ball. In very hard soils, roughen the edge of the hole to assist new roots in growing out into the surrounding soil.

If the tree is in a container, gently remove the container from the root ball - don't pull by the trunk. Loosen roots with finger tips and prune away damaged or circling roots.

For balled or burlapped trees, rest the root ball in the center of the hole, reshaping the hole so the tree will be straight and at the proper level. After adjusting the tree, pull the burlap and any other material away from the sides and top of the tree.

Loosen the soil near the trunk to find the trunk flare. *{See graphic}* This point should be visible at the top of the root ball. If it is not visible, remove soil from the top until the trunk flare is visible.

Place the tree in the hole resting the bottom of the root ball on solid undisturbed soil. When finished, the trunk flare should be at or just above the soil surface. Planting too deep, covering the trunk flare, is the most common mistake, which causes the bark to rot!

Stand back and look at the tree before putting the soil back into the hole. You can make careful adjustments at this time to the planting height and the direction the branches face without seriously harming the roots.

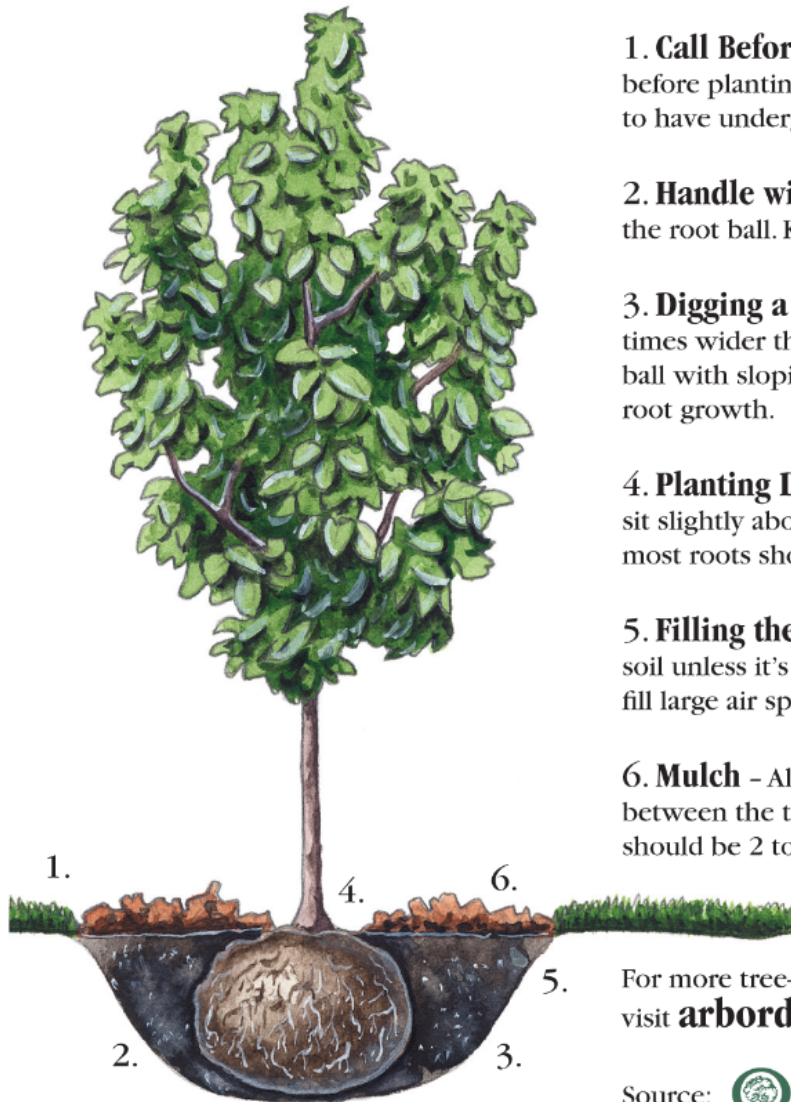
Gently refill the hole with the original soil using one-third of the soil at a time. Compost and a small amount of fertilizer can be added to the soil mix before refilling to improve root growth knowing that organic matter in soil will decompose and soil will settle. Break up dirt clods and remove any grass, weeds or rocks. Lightly pack the soil with the shovel handle to remove air pockets, be careful to not compress the soil too heavily. Remember the roots need to penetrate the native soil surrounding the pit. Water briefly. Refill and pack again until soil is even with the top of the root ball and the trunk flare is slightly above the soil. Water thoroughly.

If your tree is not planted in a lawn, using excess soil, construct a small earthen dam or berm, less than 4 inches tall, just outside of the root ball zone. This helps retain water and allows the water to soak into the soil rather than running off. The berm is temporary, remaining no more than two years, while your tree becomes established.

Mulch (chipped wood, bark compost or dry leaves) may be used over the entire loosened area of soil to about 3-4 inches deep. This will slow water loss, reduce competition from weeds and grasses, moderate the soil temperature and provide a small amount of nutrients. Keep mulch away from the trunk of the tree to prevent disease.

Remove the nursery stake. The nursery stake is tied tightly to the trunk and causes serious injury to the trunk of the tree if left in place after planting. If damage from the nursery stake is noted at the time it is removed, the tree may require replacement if the wounds are serious. Adding larger stakes is an optional temporary measure if tree stability is a problem. This will allow the trunk to develop strength. Be sure to remove it as soon as possible. The sooner the stakes and ties are removed, the stronger your tree will be. Typically this can be 1-2 years and no longer than 3. *Reddy stakes*, available from your nursery, are the easiest to use.

Six things you should know when planting a tree.



1. Call Before You Dig - Several days before planting, call the national 811 hotline to have underground utilities located.

2. Handle with Care - Always lift tree by the root ball. Keep roots moist until planting.

3. Digging a Proper Hole - Dig 2 to 5 times wider than the diameter of the root ball with sloping sides to allow for proper root growth.

4. Planting Depth - The trunk flare should sit slightly above ground level and the top-most roots should be buried 1 to 2 inches.

5. Filling the Hole - Backfill with native soil unless it's all clay. Tamp in soil gently to fill large air spaces.

6. Mulch - Allow 1 to 2 inch clearance between the trunk and the mulch. Mulch should be 2 to 3 inches deep.

5. For more tree-planting tips and information, visit arborday.org.

Source:  **Arbor Day Foundation**
90075201

Can I use root barriers?

In planting strips, trees can grow roots under sidewalks, driveways, and street pavement and over time roots get larger and heave up cement and asphalt. One solution is to add a root barrier, a stiff hard partition around the edge of the planting strip that is over one foot deep. Roots can not grow through these barriers and do grow along the borders and under them. This gives room for roots under the surface to grow larger without lifting the upper surface. The problem with this method is that tree roots support a large upper above ground structure and without adequate support the bound roots do not give enough structural support and trees can blow over in strong winds. Putting in a root barrier is similar to putting trees in containers.

How do tree roots grow naturally vs. in a planting strip? Can this create a hazardous situation if roots are limited?

Tree roots usually grow many times wider than the drip line in a spreading pattern and most of the root system is in the top one foot of soil. This gives trees a wide area to collect water and nutrients and also gives structural strength to hold up a top heavy branch system on a single stem pole. The Critical Root Zone (CRZ) is a more or less circular area above, and extending 24" below, the ground around the trunk of a tree. The radius of the CRZ is equivalent to the dripline of the tree, or 1.25 times the diameter breast height of the tree, whichever is greater. The CRZ increases in size as the tree grows.

