DeKalb County
GEORGIA

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DEPARTMENT OF PLANNING & SUSTAINABILITY

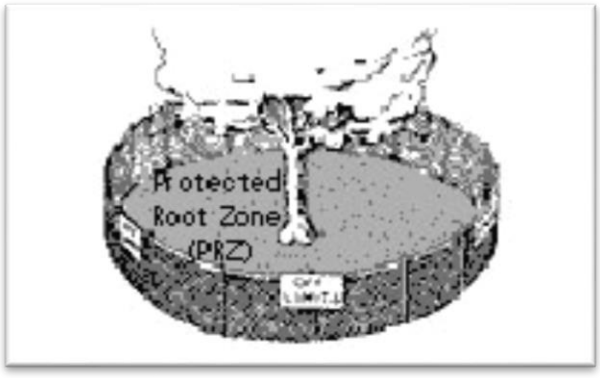
Plan Ahead!

You'll save time and money if you implement the tree protection plan before construction begins. Careful preparation will help you avoid the expense of repairing or removing trees located too close to construction activities as well as having to replace damaged trees.

The following steps will help to preserve and protect trees on a construction site.

Inventory trees on the site - Record the location, size, and health of each tree. Wilted leaves, broken or dead limbs, trunk rot, and thin tops are all symptoms of stress. Trees that display poor form, lean heavily over future buildings, or have severe insect or disease problems should be marked for removal during the construction planning process. Mark trees that need pruning to make room for future structures and access of construction equipment.

Mark construction zone boundaries - Obtain the complete set of site development plans, including the proposed location of buildings, drive-ways, sidewalks, and utility lines. Ask the builder or architect to mark areas where heavy equipment will be used, where soil will be permanently added or removed and to what depth, and where fill and building materials will be temporarily stockpiled. Use a measuring tape, stakes, and string to temporarily mark the boundaries of construction activities on the site.



Protect the trees to be saved - Refer to the Tree Protection Plan with the builder or architect showing the location of trees to be protected and the safest route for access to the building/construction zone. Install bright orange polypropylene fencing and post "Off Limits" signs at the CRZ of the trees to be saved. The primary objective is to protect delicate root systems, so provide trees with as much space as possible. Make sure all construction workers know that nothing inside this area is to be raked, cut, stored, or otherwise disturbed. A landscape protection contract signed by the builder and all contractors will help ensure compliance. Take several photographs of the site before construction begins to document the protection methods used and the condition of individual trees. Install tree protection fence and signs. Alert construction workers to potential damage!

Prepare the trees for construction disturbance - You'll boost trees' survival if you make sure they're as healthy as possible before construction begins. Regularly water the trees if rainfall is not adequate. Fertilize them if soil tests or deficiency symptoms indicate they are nutrient stressed. For soil test information, contact the DeKalb County Extension office. Prune branches that are dead, diseased, hazardous, or detrimental to the plant's natural form.

Protect and preserve the soil for future tree planting - Apply a layer of wood chips at least six inches thick over areas that will be used for traffic or materials storage during construction. If these areas become part of the new landscape, the wood chips will prevent the soil from becoming too compacted.

Monitor the construction process - Visit the site periodically and inspect the trees. Irrigate the CRZ of the trees regularly-- never let trees become water-stressed. Your presence alerts workers of your concern for the careful treatment of the trees. Should damage occur, begin repairs as soon as possible. Immediately inform the builder of any violations in the Tree Protection Plan and photograph the damage.

Make a final inspection of the site - After construction has been completed, evaluate the condition of the remaining trees. Look for indications of damage or stress. It may take several years for severe problems to appear. Careful monitoring and preventive treatment (e.g., watering) may help minimize damage.

Minimize the impact of construction activities - In addition to protecting the CRZ, there are other ways in which you can reduce the impact of construction activities on trees. Some of these are relatively simple; others can be extremely expensive. Carefully consider the importance of each tree to the future appearance of the site and consult a tree-care specialist before deciding whether protective measures are worth the cost.

Site clearing - When a large number of trees are removed, the remaining trees are exposed to new conditions. Sudden increases in the amounts of sunlight and wind will shock many trees. It is not uncommon to find scorched leaves, broken branches, and uprooted trees after a site is cleared. Although some of these problems are temporary, they may compromise tree health when coupled with additional construction damage.

