



# TREE NOTES

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## TREE ROOTS - MAJOR CONSIDERATIONS FOR THE DEVELOPER

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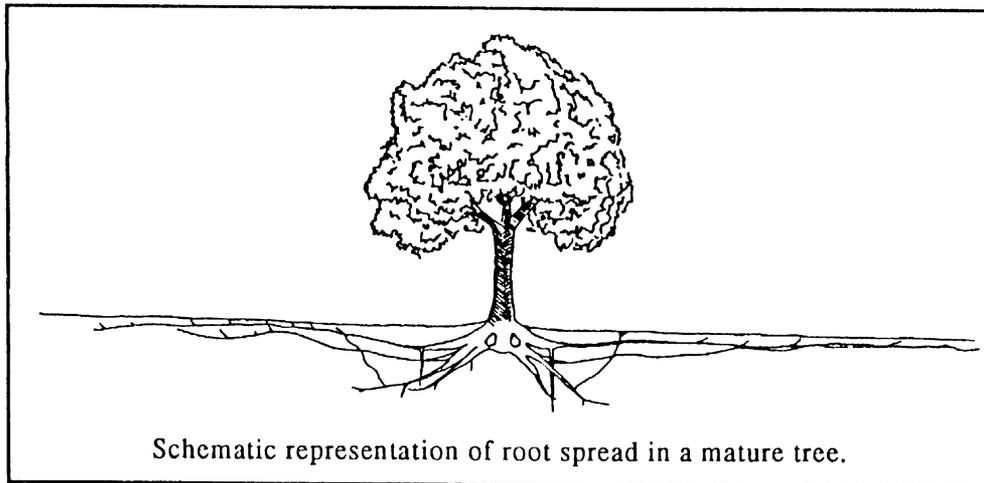
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Roots support and anchor, absorb water and minerals, store energy and produce important compounds.

Roots grow where there is sufficient oxygen, water, minerals and where the soil is not too hard to penetrate. 90% or more of tree roots grow in the upper three feet of the soil. Up to 70% are in the top one foot. The surface layer of undisturbed soils is generally quite porous, allowing oxygen,

horizontal to the surface. Vertical growing roots are common close to and under trees. They may go down to five feet or more in sandy soil. These roots take up water during dry periods and provide support, especially if the lateral roots are cut.

The large buttress roots which originate at a tree's base, rapidly decrease in diameter, one to three meters from the trunk, to form a network of long, thin, rope-like roots, 8 to 12 inches below the



Schematic representation of root spread in a mature tree.

water and roots to penetrate. Minerals are also concentrated there. Soil becomes less porous and more difficult to penetrate as depth increases.

Oxygen availability affects mineral absorption, growth, health and root depth. Poor oxygen availability is associated with compacted, waterlogged, heavy clay, paved over and filled (raised) soils. The mixing of soil or the addition of off-site soil, greatly reduces oxygen availability and water drainage. Waterlogging of the surface layer and excessive dryness below may result.

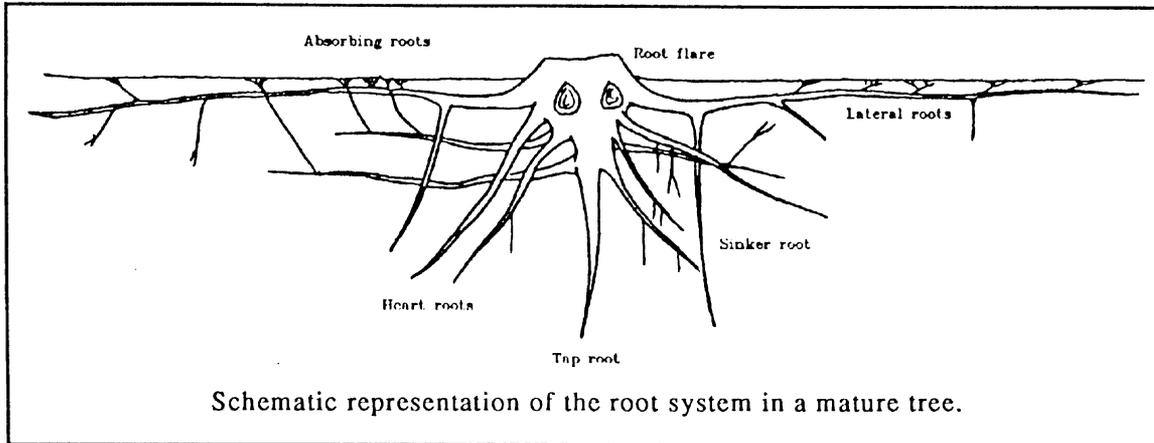
Roots do not normally grow deeper than three or four feet. Most grow radially outward and largely

surface. These roots branch and rebranch to form an extensive network of absorbing roots, extending outward one to two times the height of the tree. The greatest concentration of active roots is directly beneath the leaf canopy (drip zone).

Cutting large roots near the trunk is much more injurious than cutting smaller roots beyond the area of rapid taper. Few large roots are found beyond 10 feet of the trunk. Much of a tree's water absorbing roots are under and close to the tree's base. Because of their depth and location, these roots are less likely to be damaged by construction.

Root loss due to root pruning, trenching or grade changes, reduces tree growth, health, aesthetics and stability. The destruction of roots just outside the drip zone on one side of a tree represents about a 15% loss. If the roots are cut midway between the drip zone and the trunk on one side, about 40% of the roots will be lost. Severe root loss (50% or more) usually causes immediate water stress and reduces photosynthesis (food production). Growth is reduced, dieback and even death may result.

The worst time to cut roots is just prior to bud break in the spring because growth hormones are not present in the roots to stimulate root growth. Avoid cutting roots later in the spring when food reserves have been nearly depleted by leaf growth. Root growth proceeds most rapidly in the summer and fall when top growth has slowed, food reserves are high and growth hormones are present in the roots.



Young, healthy, vigorous trees can survive severe root loss while large, old or declining trees may not. Recovery following the shock of severe root loss depends on rapid root replacement.

Top pruning to reduce demands on the damaged root system reduces the amount of food available to the roots, thus slowing recovery.

### ***The recovery of a tree sustaining severe root loss is influenced by:***

- Species, age, vigor and size
- Growing conditions
- Date of injury (season)
- Percent root loss and distance from trunk
- Other soil disturbances
- Treatment given

Root growth requires adequate food reserves, growth stimulating hormones, water and minerals. If these are available, and there are no other restrictive influences or construction impacts, root growth and replacement will generally proceed rapidly. Low or depleted food reserves will delay root replacement. If the soil conditions have been seriously altered by construction, root replacement will be slowed or stopped. **A DELAY IN RECOVERY FROM ROOT LOSS WILL RESULT IN GROWTH LOSS, DIEBACK OR TREE DEATH.**

### ***Further Reading***

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