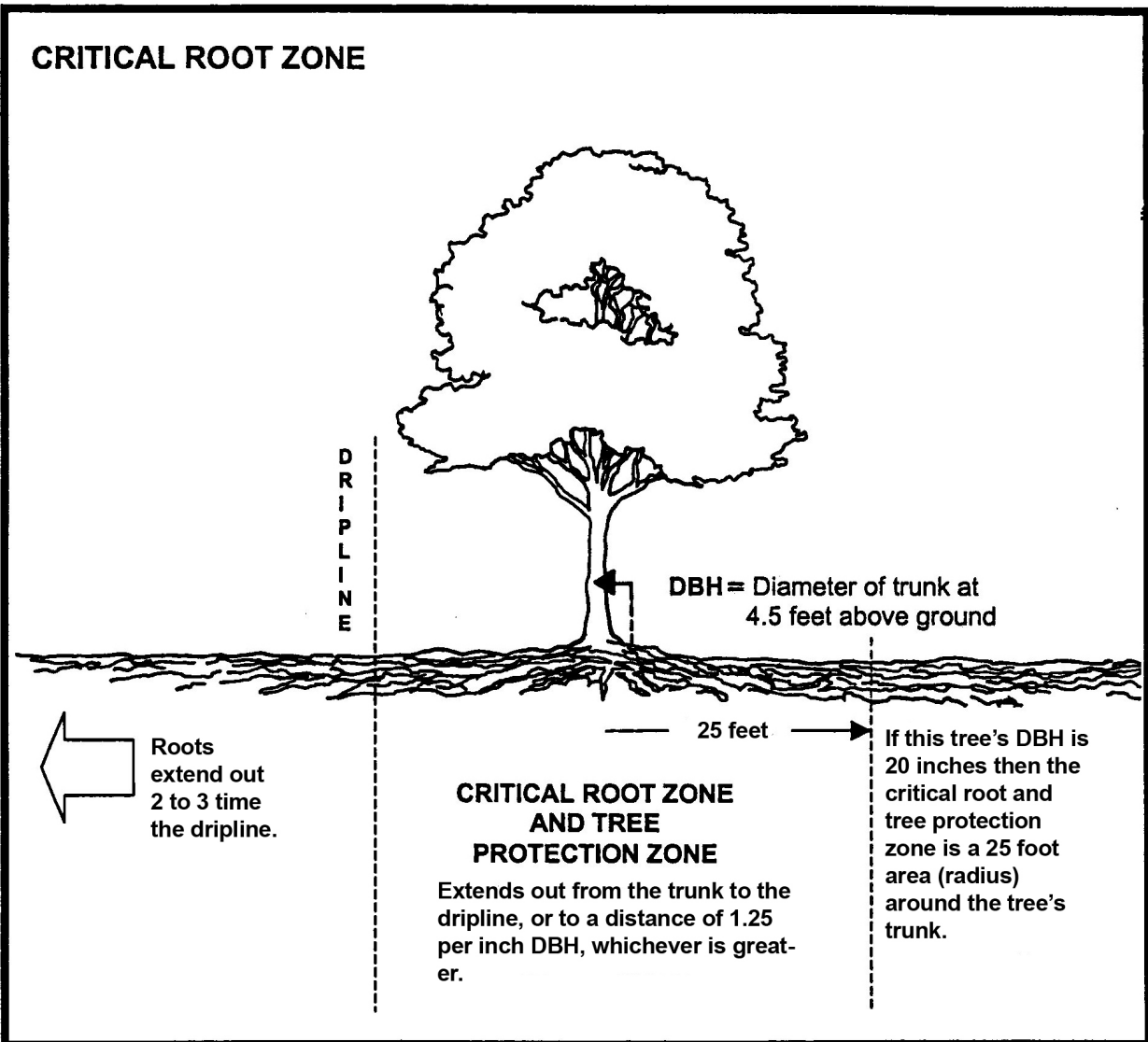


Image Credit: [Athens Clarke County](#)

Tree roots in planting strips tend to stretch out in the direction of the planting strip and the tree can topple over if the wind direction is perpendicular to the planting strip. Trees whose roots get out of the tree pit and under pavements can be prone to toppling. Tree pit design is arguably

more important than tree selection in that a well designed tree pit will relieve the tree of any growth stresses associated with tiny pits—insufficient moisture or room to solidly anchor the trunk. Tree pits should be considered as part of the street and sidewalk infrastructure and room for them must be found within the limited real estate that must be shared by all the utilities also under the street and sidewalks.



A toppled tree offers a glimpse at shallow, plate-like root systems that run through the subsoil.
Photo Credit: BRIAN THOMPSON /Postmedia

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How Should I Maintain My Trees?

Homeowners and business owners with street trees should maintain them in a healthy condition. Monitor and assess your trees at least annually to detect basic needs like water, pruning, and mitigation for physical damage that may have occurred as a result of vehicles or vandalism. Newly planted trees should be monitored more frequently. Healthy trees can withstand a moderate level of insect pests and disease and recover without any intervention. There are [many sources of information for general maintenance of trees](#), as well as specific guides for specific trees found in Internet searches. Professional arborists are available locally to advise if you need help.

Below are a few questions to ask when monitoring tree health:

- Leaves: Are the leaves the right color for the species and the season? Are the leaves distorted, show signs of insect chewing or dead spots? Are any insects present or signs of insects, like sticky sap on the ground? Are leaves falling prematurely?
- Twigs: Do the twigs have leaf growth to the tip? Are twigs distorted?
- Branches: Are broken or hanging branches present? Are branches discolored or oozing sap? Are branches too close or crossing and rubbing?
- Trunk: Is the trunk vertical or leaning? Is bark missing? Is sap or dark liquid oozing from the trunk? Are unusual overgrowths (galls) present?
- Ground Plane: Is soil moisture adequate? Are mushrooms present (often indicates overwatering)? Are weeds present?

How do I get the neighbors to work as a team on the street trees since they should all be treated the same down the street? Who can I call to help?

Use your Home Owner Association, Community Watch, or Landscape Assessment Development to organize a local meeting and set up a volunteer program to help each other. Several nonprofits in Petaluma work on tree and garden programs in various ways so check out each one on the web:: [Master Gardeners](#), [Native Plant Society](#), [Daily Acts](#), [Cool Petaluma](#), and [ReLeaf Petaluma](#).

Watering Street Trees



**Save Our Water
and Our Trees!**

Street trees have less access to water than field trees due to the amount of asphalt and cement surrounding their root systems.

Street trees need occasional deep watering in the summertime.

If you removed your nearby lawn and/or cut back on watering, then occasional deep watering is even more important for street tree health.

[Canopy](#), a tree focused nonprofit in Palo Alto and leader of urban forestry in California, has some good information on [watering trees](#).

Watering During Drought

Source: [California Save Our Water Save Our Trees](#) and [Canopy Save our Water and Save Our Trees](#)

Why do I need to take care of my tree during the drought?

Your trees provide an immense range of health, energy, environmental, and economic benefits:

- Trees improve air and water quality
- Trees provide shade to the landscape and reduce water needs
- Trees help keep your home cooler
- Trees slow stormwater runoff and help recharge groundwater
- Trees reduce soil erosion
- Trees add value – sometimes thousands of dollars' worth – to your home & neighborhood

Trees take a long time to grow. Without helping our trees through the drought, we risk losing their benefits. While the drought may not last long, it can seriously damage or kill trees, and these benefits will take 10, 20, or even 50+ years to get back. Taking care of your trees during the drought ensures that we preserve and protect these life-giving benefits for ourselves, our families, our homes, and our communities.

How often should I water my large mature trees?

Mature trees in your lawn need to be closely monitored. With a generous layer of mulch and monitoring, these trees need to be gradually transitioned to a deep watering 1 – 2 times per month, depending on the number of hot days (over 95 degree F).

Place a soaker hose in a spiral pattern toward the edge of the tree canopy (drip line). Check the soil by plunging a long screwdriver or similar tool into the soil. The soil should be moist to at least 18 inches deep, but not soggy. Be sure not to concentrate the water at the base of the tree, since that will cause rot.

Water-loving trees such as birch, redwoods, and certain maple will always require close attention. Other tree species, even drought-tolerant ones, planted in a lawn that was frequently watered will be affected when the irrigation is cut back or stopped, particularly if your soil type is heavy or compacted. Be sure not to concentrate the water at the base of the tree, since that will cause rot.

How often should I water my mature native or drought-tolerant trees?

Trees that have matured in non-turf landscapes adapt the easiest, especially drought tolerant species. Native trees, such as our California oaks, need MUCH less water than most non-native trees. In fact, California oaks may only need one or two deep waterings over the summer, but no water within 1 to 2 feet from the trunk. They absolutely need the soil to dry out for a month or two before more water, if any, needs to be reapplied.

How often should I water my young trees?

A newly planted tree needs to be watered more often: 2 – 4 times per week in summer, depending on the soil type. More often for sandy soils and less often for clay soils.

Create a 4 – 5 feet diameter watering basin around the tree, using soil to create a small berm or ring of dirt around the tree. Fill the basin with water, allow it to soak in, then add more water. Give newly planted bare root or 5-gallon trees at least 10 gallons of water each time you water. Give newly planted 15-gallon trees about 15 -20 gallons of water each time you water.