Avoid sun and wind stress by saving groups of trees rather than individuals. When possible, remove unwanted trees in winter after the leaves have fallen. Dormant plants are less susceptible to damage. Bulldozers should not be used to remove trees near plants to be preserved. Heavily wooded sites should be gradually thinned over two to three years to reduce removal shock on remaining trees.

- **PROTECT TREES/CRZ THAT ARE OFF-SITE AND ADJACENT TO YOUR PROJECT!!!!!!**
- **TREES THAT ARE ON A PROPERTY LINE ARE OWNED BY BOTH LAND HOLDERS!!!!!**

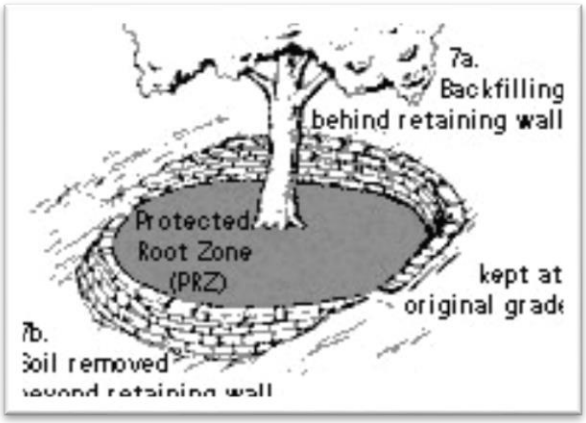
Soil damage - Soil compaction is the single largest killer of urban trees. Tree roots need loose soil to grow, obtain oxygen, and absorb water and nutrients. Stockpiled building materials, heavy machinery, and excessive foot traffic all damage soil structure. Lacking good soil aeration, roots suffocate and tree health declines.

Prevent soil compaction by carefully selecting storage areas and heavy equipment routes (the future driveway is a good choice for both) and installing protective fences and signs. Install root system bridges with steel plates suspended over railroad ties or spread several inches (six inches or more) of wood chips on the soil within the CRZ. Trees that are pruned or removed during the construction process should be chipped on site and the chips used for soil preservation measures such as this.

Avoid changes in soil pH by having concrete mixing trucks rinse in the area per the approved plans. Heavy concrete mixing trucks are to be kept off tree roots. Improper handling or disposal of materials used during construction can also harm roots. Damage from chemical spills can be prevented by filling gas tanks, cleaning paintbrushes and tools, and repairing mechanical equipment outside the CRZ.

- **All building debris and chemical wastes must be properly disposed off-site!!**

Grade Changes - Moving large amounts of soil within the CRZ usually kills a tree. Except where absolutely necessary, avoid disruptions to the natural contour of the site or shift them well outside the CRZ.

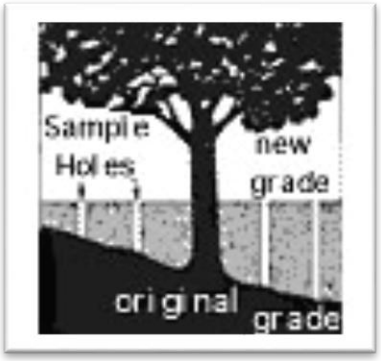


- **If you change the grade within the root zone, use retaining walls to keep as much of the original grade as possible.**

Soil fills compact the soil around a tree and often raise the water table. You may be able to protect compaction-tolerant trees from additions of six inches or less of soil by using a porous fill within the CRZ. Porous fill can be made by mixing one part loam, one part coarse sand, and one part shredded bark.

Deeper fills require more expensive measures. A retaining wall beyond the CRZ may protect some trees. These walls preserve much of the original root system and redirect excess water away from sensitive plants. Your tree-care specialist may suggest other, more elaborate measures for protecting trees that must be covered with soil close to the trunk. However, as a general rule, it is best to remove trees that would be buried by 24 inches or more of fill around the base.

