Establishment Guidelines

Community Tree Planting and

Georgia Forestry Commission

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Georgia Forestry Commission

2002

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This Document is intended to aid homeowners and local government staff in planting and directing the establishment and maintenance of community trees. The landscape design details provided in this document have been endorsed by the American Society of Landscape Architects. The planting details were written and tested by certified arborists, foresters and landscape architects and were determined to be minimum requirements to facilitate the establishment and growth of community forests. In addition to the incorporation of these standards, communities should adopt an active tree conservation, protection and management program. Sources for more detailed information regarding these and other community forest issues are listed in the back of this document.

Source: Morton Arboretum

Roots of mature trees extend far beyond the extent of the branch tips or drip line. With adequate soil volumes tree roots may extend as far as 2 1/2 times the drip line diameter. Additionally, the majority of the

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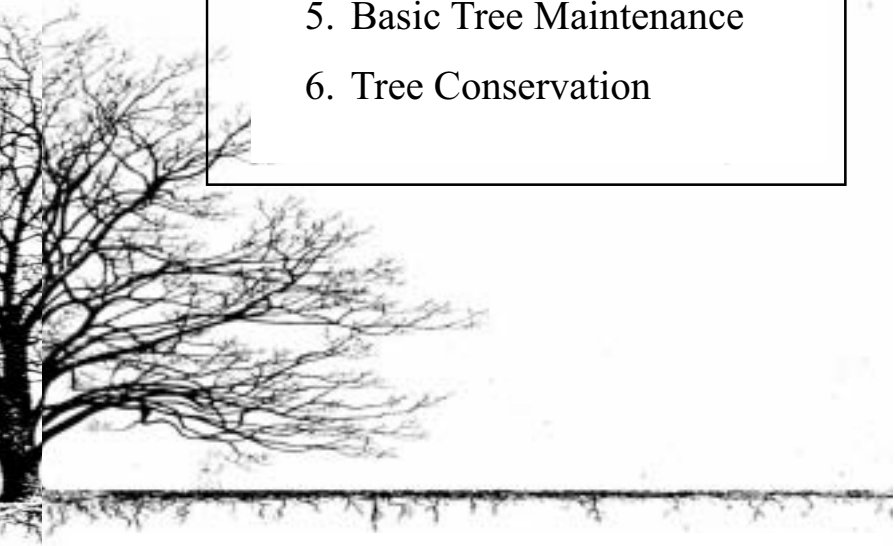


nutrient absorbing roots exist in the upper 12 to 16 inches of the soil.. It is critical to understand tree root growth requirements to allow landscape trees the opportunity to grow to maturity.

Tree Growth Requirements

Trees require sunlight, sufficient water, moderate temperatures, well drained soils, and adequate nutrients to become established.

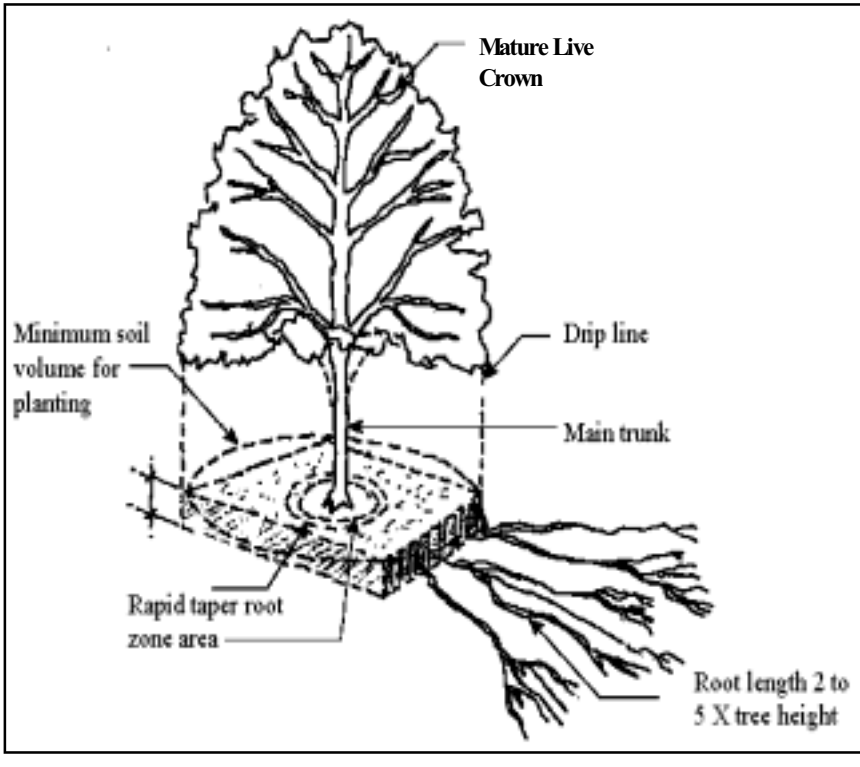
Sunlight – Some tree species grow naturally in full sun while others prefer shade. This characteristic is known as a trees' shade tolerance. Trying to establish a shade-loving tree in full sunlight is stressful to the tree, increases the need for maintenance, and may predispose the tree to pests and disease. Measure the total number of hours of direct summer sunlight the tree would receive during the day. Then select a species suited to the light conditions and published shade tolerance standards.