Trees that are 1 – 2 years old have roots that are extending beyond the canopy width, so increase the area being watered and avoid watering within 1 – 2 feet of the trunk. Trees of this age may require deep watering once a week in summer, and more than that where the soil is sandy.

How can I tell if my tree is not getting enough water?

Look at the tree leaves. Wilting leaves is the first indicator of lack of water to the roots. Wilting leaves can also mean too much water, but in a drought year, that would be rare.

When should I water my trees?

Water early in the morning or after sunset, when the sun won't evaporate water as readily. Make sure you are watering the soil around the tree, not the leaves, branches or trunk.

How is watering trees different from watering my lawn?

Your lawn sits on the surface of the ground and has shallow roots. It needs watering a few times a week, usually with a sprinkler.

Trees need to be watered less frequently, but with deeper soaking – because their roots grow deep in the earth – the majority of tree roots are 1½ -3 feet deep. Lawn irrigation does not water trees effectively. It generally reaches only the first few inches of soil, encouraging weak surface roots to grow.

What else can I do to save water and save my trees?

Stop watering your lawn this summer – let it “sleep” or go gold, or remove your lawn completely – to eliminate competition for water and nutrients. Replace with bark or mulch to help retain ground moisture. Consider sheet mulching to prepare your lawn for drought-tolerant turf and plants. Trees near lawns do use the water from lawn watering so if you do remove the lawn, then use occasional deep watering of your trees during the summer months. During drought you can water by using tree bags which hold about 20 gallons of water around the trunk of young or newly planted trees or use a 5 gallon bucket with small holes in the bottom to drip water into the root zone of larger trees.

Mulch the tree base with wood chips. Wood chip mulch is one of the best ways to save water and keep your trees healthy. A thick layer of mulch will keep moisture in the soil longer and protect the roots from summer heat, so you use less water and your trees stay happy. Spread mulch in a 4- 6 inch layer around your tree – your tree would love the mulch to be as wide as the canopy of the tree. You will need to either remove the lawn underneath the mulch or “sheet mulch” with cardboard or newspaper to prevent the grass from growing up through the mulch. Keep mulch 2 – 3 inches away from the tree trunk to prevent rot around the base of the tree. Reusing greywater and non-potable water – for example, collecting shower water in buckets as you wait for it to warm up – is a great way to water your young trees that need about 10 – 20 gallons per week. Just be sure your greywater is free of non-biodegradable detergents, soaps, or shampoos or other harmful chemicals.

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Pruning

Why Prune?

The removal of **dead, diseased, or damaged branches (the three D's)** helps to reduce the amount of stress on a tree and keeps it growing. Branches that are weak or interfere with things like traffic signs or electrical lines should be trimmed to avoid possible injury to people or property. When trees are young, shaping the branch structure can improve the long term structural strength of the tree. Shaping fruit trees can improve harvest productivity.

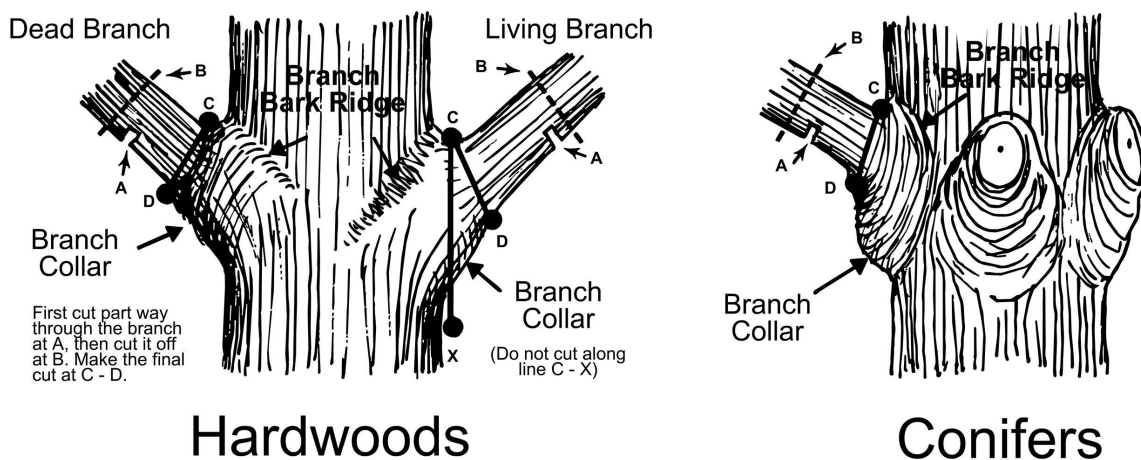
How do I prune the tree – to what specifications?

Tree pruning can be tricky to get right. The purpose of pruning young trees is to design the future structure for a strong trunk with balanced branching, a pleasing look, and in Petaluma, wind gusts. We have sea breeze winds most afternoons coming from the northwest and some trees tend to shape in a wind blown fashion over time. Consult professional help if needed.

The critical specifications for older trees is to keep the branches and limbs clear to a certain height, 8 feet above walkways for pedestrians and bicycle riders and 13 feet above the roadway where vehicles can park and move without hitting branches.

What are some simple rules to follow when pruning?

Proper Pruning Principles



Arbor Day Foundation has [bulletins](#) and educational videos focused on pruning as well as a wealth of [tree care tips](#).

Prune with a purpose: remove the three D's (dead, diseased, or damaged branches), provide clearance, or improve structure.

Use proper technique -- improper cuts can cause long-term damage.

Make small cuts -- this creates less damage to the tree than large cuts.

Make cuts just outside the branch collar -- this allows for faster wound closure (see below for illustrations).

Do not leave stubs.

Only use sharp and clean tools.

If a tree has fire blight damage or other internal disease, then special care is needed to prevent spread of the disease such as dipping pruning shears in germ killing solution between each cut.

Why is topping a tree bad for the tree?

Avoid Topping!!! Toppings belong on ice cream sundaes - not trees! At times, a tree or plant needs to be pruned to avoid interfering with utility lines, buildings, or other aspects of the urban environment. In these cases, it is important to avoid the practice of topping - the removal of all parts beyond a certain height with no consideration of the plant's structure or health. While many believe topping will reduce a hazard, it actually makes the tree more hazardous in the long run, and it is a temporary and ineffective solution.

What are the destructive effects of topping?

- "Starved" trees - Topping often removes 50-100 percent of the leaf-bearing crown robbing the tree of food-creating leaves. Creation of weak shoots - As a defense mechanism, a tree will quickly grow (up to 20 feet in one year) food-producing shoots that are weak and prone to breaking, resulting in a more hazardous tree.
- Added stress for the tree - If a tree does not have enough stored energy it will not be able to produce the chemicals required to defend the multiple wounds from a disease or insect attack.
- "Sunburned" trees- The leaves within a tree's crown absorb sunlight. Without this protection, branches and trunks are exposed to high levels of light and heat which can burn the tissues beneath the bark.
- Poor aesthetics- Topping removes the ends of branches often leaving unsightly stubs, and destroying the natural form of the tree. A tree that has been topped can never fully regain its natural form.
- Higher maintenance costs- Trees that have been topped will need pruning more often, or may die and need to be removed. Topped trees are potential liabilities and can reduce property value.

When should I prune?

Most routine pruning to remove weak, diseased, or dead limbs can be done at any time of the year. Growth is maximized and wound closure is fastest if pruning occurs before the spring growth flush - when trees expend a great deal of energy to produce foliage and early shoot growth. Heavy pruning immediately after growth flush can stress the tree. Avoid pruning during active disease transmission periods (such as early and mid-spring and early fall). A few tree diseases, such as oak wilt and fire blight, can be spread when pruning wounds allow spores to access a tree.

Summer flowering occurs on the new wood produced in the spring, while spring flowering occurs on the wood produced during the summer growth. Pruning for summer flowering plants and trees should take place in the winter or early spring to establish a healthy growing environment for new buds.

Pruning for spring flowering plants should take place after the plants have bloomed in early spring. If the tree or shrub is less than two years old, only light pruning is needed.

How much should be pruned?

Think of your pruning as a tight, closely monitored budget that is not meant to be over-extended; pruning too much is like going into the red. The amount to remove depends on the tree size, species, and age, as well as pruning objectives. Younger trees tolerate the removal of a higher percentage of living tissue better than mature trees do. Removing just one, large-diameter limb can create a wound that the tree may not be able to close. An important principle to remember is that a tree can recover from several small pruning wounds faster than from one large wound.

