



# Tree Conservation Notes

Athens-Clarke County Community Tree Program

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## Vertical Mulching

### ***Introduction***

Vertical mulching is a technique that can be used to partially alleviate soil compaction within the critical root zones of trees. Soil compaction is harmful as it reduces the amount of pore space in the soil normally filled by oxygen (micro-pores) and water (macro-pores). Tree roots require both oxygen and water in relatively large quantities. The amount of pore space in a soil is measured as “bulk density”, the weight of a given volume of soil expressed as grams per cubic centimeter, or pounds per cubic foot. The greater the bulk density the more that root growth and function will be restricted.

### ***Location of Tree Roots***

In our area, with heavy clay soils, tree roots are generally found in the top 12 to 18 inches of soil and extend out from the trunk a distance of 2 to 3 times the width of the crown. *Tree roots do not go down, they go out.* While most trees have a “tap” root in their early years, lateral roots quickly develop and extend out from the tap root, becoming the primary root system.

### ***The Critical Root Zone***

The critical root zone of a tree, which is often also called the “tree protection zone”, is customarily defined in one of two ways. The first way to think of the critical root zone as a circle on the ground that corresponds with the “dripline” of the tree. The dripline is the greatest extent of the tree’s branches (see Figure 1). For some trees with narrow crowns, however, this distance is not near enough to insure that the critical tree roots will be protected.

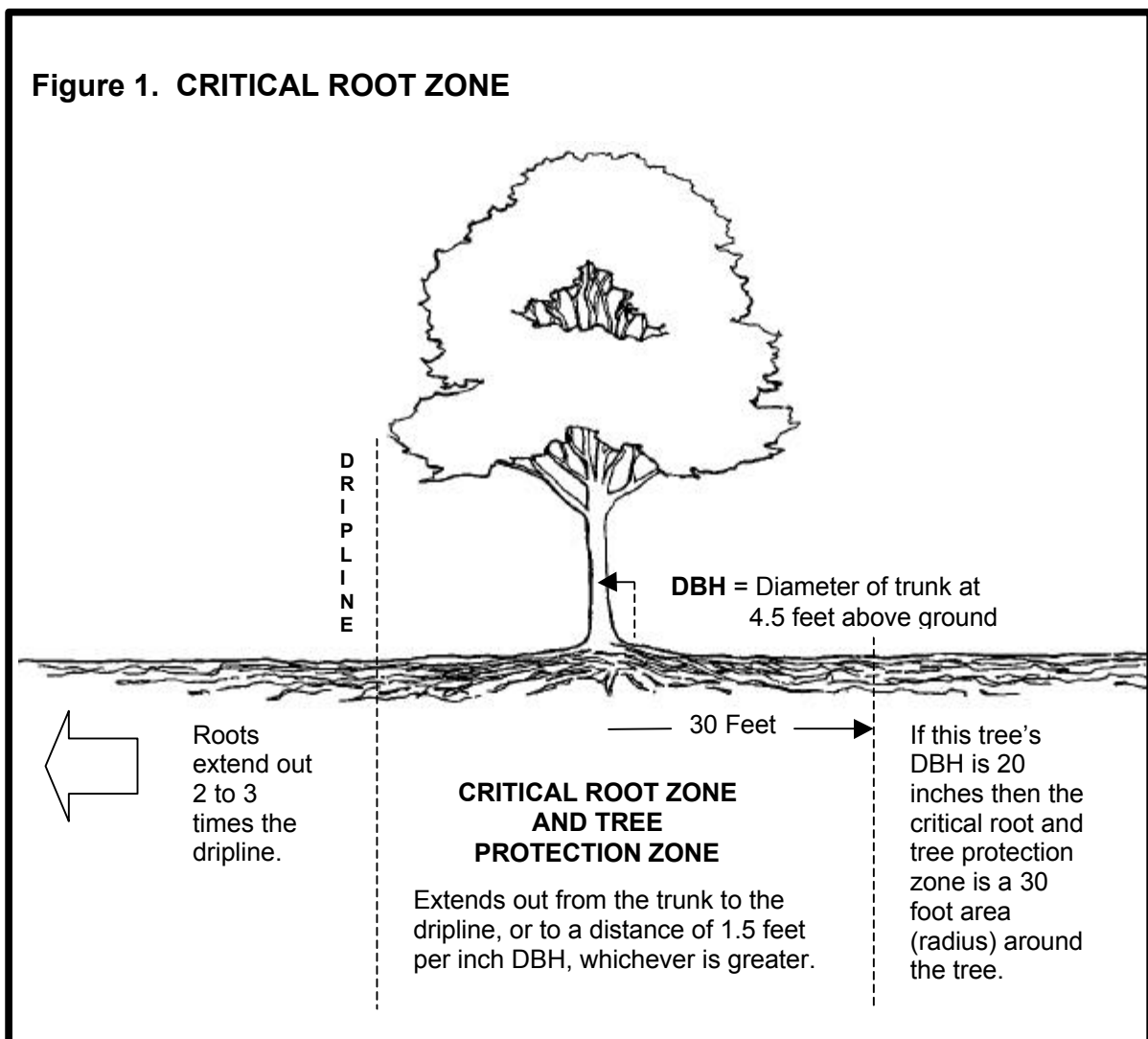
Another, more effective way to define the critical root zone is a circle on the ground that has a radius equivalent to 1.5 feet for every inch in trunk diameter (see Figure 1). The trunk diameter of a tree is measured at 4.5 feet above the ground. You can estimate this diameter, or calculate it by first measuring the circumference of the tree with a tape, then dividing by 3.14 (a constant known as  $\pi$ ). For example, a circumference of 36 inches is roughly equivalent to a diameter of 12 inches.