Water – All plants need water to survive but the amount of water needed varies by site, species and size. Without sufficient water trees cannot take up enough nutrients to produce the food they need to support life. Likewise too much water can also be detrimental. In general, **mature** trees require about 1 inch of rainfall over their entire root zone every 7 to 10 days through the growing season (March through October). Trees in the establishment phase may require more (see page 16). Determine how much water a planting site receives a week from irrigation, flooding, etc., and determine if supplemental watering will be required. Adjust watering regimes accordingly. Remember tree roots under turf get very little water from normal turf irrigation.

Soil – While some trees will grow in dry or wet sites, most require well drained soils with some moisture holding capabilities to minimize stress. To determine if the selected planting site is acceptable, dig a 12 inch diameter hole about 12 inches deep. Fill it with water. If the water remains after 8 hours, pick another spot. Do not add sand or organic matter to only the planting hole. This is not a long term solution for improving poor soil quality. Backfill the planting hole with un-compacted native soil. If additional soil amendments are required they must be incorporated into the entire planting area. Improperly amending the planting area alters the soil hydrology, contributes to root stress and slows tree growth.

Nutrients – With the exception of very poor soils, nutrient additions are seldom required during the early establishment period of a tree. Conduct a soil test after the site is selected to determine the existing balance of nitrogen, potassium, phosphorus, and organic matter. Should fertilization be required, proceed cautiously and usually only after the first year of establishment has passed. Nutrient applications should take place at three intervals during the year - spring, summer and fall. Additionally, the incorporation of mycorrhizae into the soil can be beneficial during the establishment period in situations where soil quality is very poor.

Tree Root Area Requirements



Site Selection

Selection of a proper planting site depends upon a number of factors:

Placement of overhead and below ground utilities,
Nearness to structures, roads, walks and drives,
Availability and proximity of water for irrigation,
Energy conservation opportunities,
Aesthetic concerns,
Available soil surface area for root colonization.

How to calculate minimum soil areas:

Step 1: Estimate the maximum expected future size of trunk diameter 4.5 feet above ground at maturity,

Step 2: Calculate required soil area as:
Expected diameter X 2.0 = each side of planting **square** in feet

OR

Expected diameter X 2.25 = diameter of planting **circle** in feet

(Calculations based on 60 ft^2 basal area optimum - 750 ft^2 per foot of cross-sectional area. See detail previous page)

Example: *A 10 inch diameter mature tree would need a 20 X 20 foot planting square or a 22.5 foot planting circle.*

Large trees require a minimum of 200 to 400 square feet of rooting area to reach maturity and should not be placed within 25 feet of a structure, 30 feet of an overhead utility, or within 15 feet of an underground utility, road, drive, or walk.

Small trees, growing to a mature height of under 30 feet, require a minimum of 100 to 200 square feet of rooting area depending upon the species and should not be placed within 15 feet of a structure, 10 feet of an overhead utility, or 10 feet of an underground utility, road, drive, or walk.

Watering will be required for all trees through the first two growing seasons. Placement for energy conservation can generate significant savings by shading windows, air conditioners, and south and west facing walls. Aesthetic concerns should not override any of the above recommendations.

Tree Selection

The successful growth of a tree to maturity depends upon a number of factors, particularly the quality of the tree itself. Assuming you have selected the right space (see page 6), use the following guidelines to select a quality specimen:

Don'ts

Do not pick a tree that has been topped or had the central leader cut back.

Do not pick a tree with damaged bark or old wounds on the trunk or branches.

Do not pick a containerized tree that is pot bound or has girdling roots. Remove the container and inspect the root system if possible.

Do not pick a tree that has been planted too deep in the container, (trunk root flare should be obvious).