Mature trees should require little routine pruning. A widely accepted rule of thumb is never to remove more than one-quarter of a tree's leaf-bearing crown. In a mature tree, pruning one-quarter of a tree's leaf bearing crown could have negative effects. The pruning of large mature trees is usually limited to removal of dead or potentially hazardous limbs. The older and larger the tree, the less energy it has to close wounds and ward off decay or insects. A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. Over-thinning reduces the tree's sugar production capacity and can create tip-heavy limbs that are prone to failure.

What are the best pruning tools?

When pruning trees, it is important to have the right tool for the job. For small trees, most of the cuts can be made with hand pruning shears. The scissor-type, or bypass blade hand-pruners, is preferred over the anvil type; they make cleaner and more accurate cuts. Cuts larger than one-half inch in diameter should be made with lopping shears or a pruning saw. Never use

hedge shears to prune a tree. Whatever tool you use, make sure it is kept clean and sharp. Diseases can be spread with tools.

How do you make proper pruning cuts?

Where you make a pruning cut is critical to a tree's response in growth and wound closure. Make pruning cuts just outside the branch collar. Because the branch collar contains trunk or parent branch tissues, the tree will be damaged unnecessarily if you remove or damage it. In fact, if the cut is large, the tree may suffer permanent internal decay from an improper pruning cut. If a permanent branch is to be shortened, cut it back to a lateral branch or bud. Internodal cuts, or cuts made between buds or branches, may lead to stem decay, sprout production, and misdirected growth. When removing a large limb, first reduce its weight to avoid tearing the bark and make an undercut about 12-18 inches from the limb's point of attachment. Then make a second cut from the top, directly above or a few inches further out on the limb.

What is the best pruning technique?

There are specific types of pruning that help trees stay healthy, safe, and beautiful. Cleaning removes dead, dying, diseased, crowded, weakly attached, and low-vigor branches from the crown of a tree. Thinning selectively removes branches to increase light penetration and air movement through the crown and reduces weight on heavy limbs to retain the tree's natural shape. Raising removes lower branches from a tree to clear space for buildings, vehicles, pedestrians, and views. Reduction trims the height or spread of a tree by pruning back the leaders and branch terminals to lateral branches that are large enough to assume the terminal roles (at least one-third the diameter of the cut stem). Compared to topping, this helps maintain the form and structural integrity of the tree.

How and why do I prune a young tree?

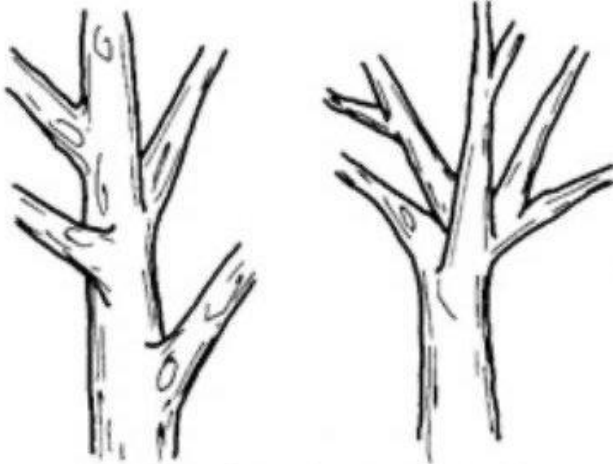
Proper pruning is essential in developing a tree with a strong structure and desirable form. Trees that receive the appropriate pruning measures while they are young will require little corrective pruning when they mature. Keep these few simple principles in mind before pruning a tree: Each cut has the potential to change the growth of the tree. Always have a purpose in mind before making a cut. Proper technique is essential. Poor pruning can cause damage that lasts for the life of the tree. Learn where and how to make the cuts before picking up the pruning shears. Trees do not heal the way people do. When a tree is wounded, it must grow over and compartmentalize the wound. As a result, the wound is contained within the tree forever. Small cuts do less damage to the tree than large cuts. For that reason, proper pruning of young trees is critical. Waiting to prune a tree until it is mature can create the need for large cuts that the tree cannot easily close.

How do I establish a strong scaffold structure?

Permanent Branch Selection

YES

NO



Branches should be well spaced radially and along the trunk as shown in the tree on the left.

A good structure of primary scaffold branches should be established while the tree is young.

The 6 scaffold branches provide the framework of the mature tree. Properly trained young trees will develop a strong structure that requires less corrective pruning as they mature.

The goal in training young trees is to establish a strong trunk with sturdy, well spaced branches. The strength of the branch structure depends on the relative sizes of the branches, the branch angles, and the spacing of the limbs. Naturally, those factors vary with the growth habit of the tree.

Pin oaks and Sweetgums, for example, have a conical shape with a central leader. Elms and live oaks are often wide-spreading without a central leader. Other trees, such as lindens and Bradford pears, are densely branched. Good pruning techniques remove structurally weak branches while maintaining the natural form of the tree.



When co-dominant stems develop, bark may become "included" in the crotch. It is best to prune one of the stems while the tree is young.

Nursery trees often have low branches that may make the tree appear well proportioned when young, but low branches are seldom appropriate for large-growing trees in an urban environment. How a young tree is trained depends on its primary function in the landscape. For example, street trees must be pruned so that they allow at least 13 feet of clearance for road traffic and parking and 8 feet for pedestrian traffic on sidewalks.

Most landscape trees require only about 8 feet of clearance. The spacing of branches, both vertically and radially, in the tree is very important.

Branches selected as permanent scaffold branches must be well-spaced along the trunk. Maintain radial balance with branches growing outward in each direction.

A good rule of thumb for the vertical spacing of permanent branches is to maintain a distance equal to 3 percent of the tree's eventual height. Thus, a tree that will be 50 feet tall should have permanent scaffold branches spaced about 18 inches apart along the trunk. Avoid allowing two scaffold branches to arise one above the other on the same side of the tree. Some trees have a tendency to develop branches with narrow angles of attachment and tight crotches. As the tree grows, bark can become enclosed deep within the crotch between the branch and the trunk. Such growth is called included bark. Included bark weakens the attachment of the branch to the trunk and can lead to branch failure when the tree matures. You should prune branches with weak attachments while they are young, if possible. Avoid over-thinning the interior of the tree. The leaves of each branch must manufacture enough food to keep that branch alive and growing. Removal of too many leaves can "starve" the tree, reduce growth, and make the tree unhealthy. A good rule of thumb is to maintain at least half the foliage on branches arising in the lower two-thirds of the tree.

Trunk Development. For most young trees, maintain a single dominant leader growing upward. Do not prune back the tip of this leader. Do not allow secondary branches to outgrow the leader. Sometimes a tree will develop double leaders known as co-dominant stems. Codominant stems can lead to structural weaknesses, so it is best to remove one of the stems while the tree is young. The lateral branches growing on the sides contribute to the development of a sturdy well-tapered trunk. It is important to leave some of these lateral branches in place, even though they may be pruned out later. These branches, known as temporary branches, also help protect the trunk from sun and mechanical injury. Temporary branches should be kept short enough not to be an obstruction or compete with selected permanent branches.

Should I put wound dressing on cut branches?

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure and rarely prevent insect or disease infestations.

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Fertilization - Providing Nutrition for Tree Growth

How do I fertilize the street tree?

Trees require certain nutrients (essential elements) to function and grow. Urban landscape trees, esp. street trees, are often grown in soils that do not contain sufficient available nutrients for satisfactory growth and development. In these situations, it may be necessary to fertilize to improve plant vigor. Fertilizing a tree can improve growth; however, if fertilizer is not applied wisely, it may not benefit the tree at all and may adversely affect the tree.

Many trees in managed landscapes are able to scavenge for enough elements once they become established due to their extensive root systems. They have access to naturally occurring elements as well as elements applied as fertilizer to the lawn, shrubs, and garden and may need no additional fertilizer. Some species such as hollies, crapemyrtle, maples, Chinese elms and others appear yellow and chlorotic in some circumstances unless fertilized. These and trees like them can benefit from regular fertilization, at least until established.

Mature trees making satisfactory growth may not require fertilization. When all branches on mature trees have foliage to their tips, and foliage is green, there is little reason to add fertilizer. Harm can occur when a tree with low reserves due to root damage or old age attempts to incorporate nitrogen into cell components. Since this process requires energy expenditure, reserves can be lowered further. This could lead to a decline in health. Trees with low reserves have reduced ability to fight the effects of injury and pests.