### ***Soil Compaction***

Soil compaction occurs as the result of many different activities, either daily or occasional, such as those related to construction. Research has shown that the first

pass of heavy equipment, including automobiles, over the top of tree roots elongates the root beneath and squeezes out 60% of the water within the root. The root never recovers from this initial damage. In addition, the first couple of passes compacts the soil, reducing and eliminating pore spaces that would otherwise hold oxygen and water. A reduction in these two elements reduces tree growth and can jeopardize a tree's survival. The negative effect of compacted soils is exaggerated in times of drought, when water is at a minimum anyway.

Soil compaction most frequently occurs from equipment and vehicular traffic, pedestrian traffic, and materials storage. To maximize tree health and minimize root damage, these activities should be avoided within a tree's critical root zone. These activities are common on construction sites.



### ***Tree Protection***

To protect trees and their roots, sturdy fencing should be placed around the perimeter of a tree's critical root zone during site grading and construction. All construction personnel should be informed prior to beginning work on the site of the need to keep out of this "tree protection zone". This requirement should be enforced with substantial penalties for anyone who enters this zone and causes root, trunk, or crown damage.

### ***The Vertical Mulching Technique***

Vertical mulching is done using a power auger with a 2-inch diameter drill bit. *Starting out beyond the tree's large woody roots, about 8 feet out from the trunk, drill 2 inch diameter holes 12 inches deep on an approximately 18 inch x 18 inch grid (no less than a 24 inch x 24 inch grid).* The holes should be drilled out to the dripline. When woody roots are encountered, move the drill hole over slightly to avoid root damage.

The holes should then be back-filled with pea gravel, or sand, or a mixture of compost with pea gravel or sand. In our area, pea gravel with a small amount of compost is ideal. The drilling fractures the soil, and the backfill provides a well-aerated column for the penetration of water, infiltration of oxygen, exchange of gases, and colonization of tree roots.

A 3-4 inch layer of good quality organic mulch, such as aged wood chips, leaves, compost, or pine straw spread evenly over the entire critical root zone will also help trees substantially. Mulching will result in improvement of soil texture, moisture retention, increased soil fertility, weed control, and visual identification of the tree's critical root zone and tree protection zone.

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For more information, contact the Athens-Clarke County Community Forester at (706)613-3561 voice, (706)613-3566 fax, or by e-mail at [forester@co.clarke.ga.us](mailto:forester@co.clarke.ga.us).