Do not pick a tree that has too small a root ball for the diameter of trunk. Root ball diameter should be 10 to 12 inches for every inch of trunk diameter measured at 6 inches above the soil (tree caliper).

Do not pick a tree with broken branches, diseased or discolored leaves or cracked bark.

Don't pick a tree just because it is a bargain.

Don't expect a substandard tree to do well in the landscape simply because it is properly planted and maintained.

Do's

Do pick a tree that conforms to the American Standard for Nursery Stock for landscape trees.

Do pick a tree that is the correct species for the selected planting site.

Do continue maintenance practices throughout the life of the tree.

Do plant the tree properly.

Tree Planting - Basic Installation

After following the directions for site selection and soil area determination, proceed as follows:

1. The planting area should be tilled to a depth of 6 to 8 inches (deeper if the soil is compacted) for an area of 10 times the diameter of the root ball.

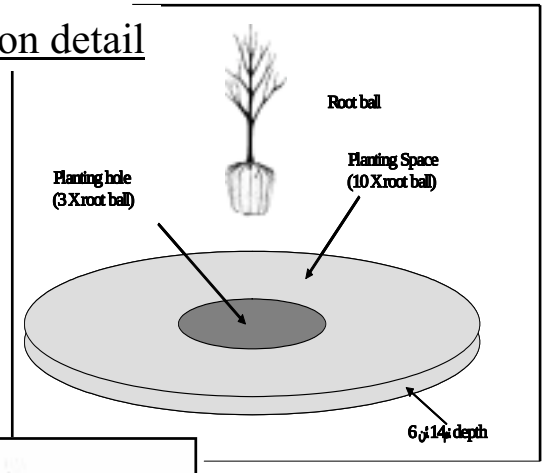
2. Excavate a hole three times the diameter of the root ball and no deeper than the ball or container. Leave the soil at the base of the hole compacted.

3. Remove the container, cut girdling roots and place the tree in the hole. For Ball and Burlap trees (B&B) remove all ties, strapping, wire basket and burlap. The top of the root ball should rest no more than one inch above existing soil line for every 10 inches of root ball depth and never lower than the existing soil line (ex. *a 15 inch deep root ball should rest 1.5 inches above existing soil line*).

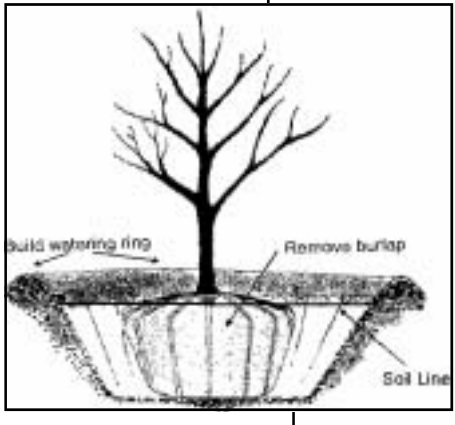
4. Backfill the hole with the un-compacted native soil previously removed to make the hole. Lightly pack the soil and water as you go to eliminate any air pockets. Construct watering ring at outer edge of planting hole (note: this ring will be removed in year two) and mulch to a depth of 2 to 3 inches with composted wood chips. Do not mulch within 6 inches of the trunk. This will allow air circulate around the trunk root flares and top of the root ball.

5. Stake the tree only if wind throw is a significant issue and allow for at least 3 inches “slack” in tie wires. Never allow bare wires to contact bark. Remove stakes, and all wires, hoses and ties after first growing season.