When considering supplemental fertilizer, it is important to know which nutrients are needed and when and how they should be applied. Soil conditions, especially pH and organic matter content vary greatly, making the proper selection and use of fertilizer a somewhat complex process. When dealing with a mature tree that provides considerable benefit and value to your landscape, it is worth the time and investment to have the soil tested for nutrient content.

Professional arborists can arrange to have your soil tested at a soil testing laboratory and can offer advice on application rates, timing, and the best blend of fertilizer for your trees and the rest of your landscape. Mature trees have extensive root systems that extend from 2 to 3 times the size of the leaf canopy. A major portion of actively growing roots are located outside the tree's drip line. There is a long-standing inaccurate belief that trees must be "deep root" fertilized. This notion is associated with the myth that a tree's root system is an underground mirror of the crown.

Because most of the absorbing roots are actually in the upper few inches of soil, it makes little sense to place the fertilizer deeper. It is important to understand this fact when applying fertilizer to your trees as well as your turf. Understanding the actual size and extent of a tree's root system before you fertilize is necessary to determine how much, what type, and where to best apply fertilizer. If you are fertilizing your lawn and trees are occupying the same area, the trees

might not require supplemental fertilization. The key to any fertilization program is to base the application of the fertilizer based upon the plant's needs.

How do I apply fertilizer? How do I avoid runoff?

Some contamination of surface waters has been attributed to fertilizer runoff from asphalt and concrete surfaces. This occurs when fertilizer is carelessly or inadvertently applied to the hardscape. To reduce the chances for runoff, apply fertilizer very carefully where the fertilizer surface meets hardscape. You might apply solid granules of fertilizer by hand wearing gloves in these sensitive locations, or you could use a deflection shield. Another method is applying a solution using a watering can to carefully distribute nutrients over a large area of soil under and beyond the drip line. Tree roots of older trees extend far beyond the drip line. Remember to sweep up any granular fertilizer that falls on cement or asphalt and do not allow particles to float away into the local creeks.

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Trees In or Near Lawns

Maintenance practices for trees and turf are different. Because tree and grass roots exist together in the upper 6 to 8 inches of the topsoil, treatment of one may damage the other. Fertilizer applied to one plant will also be absorbed by the roots of a nearby plant. Normally that is good, but excessive fertilization of either trees or turf can result in tree crown or grass blade growth greater than desired.

Chemical treatments

Herbicides, especially broadleaf weed killers, are often used on lawns. It is important to remember however, that most trees are broadleaved plants and can be injured or killed if high enough doses reach them. Homeowners must keep in mind that "weed and feed" fertilizers contain herbicides, which can damage trees.

Lawns, water and trees

Watering can be beneficial to trees and lawn if the watering is done correctly. Trees need, on average, the equivalent of one inch of rain every seven to ten days, depending on the species. Tropical rain forest trees may require more. Frequent, shallow watering does not properly meet the needs of either trees or turf and can be harmful to both; deep and slow watering 1-2 times a week to meet the amount needed is preferred.

Mowing and Line-Trimming



Turf growing under or near trees should be mowed at the top of its recommended mowing height.

Mowing off no more than one-third of the grass blade's height and letting the clippings remain on the lawn helps to ensure a healthy and vigorous lawn.

In an ideal situation, tree and turf maintenance would be handled by the same individual in order to maximize the benefits of all maintenance practices.

Most people don't realize the degree of damage that can be caused by the bumping of a mower or the whipping

action of a nylon string trimmer. A tree's bark can only provide so much protection against these devices. Young, thin-barked trees can be damaged almost immediately. In the worst-case scenario, the trees may die. Those that are not killed will be stressed (weak and susceptible), and wounds may serve as entry points for diseases, borers or other insects.

Pruning for light penetration

Pruning to increase light penetration for the lawn may be considered, keep in mind that it is usually not a permanent solution. That's why a rule of thumb is not to remove more than one-fourth of the tree's foliage-bearing crown in a single pruning. If a tree is thinned too much, it will be stressed, and will probably produce many water-sprouts (suckers) along its branches to compensate for lost foliage. This process defeats the purpose of pruning to allow more light penetration. It may help to "raise" a tree's crown to improve light penetration. Crown raising involves the removal of lower branches on trees, and most tree species are quite tolerant of this pruning practice.

Root Control

Some trees tend to form surface roots, which can be a major problem in lawns. Homeowners always want to know to what extent they can prune or remove tree roots without killing the tree. Because cut roots tend to develop more roots, root pruning is generally not a solution.

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Mulching

Why mulch at all?

Mulch is any material applied to the soil surface for protection or improvement of the area covered. Organic mulches are made of natural substances such as bark, wood chips, leaves, pine needles, or grass clippings. They decompose over time and need to be replaced. Urban landscapes are typically harsh environments with poor soil conditions, little organic matter, and big fluctuations in temperature and moisture - all "unfriendly" growing situations for trees. When applied properly, mulch helps maintain soil moisture, control weeds, improve soil structure, and inhibit certain plant diseases. Mulch also protects plants and trees from "weed whacker" damage and "lawnmower blight" in addition to giving planting beds a uniform, well cared-for look. But too much mulch - be it layers deep or piled high against tree trunks - can cause major problems for homeowners, including: Excess moisture in the root zone, which causes plant stress and root rot; Insect and disease problems; Micro-nutrient deficiency or toxicity; Weed growth; Smelly planting beds, caused by anaerobic conditions and "sour" mulch; Habitat creation for rodents that chew bark and girdle trees.

The Basics of Mulching

To ensure the health of your trees and plants, follow these practical mulching tips to landscape like the pros:

- For well-drained sites, apply a 2- to 4-inch layer of mulch.
- If drainage problems exist, use a thinner layer.
- If mulch is already present, check the depth. Do not add mulch if there is already a sufficient layer (2 to 4 inches) in place. Instead, rake the old mulch to break up any matted layers and refresh the appearance.
- Avoid placing mulch against the tree trunks. If mulch is already piled against the stems or tree trunks, pull it back several inches so that the base of the trunk and the root crown are exposed.
- Mulch out to the tree's drip line or beyond if possible.

Some plants may benefit from the use of slightly acidifying mulch such as pine bark. Organic mulches are preferable for their soil-enhancing properties. Be sure it is well aerated and composted to avoid sour-smelling mulch. Avoid using un-composted wood chips that have been piled deeply without exposure to oxygen. Use composted wood chips instead, especially when they contain a blend of leaves, bark, and wood.

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Tree Protections

Can I cut down any tree I do not want?

No. Many trees, depending on species and location, are considered a public resource. Petaluma has tree ordinances like most cities and many trees are protected by city municipal code. City Tree Ordinances are currently being reviewed and rewritten to strengthen current rules and protect more trees including larger trees on private land. The city codes start in [Chapter 17 Tree Ordinances](#) but trees are also referenced over dozens of times scattered throughout city codes. Street tree removal requires a [permit](#) from the city and must be replaced with an equivalent tree on the [Approved Street Tree List](#)

Before construction can be done on private or public land, a city permit must be obtained which includes protections for on site trees, especially larger native species. If you want to develop land requiring a city permit, then you must abide by rules in the City [Tree Technical Manual](#). A professional Arborist Report may be needed and there are many rules about methods needed to protect remaining trees during the construction period. Contact the [City Planning Department](#) before doing any tree removal in the future.

Currently trees on private land not in a public right of way and is not going to be used for near term construction can be removed without permission except a “grove of native trees” is still protected. Rules in [Chapter 17 Tree Ordinances](#) are being reviewed and updated with protections expected to be increased.

Are there rules for pruning street trees?

Trees in the public right of way need to be safe for vehicles, bike riders, and pedestrians. Trees with foliage over streets must be removed and maintained at 13 feet above street level so fire trucks and other vehicles have easy access. Trees with foliage above bicycle or pedestrian rights of way must be removed and maintained at 8 feet above that surface.

Tree Pests and Diseases

Most trees and other plant material that are genetically well-suited to their environment will thrive once planted. In a natural setting, disease is the exception, not the rule. The environment and the tree species selected favor good health and hardiness for the tree to naturally resist the pest or disease. Prevent plant disease by selecting a suitable tree species. Control of the environment is possible and necessary to prevent plant disease by providing and maintaining healthy soil and adequate water around the tree. In the real world the environment and the proper tree species are more important than the presence of the pest in deciding whether disease will occur. Detailed information on common pests of trees and landscape plants in California can be obtained from the [UC Cooperative Extension IPM website](#).

