



TREE NOTES

CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION

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Protecting Trees From Construction Impacts

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Why Should We Protect Trees

An important benefit of trees to society is their aesthetic value. Our parks, streets, homes and businesses would seem sterile without them. Trees also have monetary value. Residential and commercial properties with established trees have a greater market value than those without them. Trees provide other benefits which include: shade, noise abatement, wind breaks, erosion control and air pollution reduction. Like all green plants, trees convert carbon dioxide into oxygen during photosynthesis. This process contributes significantly to the recycling of the atmospheric gases we breathe. Unfortunately trees are often irreversibly damaged or killed during construction and/or landscaping.

Understanding a Tree's Root System

The primary impact of construction around a tree is to the unseen portion, the root system. Activities which disturb or alter the soil in which roots grow can injure or kill a tree. To reduce or prevent adverse impacts, we must understand how roots function and how they develop in the soil.

The greatest proportion (90%) of tree roots is found within the first three feet of soil. Roots function to support and anchor the tree. In addition, specialized (absorbing) roots function to exchange gases and to absorb water and minerals. Most absorbing roots are found in the first 8-12 inches of soil where water and oxygen can readily penetrate. Roots require both water and oxygen to grow and function. A network of supporting roots and absorbing roots grows well beyond the trunk. Depending on soil conditions they may extend two to three times the radius of the crown.

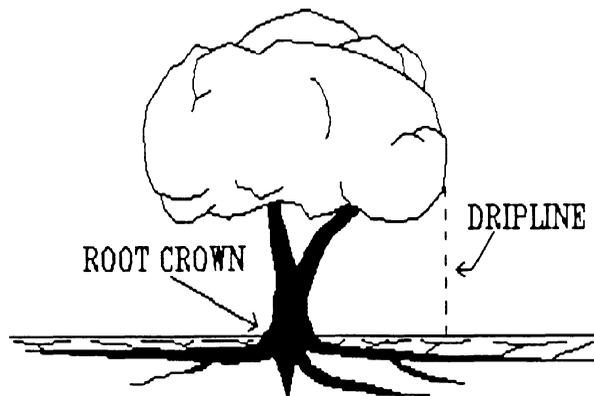
The roots of most tree species are associated with beneficial fungi called mycorrhizae. These fungi increase the roots ability to absorb water and minerals

Soil disturbance during construction can permanently disrupt this association.

How Construction Affects Roots

By understanding where roots grow and how they function, we can begin to see how construction activities such as trenching, slope cuts, soil compaction, soil grade changes and paving can affect roots.

When trenching for utilities and foundations or where grade lowering is done close to a tree, there is a likelihood that roots will be cut. The closer the trench is to the trunk the greater the damage. Each root that is cut reduces the tree's capacity to supply water and nutrients to the leaves. Trenching within just a few feet of a trunk can reduce the functional root system by as much as 50%.



Soil is compacted during construction by heavy equipment which squeezes out the air spaces making it more dense and stable. Unfortunately, this process greatly reduces the infiltration of water and oxygen into the soil. As a result roots cease to function and eventually die. In addition, root penetration is decreased.

Soil grade changes alter the natural soil level around a tree. The addition of fill soil in particular, can have an effect similar to soil compaction. The depth and porosity of the fill soil are the most important factors affecting the tree. If the depth is significant or the porosity is low, root death can occur. For some tree species, a grade change of two inches can be significant. Soil fill that is compacted or has lower porosity than the native soil will restrict root activity. If roots cannot develop or grow into the fill, recovery by the tree after construction may be impaired or prevented.

Fill soil around the root collar (the flared part of the trunk at or just above soil grade) and trunk will result in death and decay of the bark tissue. This can cause the death of all or part of the root system including the supporting roots. Often this results in a "Hazardous" tree.

Grade changes that require the removal of soil often remove absorbing roots and expose and injure other roots.

Concrete or asphalt paved over soil where roots are present will seal the surface, reducing water availability and gas exchange to the roots beneath. Usually soils are compacted prior to installing pavement which compounds these problems.

Symptoms Of Construction Impacts

An injured tree may take several months to many years to exhibit symptoms of construction impacts. These can include: slow decline, insect or disease attack, sparse foliage, significant branch dieback and wilting or yellowing of leaves.

Reducing Construction Impacts

The following techniques can be used during construction to prevent or reduce tree injury:

- Fence around the area within the dripline to protect it from construction activities. Because roots often grow beyond the dripline, enclosing a larger area is desirable.
- Place six inches of mulch over the root zone to reduce soil compaction where vehicular access is required.
- Dig trenches by hand or tunnel under the tree if underground utilities must be installed within the tree's drip line.
- Prune roots that must be removed, do not rip them out with a trencher or back hoe.
- Bridge over roots when trenches for new foundations will damage them.
- Construct wells around trunks and root collars to keep soil away and install aeration systems when the soil grade must be raised. Use a coarser fill soil than the soil being covered and do not compact. Add fill in the late fall or winter when roots are less active. Avoid working on wet soils.

What To Do After The Damage Is Done

- Soil aeration (vertical or hydrojet mulching) can be effective where soils have been compacted.
- Only remove dead, hazardous or obstructive branches. Never remove more than 20% of the foliage during a single year. Leaves produce carbohydrates and buds produce hormones - both are necessary for root growth.

- Where appropriate, apply pesticides to reduce attacks by insects or other pests until the tree's vigor is restored.
- Place organic mulch over bare soil.
- Restore soil grade by removing fill.
- Restore irrigation regime that existed before construction took place.

Summary

Construction around trees can be done successfully. However, this requires planning before construction or landscaping. Not all trees on a site are worth saving. Each tree should be evaluated by a consulting arborist to determine its condition and value in the landscape. It may be more desirable in the long run to plant new trees after construction is completed. The value of a tree should be used as a guide to determining the measures used to save it from construction impacts. Where trees of high value are present the effort and expense to save them is worthwhile. Mature trees take years to grow and their beauty and aesthetics are irreplaceable.

Further Reading

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