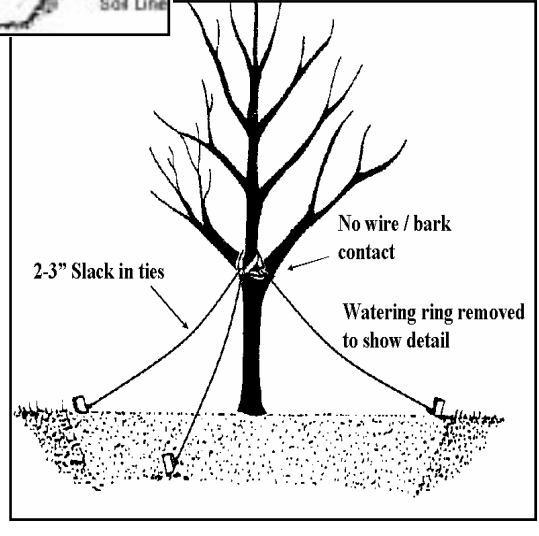
Site preparation detail



Planting detail

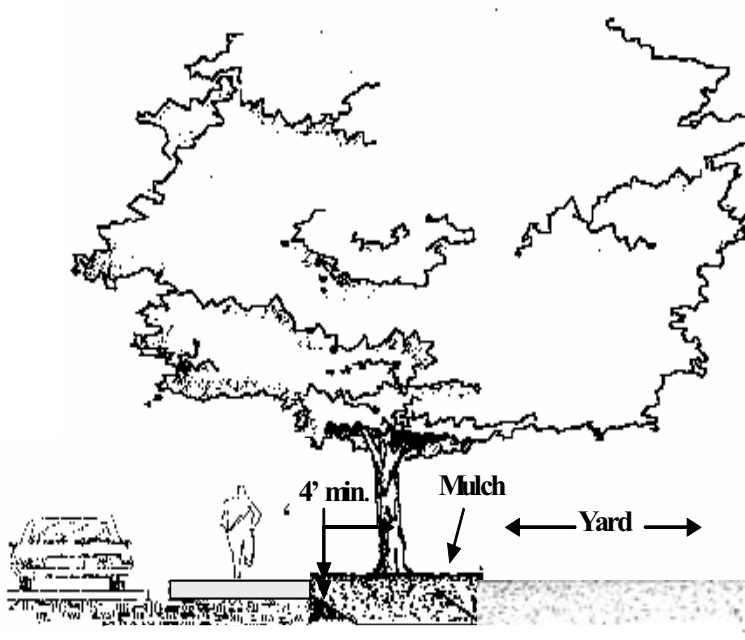


Staking detail

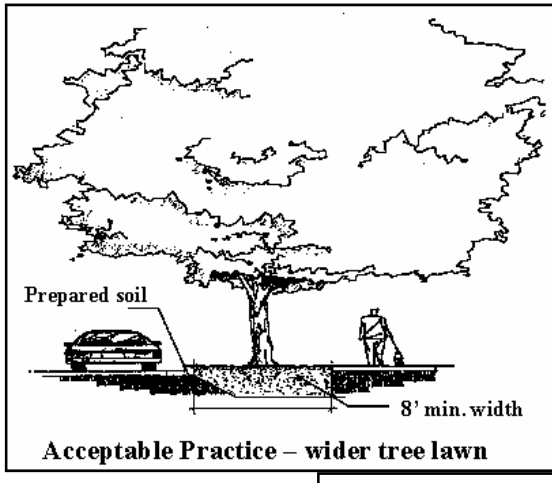


Tree Planting – Street Trees

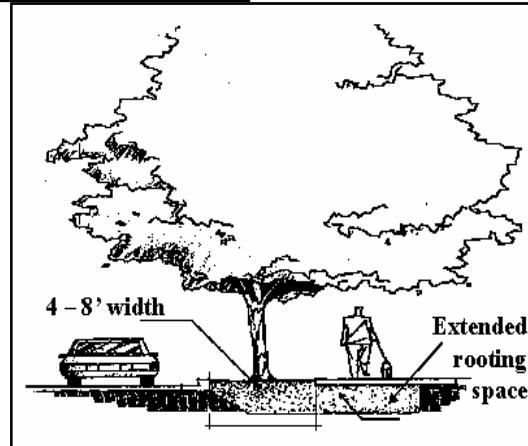
The installation of street trees may follow the same guidelines as found in the "Basic Installation" section of this booklet (page 8). However, tree planting along streets, sidewalks, driveways and medians usually requires special consideration of soil volume minimums and infrastructure conflicts. Spacing width of planting area, and soil preparation at depths of 2 to 3 feet requires a significant amount of planning and investment if the trees are expected to grow to maturity. Descriptive details regarding tree placement for typical street tree planting situations follow:



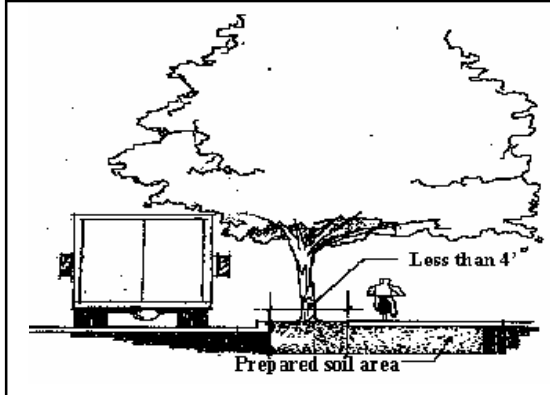
Best Practice - tree on property side of sidewalk