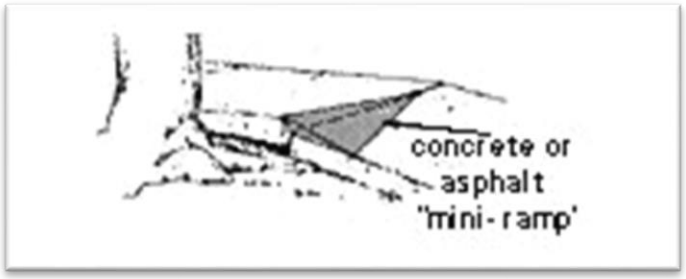
Cutting the soil away from a tree removes vital feeder roots, eliminates nutrient-rich topsoil, and often lowers the water table. Damage caused by shallow cuts (less than two inches) at least three feet away from the base of the tree may be minimal, but still can be a shock to a tree's vitality and health. If possible, avoid making the cut during hot, dry weather; water the tree (undisturbed portions) before, during, and after soil removal; and allow only hand digging inside the CRZ. A shallow layer of mulch (pine needles, wood chips, or coarsely chopped twigs and bark) and clean root cuts will help wound closure and regrowth. Deeper cuts within the root zone will require construction of a retaining wall no closer than the limit of the CRZ.



Drainage systems and grade changes may cause some trees to receive too much water. Species differ in the amount of water they can tolerate. Intolerant plants will exhibit twig and branch death. Don't wait for these symptoms to appear. If you suspect your plant is receiving too much water, contact a tree-care specialist for an evaluation of the problem. Treatment differs by tree species and by the amount of time the water remains on or close to the surface. For some species, a retaining wall or culvert may be needed to redirect the flow of water.

Excavation and Trenching - As much as 40 percent of a tree's root system could be cut during the installation of a nearby utility line. This reduces water and nutrient uptake, and may compromise the stability of the tree. If it is not possible to relocate the utility line outside the tree's CRZ, you can reduce root damage by as much as 25 percent by tunneling under the tree's root system. When digging a trench near a tree, begin tunneling when you encounter roots larger than one inch in diameter.

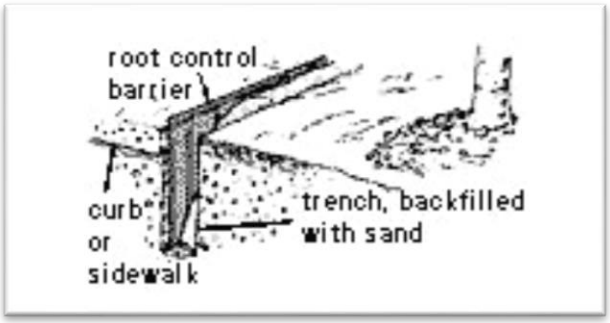
For all digging operations, exposed roots must be cut cleanly to promote quick wound closure and regeneration. Vibratory plows, chain trenchers, and hand tools do a better job at this than bulldozers and backhoes. Minimize damage by avoiding excavation during hot, dry weather; keeping the plants well watered before and after digging. Cover exposed roots with soil, mulch, or damp burlap as soon as possible.



Walkways and Pavement - Walkways and driveways located too close to a tree endanger its health and may threaten pavement stability. Factors such as frost heaving, poor drainage, and pavement flaws give roots an opportunity to expand, gain a foothold, and cause damage. Homeowners are faced with costly repair bills and potential liability for the hazardous situation that develops.

Paving materials such as brick or flagstone over sand will produce less disruption to tree roots than poured concrete.

These problems can be avoided if you consider the spatial needs of a tree and its root system when designing the layout of new walkways and driveways. Just how much space is required depends on a tree's sensitivity to root cutting and its future size. It's best to locate walkways and driveways outside the anticipated CRZ. At a minimum, walkways should be at least three feet from the trunk of a tree; driveways may cover up to half the distance from the tree's CRZ to its trunk, as long as no excavation occurs. No tree should be boxed into an area less than eight feet by eight feet by three feet deep, with larger trees receiving at least 300 cubic feet of root/soil volume.



A vertical underground barrier will help keep tree roots from damaging concrete as they grow. You can minimize disruption by using alternatives to conventional paving materials. Brick or flagstone walkways on sand foundations can be substituted for concrete. These materials protect soil pH and allow water and oxygen penetration.

Preserve natural contouring by spanning uneven areas with wooden walkways elevated on posts. Elevated decks are excellent alternatives to concrete porches. Where additional pavement strength is needed (e.g., driveways), concrete requires less excavation than asphalt.

"Structural soils" may be used under pavement to allow for both adequate pavement base strength and tree root penetration. Structural soils are composed of 80% stone chips, 20% clay-loam soil, and a polymer binding agent. Ask your builder about raised pavement techniques near valuable trees.