Common Pests and Diseases

BARK BEETLES

Bark beetles are becoming a more severe problem for conifers and other trees in our area. See the [UC IPM page on Bark Beetles](#) for a long list of species and susceptible trees. The drought particularly made our trees stressed and susceptible to attack. The USDA has an online brochure on [bark beetles in our California conifers](#). Bark beetles dig under the bark and feed on the cambial layer and contaminate the tree with fungal spores that spread. The best defense is keeping trees healthy and well watered.

SYCAMORE SCALE

Sycamore scale is a minute sucking insect which can cause severe damage to the health and vigor of both young and mature Sycamore trees. The primary symptoms are small (2 mm diam.) brown spots with yellow halos on the leaves and early leaf loss. The younger leaves are usually the hardest hit. Premature excessive leaf drop occurs. To avoid this pest problem use the Columbia variety of sycamore (*Platanus acerifolia* 'Columbia') instead of the Yarwood variety (*Platanus acerifolia* 'Yarwood'). UC IPM has [information and photographs](#) of this pest.

TULIP TREE SCALE

The Tulip Tree Scale is a sucking insect that feeds on the leaves and tender stems of the Tulip tree (*Liriodendron tulipifera*). The insect weakens the tree causing death of the leaves and twigs and eventually the whole tree. A sticky, clear liquid that falls to the ground is a result of its feeding as well. This tree species is not well-suited to most of the climatic and soil conditions here. No resistant varieties are available. Avoid planting this tree, especially near sidewalks. See [UC IPM page on scales](#) and their management.

APHIDS

Hackberry (*Celtis sinensis*), Zelkova (*Zelkova* spp.), Ash (*Fraxinus* spp.) and Pine (*Pinus* spp.) are just a few of the trees in San Jose commonly infested with the aphid insect. There are many different species of aphid and some are specific to only certain trees, however, similar damage results from aphid feeding on trees. Aphids feed by sucking on leaves and twigs resulting in yellowed, distorted or dead leaves. Hackberry aphid Sticky honeydew from feeding of aphids and other sucking insects. Tulip tree declining from an infestation of the tulip tree scale insect. Aphids produce a sticky substance called honeydew that attracts ants and a black fungus called sooty mold.

OAK ROOT ROT

The oak root fungus, *Armillaria mellea*, causes root rot in a wide range of shrubs and trees worldwide. The first sign of this disease ranges from a slow gradual dieback to sudden death of a tree. Examination of infected roots reveals the presence of white mats of fungus mycelium between the bark and the wood. Trees infected with *Armillaria* will often blow over, due to the loss of supporting roots. In most cases, the occurrence of oak root rot is related to previous stress on the plant. The pathogen lives in most soils, and will infect a tree when it is weakened by stress. This stress may be environmental, such as drought, flooding or poor drainage; biotic, such as a severe insect infestation of leaf disease; or people-caused, such as construction or chemical injury. Prevention, therefore, is largely dependent upon maintaining a healthy environment for the tree. Once Oak Root fungus is prevalent in the soil there is no practical control method to eliminate it. Newly planted trees are weak and susceptible to infection unless they are genetically immune to this disease. See [UC IPM page](#) for more information.

SUDDEN OAK DEATH (SOD)

SOD has been in the news over the past few years. Research is on-going throughout the state of California to help protect our native oak and other trees. To find more details and information on how you can help go to the [California Oak Mortality Task Force](#). The UC IPM Program has a web site on [Sudden Oak Disease](#). UC Agricultural and Natural Resources has a publication on [Protecting Trees from Sudden Oak Disease](#).

FIRE BLIGHT

Fire Blight is especially troublesome on our ornamental pear trees planted on many streets and fruit trees in our gardens. When you see a single branch blacken like it was burned that is a strong indicator of fire blight. Pruning out branches needs to be done with a special technique of cleaning and sterilizing tools in between each and every cut. Cutting out an infected branch without sterilizing can spread the disease to the next branch cut. Dipping tools into alcohol or spraying with Lysol between each and every cut are common techniques of cleaning pruning tools. See [UC IPM page](#) for more information.

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Trees and Fire Risk



Photo Credit: Naveen Nkadalaveni, Wikimedia Commons

With the higher risk of wildfires, foresters and arborists have shifted from talking about fire prone species and now all about fuel reduction. We support the planting of trees in Petaluma, but we are also aware that we need to be fire safe. Creating defensible space and removing dead and dry vegetation can reduce fire risk. In California, the houses have gotten larger while lot sizes have diminished. To buffer the aesthetic impact of these trends, planting trees near homes is now standard practice in urban areas. We need to select the best species and place them in appropriate locations and then maintain them well because healthy trees are less fire prone than unhealthy trees. Your insurance company may have a policy concerning landscape maintenance, tree species or tree maintenance, so check with your insurance agent. Keeping shrubs and trees 3 or even 5 feet away from all building surfaces is a common practice required by some insurance companies.

Landscape plants protect soil from erosion and provide aesthetic and ecological benefits. It is important to understand, though, that all plants will burn given the right conditions. Ensure plants are properly irrigated. Dead leaves, branches and other flammable debris should be regularly removed. Fire-safe landscapes should also include hardscape materials, like granite paths or stone walls. These can act as a fuel break and help to slow down or change the path of an approaching fire. Make sure to keep flammable things like firewood piles and propane tanks

away from your home, and remember that the house itself can be made more fire resistant. Finally, in all cases, maintain your plants and property throughout the year to reduce the amount of fuel near your home.

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.

- Keep dry grass and weeds mowed or disced, especially in vacant lots
- No vegetation growing or combustible storage under decking.
- No tree canopy within 10-feet of chimney spark arrestor.
- Break up solid areas of continuous plant growth which create a 'fire-ladder'.
- Keep trees well watered, regularly pruned and in healthy condition.
- Prevent build-up of leaves and dead 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).
- Keep propane tanks away from main buildings

How do I make my landscape more fire safe if I live outside the urban area?

From [University of California Agriculture and Natural Resources: Defensible Space, Fire Resistant Landscaping, and Fire Hazard Reduction](#)

DEFENSIBLE SPACE

Providing a "defensible space" can reduce the risk of structural damage caused by fire. This space, at least 100 feet wide in California, is the area surrounding a structure where plants are maintained to decrease the fire hazard and provide an opportunity for firefighters to safely defend your home. Vegetation that does not ignite easily should be planted in the defensible space. Landscape plants protect soils from erosion and provide aesthetic and ecological benefits. Trees and shrubs are acceptable as long as they are widely spaced and do not provide a continuous path of fuel for a fire to climb from the ground to a tree crown or roof (a fuel ladder). Proper landscape maintenance can dramatically improve the fire safety of a yard.



Image source: CALFIRE

DEFENSIBLE SPACE GUIDELINES

Below are general guidelines adapted from [CALFIRE](#) Wildfire Prevention:

- Create and maintain a defensible space of at least 100 feet or greater from each building or structure. In Zone 1, from the home to a distance of 30 feet, keep plants low, and make sure to have irrigation available when needed. Check with your local fire department about the exact distances required in your area.

- Preserve single specimens or groupings of well-spaced and well-pruned trees or other vegetation.
- Eliminate ladder fuels within the defensible space zone by disrupting the vertical and/or horizontal continuity of plants.

FIRE-SAFE LANDSCAPING

You can improve the fire safety of your property by properly designing and maintaining your landscape.

- Make sure there is horizontal and vertical separation between plants. If a fire occurs, this will minimize the spread of fire between your plants, and from your plants to your home.
- Choose fire resistant plants. It is important to understand, though, that all plants will burn given the right conditions.
- Ensure plants are properly irrigated. Dead leaves, branches and other flammable debris should be regularly removed.
- Fire-safe landscapes should also include hardscape materials, like granite paths or stone walls. These can act as a fuel break and help to slow down or change the path of an approaching fire.
- Make sure to keep flammable things like firewood piles and propane tanks away from your home, and remember that the house itself can be made more fire resistant.

Finally, in all cases, maintain your plants and property throughout the year to reduce the amount of fuel near your home.

BRUSH, FUEL AND VEGETATION — CLEARANCE, MAINTENANCE, MANAGEMENT, MITIGATION, MODIFICATION, THINNING, REDUCTION, AND TREATMENT

These terms are typically used interchangeably to mean the maintenance of vegetation (trees, shrubs, grasses, groundcovers, and vines) in a way that minimizes the transmission of fire from one plant to another, and ultimately, to your house. Proper maintenance for fire safety does not mean eradication of all plants, but rather the selective removal of highly flammable vegetation. The goal of brush clearance is not to remove all vegetation, but to specifically remove fuels that create a fire hazard. When done well, “cleared” areas should still include enough well-spaced and judiciously pruned plants to protect against excessive erosion and provide wildlife habitat.