Acceptable Practice – wider tree lawn



Compromised practice – narrow tree lawn



Not recommended for large trees - too narrow

Tree Planting - Medians

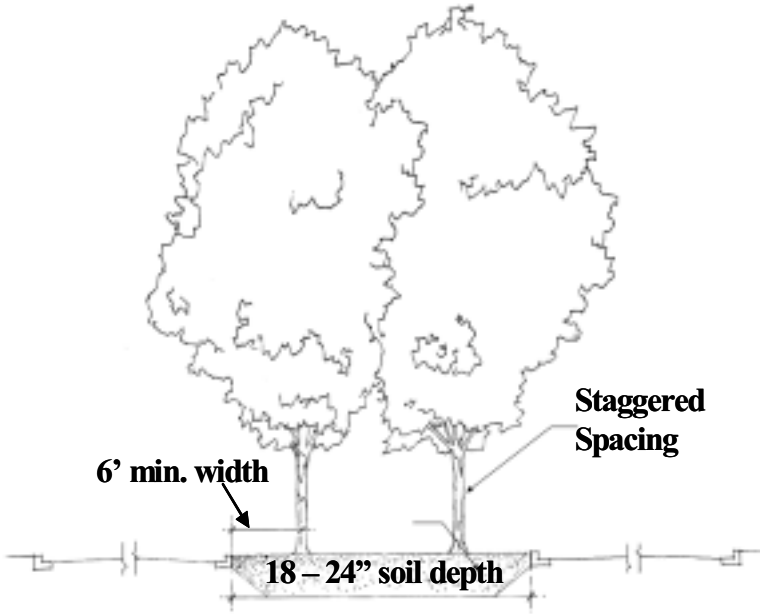
Median plantings differ from street tree plantings in that there are not as many confrontations between tree roots and infrastructure. However there are some challenges to successful establishment of trees in medians.

Width of planting area will determine how many, what size tree, and what species are acceptable to be planted in the medians. Many medians are too narrow to support more than one row of trees. Soils are usually very poor in these narrow medians, often being composed of spoil left over from road construction. The narrower the median the more likely that soil preparation will need to be extensive. Sometimes soil replacement is a more effective use of available resources. Where soil quality is acceptable, following the guidelines for tree planting and soil preparation discussed earlier should suffice (page 8). Irrigation and watering, whether temporary or permanent, will need to be planned and implemented as soon as the trees are installed. Maintenance (mulching, watering, insect control, and pruning) need to continue throughout the life of the tree.

Wider medians have more available soil area for root colonization and can support larger growing trees with less maintenance problems. Medians more than 25 feet in width can support two rows of trees spaced 20 to 40 feet apart. Medians less than 25 feet in width have difficulty supporting more than one row of trees. The actual number of trees a planting area can support depends upon species, soil type and water availability. As with any tree planting, matching species to site is critical for successful establishment.

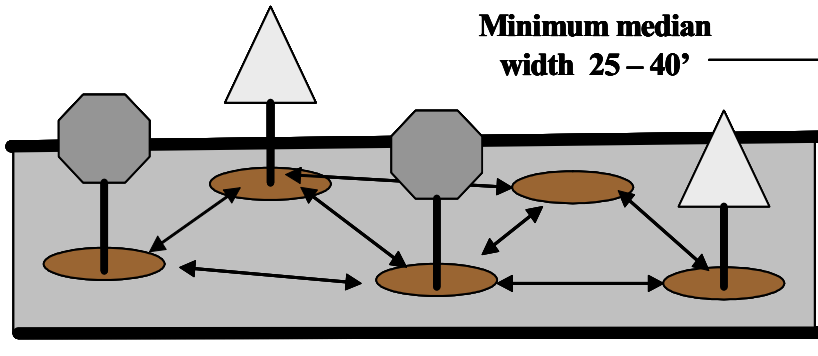
Also, remember to consult with the local transportation departments to determine regulations regarding planting prohibitions for medians and right of ways.