There are several techniques for repairing pavement that has been damaged by protruding roots. For trees that are highly sensitive to root disturbance, consider creating a concrete or asphalt. mini-ramp.

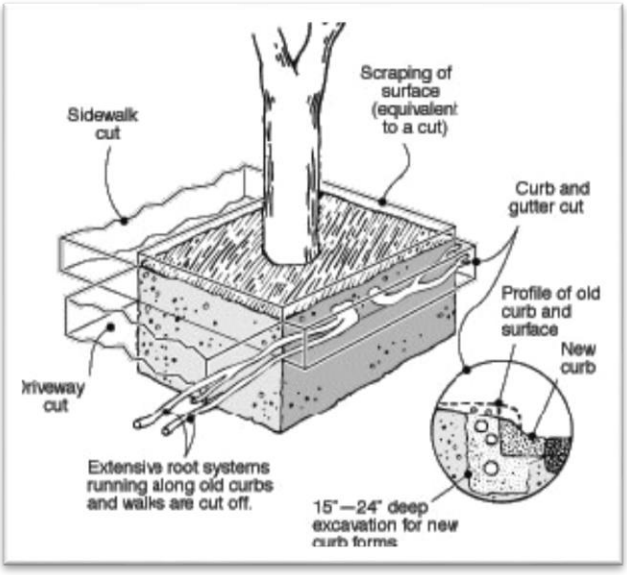
Street trees - Established street trees are subjected to damage from construction activities perhaps even more frequently than forest trees. The infrastructure of any community—streets, sidewalks, curbs, and buried utilities—is continually updated, repaired, or expanded and trees growing close to these public services and infrastructure are vulnerable to construction activities.

The most common type of damage street trees suffer is root loss. This is particularly harmful because these trees are growing in root-limited spaces. These trees are often less healthy than landscape trees due to environmental stresses (small volumes of soil, poor quality of soil, accumulations of deicing salts and pollutants, and drier soil conditions).

Trees growing near streets typically have an unbalanced and very restricted root distribution. Therefore, any root removal or damage during construction is often a more significant loss compared to trees growing in open areas. Root loss not only affects the health of these trees but their condition or stability. A street tree that experiences significant root loss will have a different center of gravity. This shift in balance often results in less stable trees –especially large, mature trees - and leaves them more vulnerable to toppling (wind throwing) during severe weather/storm events.

- **Minimize Construction Damage to Street Trees by Minimizing Root Loss!!**

Most healthy trees can tolerate one-sided root cutting and recover from the loss with long-term after-care. Trees that have roots cut on two sides suffer much more damage and are less stable.



Root cuts on more than one side seriously affect the health and stability of even healthy trees. The number of cuts near street trees may be reduced by a variety of methods and compromises. If possible, avoid widening streets or sidewalks when they are replaced. If curbs are to be replaced, then hand-form the curbs adjacent to tree roots. Excavation with machinery destroys major branch roots, even if the new curb remains in the same position as the old curb.

Consolidate utilities into common trenches whenever possible, and tunnel under tree root systems. Often it is possible to run several utilities in a common trench, minimizing the number of trenches and root cuts.

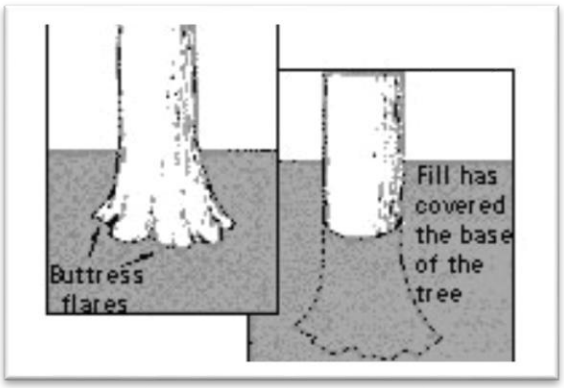
Maintain the health of trees during construction - As long as the soil drains irrigate the trees. Water, water, water, water the trees' roots. Adequate water before, during, and after construction is the most critical requirement for trees if they are to tolerate construction damage. Place soaker hoses over their root systems and soak them a minimum of one time per week during construction and immediately after, allowing two to three hours per soaking.