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Invasive Tree Species

What species should I avoid because they are “invasive” to our ecosystem?

Imported plants (imported by design or by accident) often adapt well to our California climate and spread to open space, wetlands and forested areas. Often these imported or invasive plants are detrimental to the habitat of the native plants and to the habitat of the native wildlife. Invasive trees can cause a decline of the native species of plants, insects and wildlife. Selection of landscape trees for planting (whether on private property or in the public right-of-way) should include investigating whether the tree species is considered invasive or detrimental to our California Landscape.

The nonprofit organization California Invasive Plants Council ([Cal-IPC](#)) is vigilant in its efforts to prevent, detect and remove plant species detrimental to California to protect and restore waterways and wildlands. The CalIPC website provides information on invasive species including photographs and descriptions of invasive tree species.

The list of invasive tree species for the Bay Area include:

- Black Acacia (*Acacia melanoxyton*)
- Tree-of-Heaven (*Ailanthus altissima*)
- Blue Gum tree (*Eucalyptus globulus*)
- Chinese Tallow Tree (*Sapium sebiferum*)
- Tamarisk (*Tamarisk ramosissima*)
- Russian-olive (*Elaeagnus angustifolia*)

Refer to the Cal-IPC site before selecting a tree or any shrubs, groundcover or other plant material to plant in the City of Petaluma.

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Tree Emergencies

Conditions requiring immediate attention include:

- Broken, hanging limbs
- Damaged and/or dead limbs
- Blocked streets, sidewalk or bike lanes (clearance issues)
- Interference with traffic signs or signal

If you come across a tree posing an immediate threat or safety hazard such as fallen tree in a road then call one of the hot lines below:

- **City hotline** for emergency tree hazard:
- If you find a downed tree or broken large limbs that pose a serious hazard in a public space, call the **Tree Emergency Hotline: 707-778-4303.**
- **PGE hotline** for emergencies involving electrical or gas lines:
- If you smell natural gas, see downed power lines, or suspect another emergency situation, leave the area immediately and **call 9-1-1. Then, call PG&E** at 1-800-743-5000.

Non Emergency tree issue contacts:

Report non-emergency tree hazard to the city:

The city is now asking citizens to help observe city owned trees in parks and street medians and report damaged trees and non-emergency hazardous situations through a Phone APP [engagEPetaluma on the Apple Store](#) or in Google Play [engagEPetaluma](#). Another way to report tree issues or any other issue is to use the [City of Petaluma - Report An Issue](#) website.

PG&E non-emergency tree questions:

If you would like to schedule an appointment with one of the PG&E tree care professionals or have questions about power line acceptable trees, please contact PG&E Customer Call Center at 1-800-743-5000.

To find out more, or to contact PG&E about tree marking on your property: Call: 1-877-295-4949 or E-mail PG&E at: wildfiresafety@pge.com

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Tree Hazards

Can trees be hazardous or destructive?

Large growing trees can come in conflict with utilities, views, and structures that are beyond the bounds of the owner's property.

Trees and large shrubs can grow into the visual zone of road signs, thereby creating potential road hazards.

Tree roots can grow into and under structures causing damage, e.g. redwood roots can grow into foundations and willow tree roots grow into water and sewage pipes.

Tree sap, e.g. from oak trees, can accumulate on parked cars, forming a dark and gritty coating on the surface that reduces visibility through windows and attracts insects. Runoff from washing cars with soap may enter storm drains and increase pollution in our creeks.

Tree limbs can fall out of trees, and trees can fall over, damaging property and harming people. Trees live and die in natural cycles and can be broken by wind and are susceptible to root and vascular diseases reducing structural integrity.

Currently, many trees in our community are suffering and dying from drought, disease (especially fire blight on ornamental pear trees, and sudden oak disease on oak trees), and insect attack (especially bark beetles in pine trees). Due to these factors, many street trees are distressed and dying with many limbs already dead.

Dead limbs and trees can fall on people, cars, and other property. They are also unsightly. Diseases and insects that infest trees can spread to other trees. Diseased leaves need to be removed off site and can be put in the green waste bins for composting. Damaged limbs and dead trees need to be removed safely and properly.

Who is responsible for a hazardous tree?

On private property, it is the responsibility of the property owner to mitigate or abate a known hazardous condition of a protected or designated tree that may be of questionable structure or deemed as hazardous. Most tree hazards can be prevented with regular checkups by a tree care professional and timely maintenance action by the property owner.

Street trees on city property that may be a public safety hazard should be reported to the city **Tree Emergency Hotline: 778-4303**.

The City does not require advance permission for removal of Protected or Designated Trees in emergencies. However, it does require documentation of the problem after the fact. This is to avoid the unlawful removal of sound trees on the grounds that they are hazardous. If there is no

immediate danger, and the structural deficiency can be corrected, it should be. If the City determines that there was no reasonable basis for believing there was an emergency, the property owner may face penalties for violating City law.

Determining whether or not a tree's defects constitute a condition that presents an imminent hazard to an area requires a high degree of knowledge and experience. Hazard tree assessment of a protected or designated tree should only be evaluated by an arborist who is familiar with tree physiology and can interpret the external signs of weaknesses, who can perform internal checks if necessary and recommend mitigation.

How do I evaluate a hazardous tree?

Sick and dying trees look unhealthy, often with leaves turning brown out of season. Some diseased trees, especially pines, seep sap from the trunks. Trees with diseased roots often lean to one side.

Trees and shrubs, either fallen over into pathways or growing and hiding visual cues such as road signs and barriers are considered hazardous and need immediate care.

Leaf damage from insects is a sign local ecology is working and is not a hazardous situation since trees recover from insect herbivory damage. Herbivorous insects are food for birds and predatory insects and part of the natural cycle of life and needed for healthy local urban ecosystems.

We are now asking citizens to help observe city owned trees in parks and street medians and report damaged trees or hazardous situations through the [engagEPetaluma](#) program.

Note:Permits must be obtained from the City for all street tree removals or plantings. ([Tree Preservation Ordinance – Chapter 17](#)).

If you find a downed tree or broken large limbs that pose a serious hazard in a public space, call City Tree Emergency Hotline: 707-778-4303 or involving a power or gas line leave the area immediately and call 9-1-1. Then, call PG&E at 1-800-743-5000

How can I avoid future problems with my trees?

- Always plant the right tree in the right place. Select trees based upon their mature height and shape, and make sure the species selected matches the soil and other site characteristics. For example, avoid planting tall-growing trees such as redwoods near power lines or too close to your house.
- Do not plant trees with poor structure such as a narrowly-forked stem v-crotch or girdling root ball.
- Avoid planting brittle species where falling limbs could injure people or property.
- Inspect your trees carefully at least once each season every year.

- If you own a high value tree, have a Certified Arborist inspect your trees and provide you with a written report.
- Water thoroughly (generally, until saturation is reached) during dry periods and add slowly so water moves deep into the soil (see [Watering During Drought Section](#)).
- Prune trees when they are young (see Pruning Trees section) and regularly thereafter. Use correct pruning methods, always making the pruning cut outside the branch collar. This will allow only the minimum of decay infection.
- Never prune more than 25% of the foliage at any one time.
- Do not allow topping (cutting all branches off to main stems).
- Erect barriers around or slightly beyond the root protection zone of trees during construction. Insist that these root protection zones be honored by construction workers. Soil compaction can create a poor growing situation that results in long term poor growth.
- Consider cabling or bracing weak forks of branches in larger trees of high value. See the oak tree behind the Petaluma History Museum.
- Where a valuable specimen tree may be suspected of developing into a hazardous tree, use landscaping to keep people at a safe distance. This may require techniques such as rerouting walks, moving patio furniture, or planting shrubs and hedges to function as barriers to keep foot traffic at a safe distance.

If I see a tree limb hanging in the road what do I do?

Use [engagEPetaluma](#) phone app to take a picture (doing so safely) and report the situation with your comments. A city staff person will read the reports each day and send out notices to the correct department personnel for evaluation and action. You can request feedback on resolution of the reported situation.

If I see bushes or trees hiding a stop sign or other important sign, what do I do?