Median width detail



25' Minimum / 40' Optimum

Staggered spacing detail



Note: 20 to 40' tree spacing

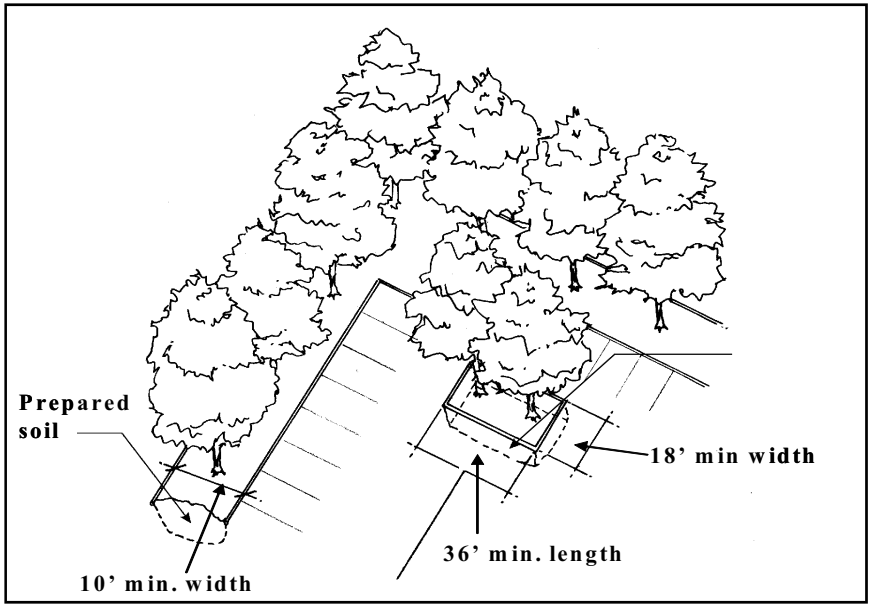
Tree Planting -Parking Lots

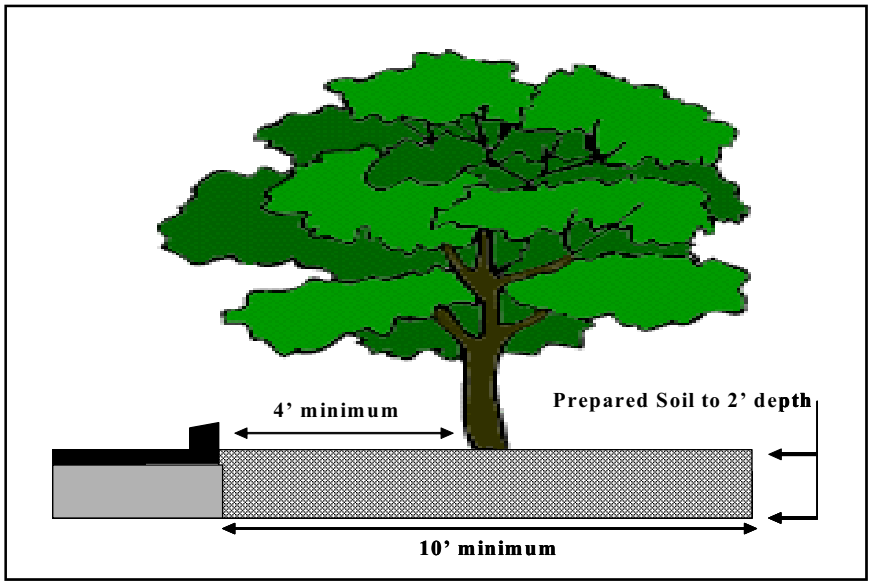
Planting trees in parking lots is a quick way to reduce the environmental impacts associated with auto emissions, heat island effects and storm water runoff. Successful tree growth in parking areas is a function of quality soil volume and water availability. Water may be made available through irrigation from in-ground systems or by hand watering. The required soil volumes needed for trees to reach maturity must be engineered into the parking lot design prior to construction. Soil types must be specified in construction plans. Constructing planting islands of proper width will ensure long tree life and reduced plant stress. There is a limited selection of trees species that can survive the environmental stresses of parking lots and reach maturity. This list expands as available planting soil area and volume increases.

Continuous landscape beds on the perimeter of the parking area should be at least 10 feet in width. Interior parking islands should be at least 18 feet wide and 36 feet long. Tree planting islands should have no less than 100 square feet of soil surface area. Small growing trees (which reach a mature height of under 30 feet) require from 100 to 200 square feet of surface rooting area, and a soil depth of 18 inches. Small growing trees should not be placed within 3 feet of a parking stop or curb. Large trees require from 200 to 400 square feet of surface rooting area and a soil depth of 18 to 24 inches to reach maturity. Large growing trees should not be placed within 4 feet of a parking stop or curb. Always make sure soil type is continuous throughout the islands, soil pH is acceptable (5.5 to 7.0) and underground irrigation line installation takes place prior to tree planting.

Finally, develop a long term maintenance and management plan for the planting spaces.