Symptoms of Construction Damage

Conspicuous symptoms of construction damage may take years to appear. Tree decline from soil compaction, for instance, may take three to seven years to appear as obvious symptoms of distress. Because of this delay, landowners often attribute tree losses to other causes. Carefully monitor affected plants and keep written records to help you recognize the less visible signs of tree stress. Remember, the most serious damage remains hidden in the root system.

Wilted or scorched leaves and drooping branches usually are the first signs of construction damage. In deciduous plants these symptoms may be followed by early fall coloring and premature leaf drop. Damaged conifers will drop excessive amounts of inner needles. In subsequent years you may notice yellowed or dwarfed leaves, sparse leaf cover, or dead branches.

Other indicators might include flowering out of season, excessive water sprout formation on the trunk, abnormal winter dieback, or abnormally large amounts of seed. Flower and seed production and water sprout formation are defense mechanisms for ensuring species survival and commonly indicate that the plant is experiencing extreme stress.



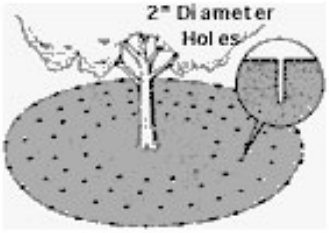
In addition to observing a tree's appearance, monitor its annual growth. Annual growth is the distance between bud scale scars on twigs. The twigs of healthy trees usually grow two to six inches each year. A slightly damaged plant will grow more slowly and be less resistant to insects, diseases, and weather-related stress. Examine the annual shoot and branch growth. Healthy trees generally will grow at least two to six inches at the ends of the branches each year. Photographs and records of the tree prior to construction can help identify growth problems.

Excavation of back-filled trees - If you purchased your home following construction, you can identify deep fills around large trees by looking for buttress flares at the base of the trunk. Most common shade trees have buttress flares, and their absence usually indicates that the tree's base has been covered. It may be helpful to examine the condition of trees on other sites where your builder has worked.

Determine whether the grade has been changed around trees on a newly built site by checking for buttress flares at the base of the trunk. Before you remove the fill that has been added around trees, take vertical samples to determine how deep you need to go.

If you or your tree-care specialist has determined that excessive soil additions have been made around valuable trees, efforts should be made to restore the original grade, at least within the CRZ.
Approach this grade restoration carefully. Determine how much fill has been added by sampling depths at several different points within the CRZ. If the depth is greater than 12 inches, you may remove most of the backfill with mechanical equipment. Once you are within 10 to 12 inches of the original grade, complete the fill excavation carefully with shovels and rakes. Make certain no soil is piled up against the tree trunk. Aerify the soil within the CRZ to complete the operation. If the tree is already exhibiting advanced symptoms of decline, restoration to original grade may be fruitless. In this case, remove the tree and plant a new one.

Treatment of Damaged Plants



When a tree is injured by construction activities, energy and resources normally used for growth must be redirected toward the process of wound closure and regrowth. During this critical period plants are particularly vulnerable to additional stress, especially insects, diseases, and severe weather. You can minimize these problems by quickly treating the damage.

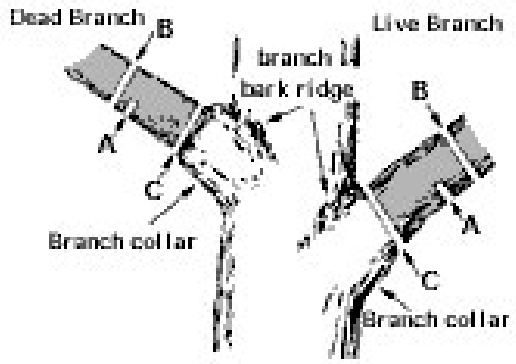
Water - Construction activities often alter the amounts of water received by trees. Thoroughly water plants before and immediately after they receive any kind of direct damage (e.g., severed roots). Continue periodic watering (at least four to five times per summer) throughout the next several growing seasons. Be careful not to overwater your trees. Soaking the soil to a depth of 8-10 inches throughout the CRZ is a good rule-of-thumb.

Aeration and mulching - Soil compaction around a tree's roots may cause leaf wilt, early fall coloring, top dieback, and slow growth. Reduce the effects of compaction by carefully drilling a series of two-inch-diameter holes in the soil to a depth of 12" to 18". Begin 3' from the tree trunk and continue drilling at one- to three-foot intervals in concentric rings around the tree out. Each hole may be refilled with sand, peat moss, or mulch. For severely compacted soils, this procedure—called vertical mulching—should be repeated every two to three years until the tree has fully recovered. A tree-care specialist may recommend other alternatives, including soil injections of air or pressurized water, to improve soil aeration.