If you have the tools and know what to do, you can help to maintain clear and visible signage that is on your property. If the sign is on a neighbor's property, you can ask permission and then do the necessary pruning. If it is on public property, you can take action at your own risk. Otherwise use the [engagEPetaluma](#) phone app to take a picture (doing so safely) and report the situation with your comments. A city staff person will read the reports each day and send out notices to the correct department personnel for evaluation and action. You can request feedback on resolution of the reported situation.

If I spot a tree dying in a park what do I do?

Use the [engagEPetaluma](#) Phone App to take a picture and send it in with comments and allow location recording so staff can find the tree in question.

What is hurting/damaging/killing some of our local trees?

Many of the ornamental pear trees have severe fire blight disease which turns leaves black and limbs die back. These trees are no longer recommended for planting in this area for this reason. This species is being cut down and replaced with other species.

Another tree species that is taking damage is pine trees due to drought, pine bark beetles, and internal fungal disease carried by bark beetles. Tree limbs die back and eventually fall off. Trees can be watered more frequently and dead limbs removed.

Trees can lift up sidewalks, asphalt, and other hard surfaces

This is a video on tree issues in Petaluma: [local YouTube video about tree issues](#)

Why do trees lift up sidewalks and road surfaces?

Tree roots extend much further than the tree drip line, sometimes more than 3x the distance. Roots collect nutrients and water for the tree. Over 90% of root mass will grow in the top foot of soil. Roots also provide structural stability in case of high winds. Roots form symbiotic relationships with solid fungi to improve nutrient uptake, esp. phosphorus. Tap and sinker roots can go down deep to gather deep water in times of drought. Roots grow out and thicken with age so a root under a hard surface will expand out from the center and push materials above it, lifting with great strength. Woody growth and water turgor provide tremendous physical force.

What can I do if my tree lifts a sidewalk or driveway?

One of the most common problems and concerns with trees is sidewalk lifting. When you first notice a sidewalk or driveway beginning to rise, measure and mark its position so you can see the amount of lift over time. Even small amounts of lifting can cause tripping hazards. At two inches of lift you have a legal tripping hazard. Property owners are responsible for the hazard and need to fix it, usually by cutting and grinding the high side, adding filler to the low side to remove the tripping hazard and restoring the sidewalk surface to level. For more severe situations, the sidewalk gets removed and reconstructed with more room for tree roots, either making it higher, bridging over the roots, or cutting out or moving the sidewalk to give the trees more ground space, a “tree-centric” remedial method. Root pruning and adding root guards can be done in some cases, but it is less preferred than modifying the sidewalk to accommodate current and future tree growth. Removing a tree is the last resort, and a permit to remove street trees is required. Removed trees must be replaced, preferably with a smaller tree species from the [approved list of street trees](#).

What do I do if my tree lifts the street pavement?

Take a photo with the [engagEPetaluma](#) phone app and report.

Who fixes sidewalks that lift from tree roots and how is it done?

When considering landscape changes, be advised that private property owners are required to maintain the sidewalk and street landscape planters directly in front of their property as described in the [Duty of Property Owner to Maintain Sidewalks and Public Street Landscape Planters handout](#). Owners should work with licensed concrete contractors to repair unsafe sidewalks. The cost of repairing the sidewalk is well worth the benefit of a large, mature street tree. Professional contractors have cement grinders of various sizes, can add a filler to remove the tripping hazard, and completely remove and replace sidewalks and pavement.

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks, curbs or other hardscape. Improper or careless extraction of these elements can cause severe injury to the roots and instability or even death of the trees. The following alternatives must first be considered before root pruning within the dripline of a street tree.

Removal and Replacement of Pavement or Sidewalk

Removal of existing pavement over tree roots shall include the following precautions:

Break hardscape into manageable pieces with a jackhammer or pick, and hand load the pieces onto a loader. The loader must remain on undisturbed pavement or off exposed roots. Do not remove base rock that has been grown into by living roots. Apply untreated wood chips over the exposed area within one hour, then wet the chips and base rock and keep moist until the overlay surface is applied.

Replacement of pavement or sidewalk:

Alternatives to severing roots greater than 2 inches in diameter should be considered before cutting roots. If an alternative is not feasible, remove the sidewalk, grind roots only as approved by the Public Works Arborist, and replace the sidewalk using #3 dowels at the expansion joint if it is within 10-feet of a street tree. Use a wire mesh reinforcement within 10-feet of the trunk of a protected or street tree.

Note: Any work in the right-of-way requires a street work permit from the Public Works Department.

Alternative methods to prevent root cutting:

The following remedies should be considered before cutting tree roots, which may result in tree instability or decline:

- Grind a raised sidewalk edge.
- Ramp the walking surface over the roots or lifted slab with pliable paving.
- Route the sidewalk around the tree roots.
- Install flexible paving or rubberized sections.

On private property, new sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are: permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, porches elevated on posts and brick or flagstone walkways on sand foundations.

Conflicts and extra costs can be avoided or reduced by the following planting practices:

- Plant deep rooted trees that are proven to be non-invasive.
- If you have soil that shrinks and swells, install a sidewalk with higher strength using wire mesh and/or expansion slip joint dowel reinforcement.
- Follow soil loosening planting techniques to promote deep rooting.

What can I do if my street tree or a neighbor's street tree is lifting a sidewalk or road surface?

Inform the owner that there is a potential hazard and refer them to this website so they can take appropriate action. You can also submit a report using the [engagEPetaluma](#) phone app. A city engineer will be assigned to evaluate any hazardous situation.

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Tree Resources

Arboriculture

California ReLeaf is a statewide non-profit organization that coordinates grants to local groups, networks regularly, and advises local nonprofits and has a [resource page](#).

Canopy is a tree focused nonprofit based in Palo Alto and leader of Urban Forestry Management in California. They have a wealth of information on their [tree information](#) page.

Urban Forestry Ecosystem Institute, at California Polytechnic State University in San Luis Obispo, urban forestry education and applied research. [SelectTree](#), a tree selection guide, is an interactive program designed to help you select appropriate trees. It will match trees to particular sites based on compatible characteristics.

USDA Forestry has [Learn about Trees](#), and they have a [National Tree Owner's Manual](#), updating the [USDA Forestry Service Tree Owner's Manual for Northeastern and Midwestern US](#)

International Society of Arboriculture: [Trees are Good](#) and [Tree Owner Information](#)

Arbor Day Foundation has a [wealth of information](#).

Urban Tree Foundation provides services and programs to benefit the urban forest. UTF is dedicated to promoting and preserving the urban forest through education, planting and tree care. In collaboration with public and private agencies, UTF assists communities in becoming active partners in the planting and maintenance of the urban forest. The [Planting details and specifications](#) (CAD-ready and PDF) includes dozens of editable details and specs for every imaginable situation.: <http://www.urbantree.org/index.shtm>

Oregon State University has a site that contains images and information on over 1,800 landscape plants, mostly woody. Individual plants can be accessed via either the [Latin Names](#) (e.g., *Acer*) or [Common Names](#) (e.g., Maple). Both lists are in alphabetical order; for the Latin Names, from *Abelia* to *Ziziphus* and the Common Names from *Abelia* to *Zelkova*. Information on each plant species commonly includes a botanical description, general care, winter hardiness (presented as USDA Zones), native range, and an explanation of the Latin epithet. In addition, some plants selected from a species and available in nurseries (i.e., cultivars) are also briefly described (e.g., *Acer rubrum* Red Sunset®). [Plant Identification](#) search system is available for help in identifying unknown plants.

Cornell University has a [Recommended Urban Trees](#) website that also has Site Assessment Checklist and Guide in the appendix.

California Urban Forest Council is a statewide non-profit composed of a diverse membership that advocates for the best possible urban forests in California.

UC Master Gardener Program has [Gardening Resources](#)

California Forest Pest Council [Training Manual](#) has insect and disease information.

Fire Protection Resources

California Board of Forestry and Fire Protection, <https://bof.fire.ca.gov/> has a [Defensible Space Guideline Document](#) available online.

CalFire has a [fire prevention program](#) and [defensible space information page](#)

Sonoma County has a fire prevention vegetation management program, <https://sonomacounty.ca.gov/PRMD/Fire-Prevention/Vegetation-Management-Services/Hazardous-Vegetation/>

Marin County has defensible space website for homeowners, <https://www.marincounty.org/depts/fr/divisions/fire-prevention-investigation/defensible-space>

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