Parking lot detail





Basic Tree Maintenance

Trees growing in parking lots, along streets, and in front yards have more stress placed upon them than trees growing in natural environments. Each site has different watering, pruning, mulching and fertilization requirements. Therefore, it is critical to the long term survivability of these trees to have a maintenance plan established.

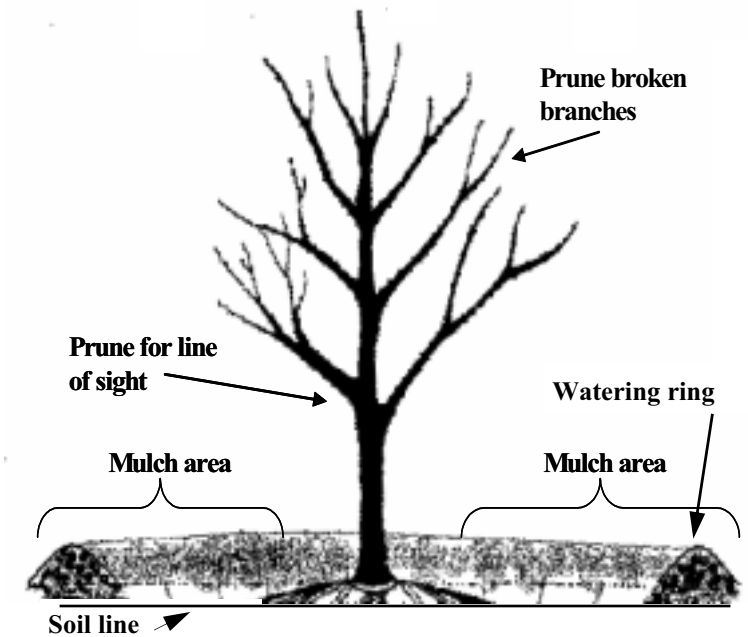
Water – All plants will need supplemental watering to survive the first and second years of establishment. The watering requirements will be driven by evaporation rates of the site, the moisture holding capability of the soil and species type. Newly planted 2 inch caliper trees require approximately 4 to 5 gallons of water over their entire root zone 1 to 2 times a week through the summer months depending upon local conditions and soil types. This may be supplied by hand watering or in-ground irrigation systems. Determine how much water a planting site currently receives per week from irrigation, flooding, etc., and determine if supplemental watering will be required. Check existing soil moisture prior to watering and **do not** water if soils are saturated.

Pruning – Limit pruning in the first two years to the removal of damaged and hazardous branches. Hazardous branches are those that would cause personal injury or line of sight issues (most often related to pedestrian or vehicular traffic). All pruning should follow the International Society of Arboriculture standards for landscape trees.

Fertilization - Conduct a soil test to determine the balance of existing nutrients and soil ph. Nutrient additions to planting areas are seldom required in yard plantings. However, fertilization may be needed in street and parking lot plantings where soil quality is very poor. Amend poor soils through out the entire island or root zone. Soil of poor quality or improper ph may have to be replaced. Additional fertilization of the site should not take place during the first year of establishment. When additional fertilization is required, nutrient

applications should take place at three intervals during the year - spring, summer and fall.

Mulching – Placement of mulch around newly planted and established trees reduces watering requirements, weed competition and reflected heat stress. Mulch should be spread over the trees' entire expected root system to a depth of 2 to 3 inches. Keep mulch 6 inches away from the trunk to allow for air exchange between the root collar, root ball and above ground environment. Mulching to a deeper depth or against the tree's trunk may well causes pest and disease problems and increase tree stress. Mulch with composted wood chips (composted for 4 months minimum) and maintain the 2 to 3 inch depth and keep root flares uncovered.



Tree Conservation

Tree root systems extend far beyond the drip line and vary in length from 2 to 5 times the height of the tree (page 5) depending upon the species, size, soil type, and location of the tree. Successful tree conservation efforts require that a large portion of the trees' root system, the critical root zone (CRZ), be protected for all trees to remain in the landscape.

Determine the root zone for established trees as follows:

Step 1. Measure trunk diameter at 4.5 feet above soil line.
Step 2. Multiply trunk diameter in inches times 2.5
Example: 20 inch diameter Oak X 2.5 = 50 feet root radius
or a 100 foot diameter root zone.

Root systems have a threshold of loss above which long term damage or death can occur. This threshold is that area defined by the limits of the critical root zone. Eliminating soil impacts in the critical root zone (CRZ) significantly reduces the likelihood of long term damage.