Two to four inches of mulch (wood chips or bark) spread over as much of the surface area of the root system as practical will help the tree retain water and stimulate root regeneration. Apply this technique to any deciduous tree exhibiting wilted leaves or any coniferous tree dropping excessive amounts of needles from the inner branches. **DO NOT** place mulch in direct contact with the trunk!

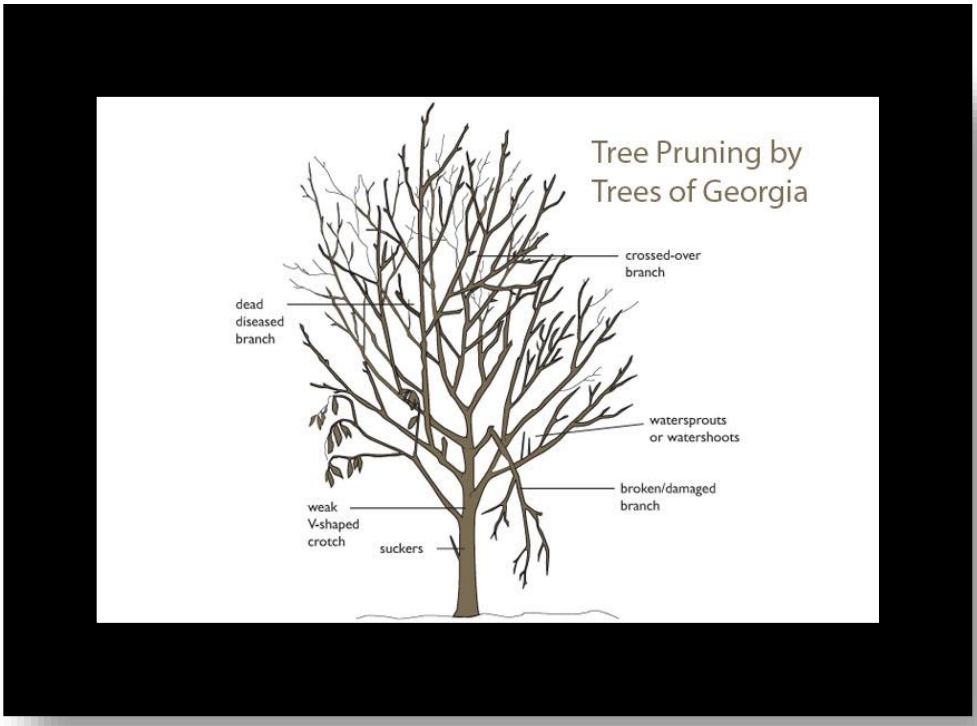
- **Do Not Allow Mulch Volcanoes in the Landscape!!**

Fertilizer - Injured trees may need additional nutrients to replace damaged root systems. Fertilizers containing phosphorus and nitrogen can help stressed plants recover since these nutrients promote root and plant growth. Avoid excessive nitrogen; increased stem and foliage growth can cause stress, especially during hot, dry weather or if the tree has been stressed due to construction activities. Because of this problem, many experts recommend waiting two years after damage has occurred before fertilizing trees.



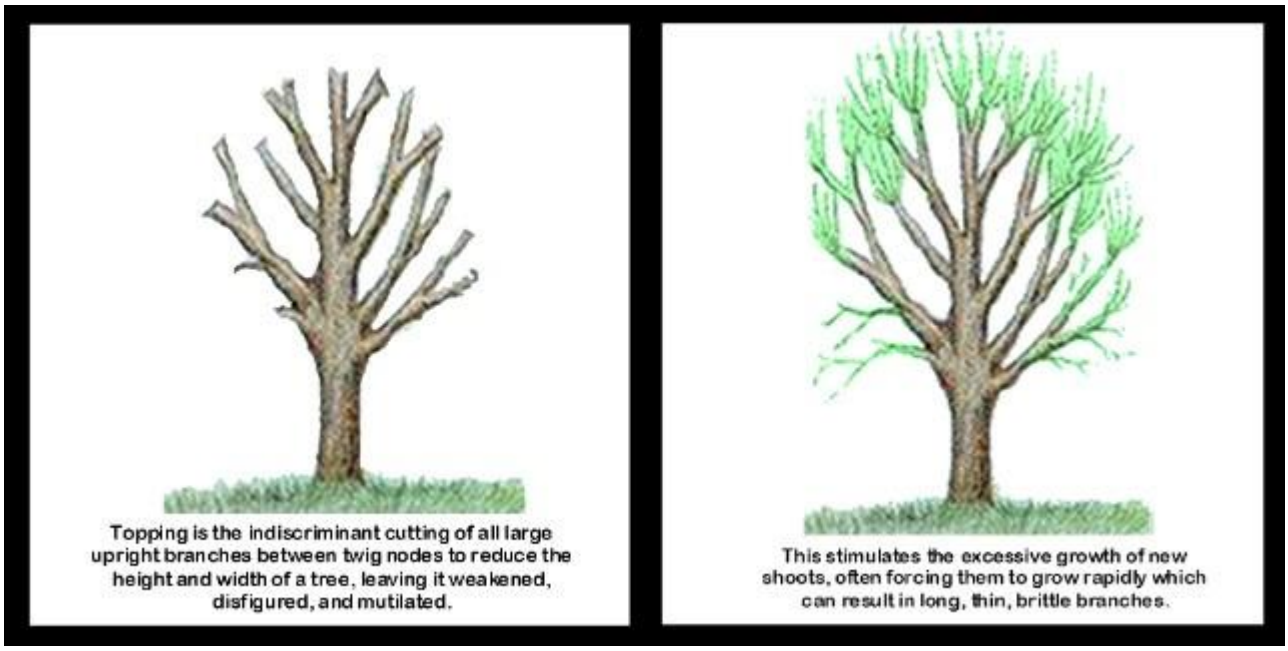
Pruning and wound repair - Careful pruning and wound repair are important treatments for damaged trees. Prune broken or dead branches cleanly at the branch collar. Buds can be used to evaluate branch condition. Live buds appear full and normal in color while dead ones appear shriveled or dry.

Pruning is commonly recommended for large trees that have suffered root damage. However, opinions differ over the merits of this practice. Assuming that the tree has adequate water and is not in severe decline, some experts believe that retaining maximum leaf cover is important for root regeneration and only dead limbs should be removed. Others argue that pruning selected live limbs is necessary to compensate for lost roots. It is best to follow the recommendation of your tree-care specialist experienced in construction damage to trees.



When properly done in moderation by a skilled professional, pruning may reduce wind resistance and limb failure and improve tree health and appearance. **DO NOT** let anyone cut off all of the top branches to the same height ("topping").

You do not need to use pruning paint or dressing to cover exposed wounds or pruned limbs. Except for special cases involving disease control, these products do little more than improve appearance.



The treatment of trunk wounds depends on the extent of damage. If 50 percent or more of the bark has been removed around the entire trunk, the tree will not likely survive and should be removed. If only a patch of bark has been removed leaving a few splinters, use a sharp knife to cleanly cut off the loose bark to a place on the stem where it is firmly attached. DO NOT make the wound any larger than necessary.

Insect and disease problems - Insects are attracted by distinctive chemicals that are released by plants recovering from injuries. Examples of insect pests that can sense a tree under stress include the pine bark beetle, bronze birch borer, two-lined chestnut borer, sap beetle (transports oak wilt fungus), and some scale insects. These insects can kill a plant by their feeding or boring or by transmitting disease.