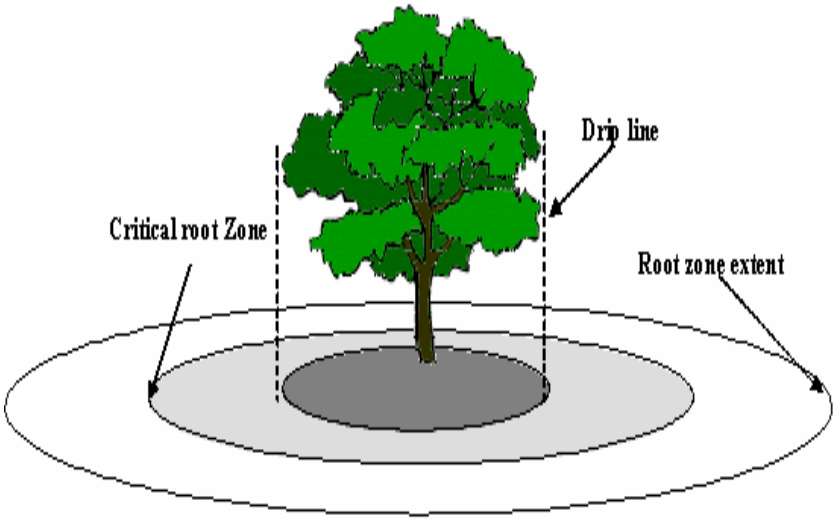
Determine the critical root zone for established trees as follows:

Step 1. Measure trunk diameter at 4.5 feet above soil line.
Step 2. Multiply trunk diameter in inches times 1.5
Example: 20 inch diameter Oak X 1.5 = 30 feet root radius
or a 60 foot diameter critical root zone.

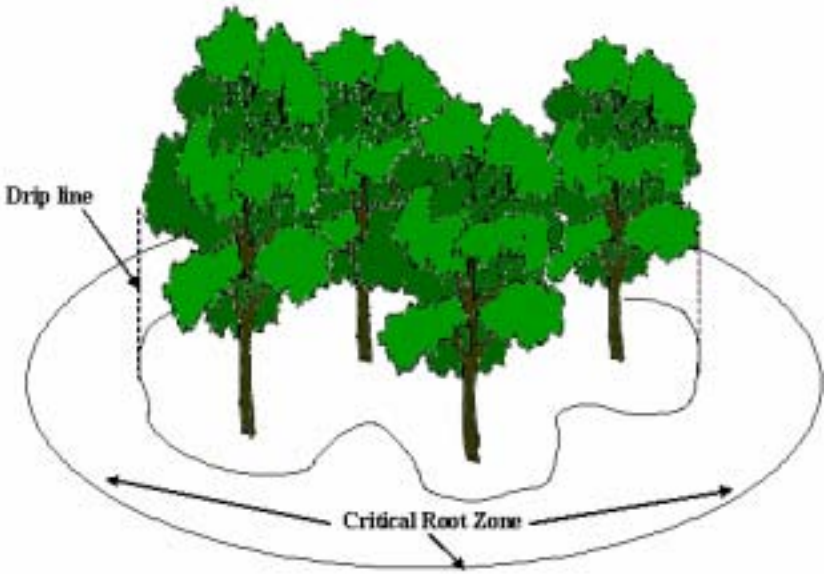
Grade changes, cuts and fills can alter the hydrology of the site and the water and nutrients available to the tree impacting root system vitality.

When construction activity is to take place around a group of trees the cumulative critical root zones of the trees should be determined to reduce or eliminate any impacts to those areas. Consider removing trees that have sustained CRZ loss in excess of 30%. Tree species, health, structural integrity, soil type, vegetation competition, structure proximity, future planned impacts, and planned maintenance and management regimes contribute to the determination of which trees should be removed.

Critical Root Zone Detail
for individual trees



Critical Root Zone Detail
for grouped trees



Sources of Document Details:

Georgia Forestry Commission, *Georgia Model Urban Forest Book* January 2001, www.gfc.state.ga.us

Coder, K. Various publications available.
University of Georgia Extension Service, Warnell School of Forest Resources, www.forestry.uga.edu/warnell/service/library/

Additional sources of information:

Gillman, Ed Various publications available.
Environmental Horticulture Department, University of Florida, Gainesville
http://hort.ifas.ufl.edu/woody/treecare.htm

American Society of Landscape Architects, www.asla.org

Nurserymens' Association of America, www.naa.org

International Society of Arboriculture, www.isa-arbor.com

Georgia Urban Forest Council, www.gufc.org

Southern Forestry Extension Service, www.soforext.net

USDA Forest Service Southern Research Station, www.urbanforestrysouth.org

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