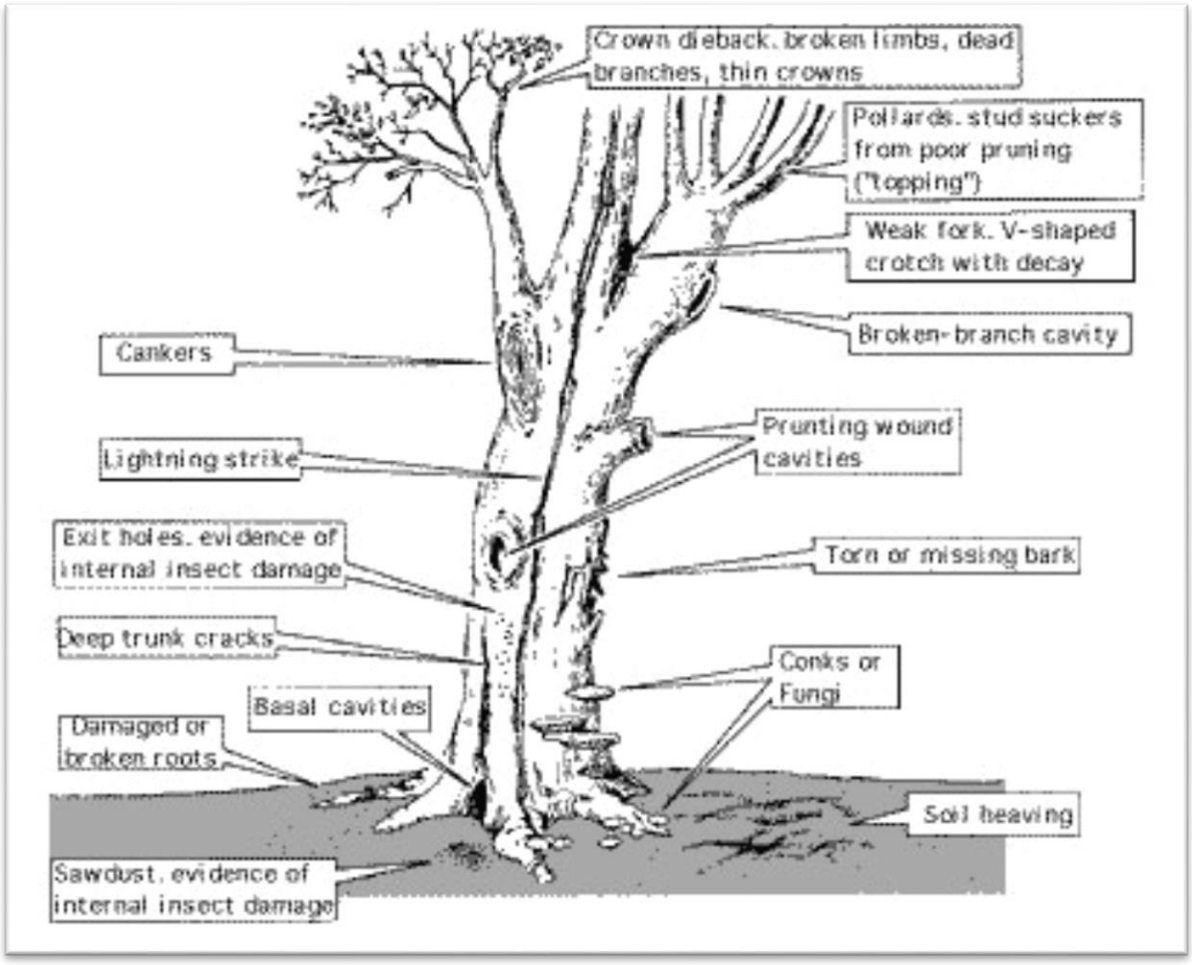
Likewise, some diseases multiply in plants experiencing stress. Verticillium wilt, ash yellows, and Armillaria mellea are examples of diseases that attack weakened trees.

Continually monitor the health of your trees, especially those near construction activities, for insect and disease problems. Proper treatment, including corrective pruning, watering, and pesticide or fungicide applications, can restore tree health. Contact the DeKalb County Arborist, Extension Agent, the Georgia Forestry Commission or other tree care professional (ISA Certified Arborist or local forester) for additional information on specific tree pests.

Tree removal - Even the best protection plans cannot guarantee plant survival. Death may occur shortly after construction or years later. Look for trees with very few leaves and many dead branches. If the tree does not leaf out the following year it is dead. Large trees that lean or exhibit rot, deep trunk cracks, or extensive top dieback are potentially hazardous. They should be evaluated by a tree-care specialist or be removed.

Dead trees are excellent for wildlife, but dangerous to people and buildings. Large trees should be carefully removed by professionals so as not to damage the remaining plants.

Tree loss can have a dramatic impact on site appearance!



- **Trees with extensive dieback, disease, or damage may pose a threat to property and people. A tree-care specialist should evaluate and if necessary remove such trees.**

In many cases you would be wise to have a tree-care specialist look for early symptoms of tree stress. Dollars invested in consultations with tree professionals before damage becomes obvious may be repaid in considerable savings later on.