

Avoiding Tree Damage During Construction



Unfortunately, the processes involved with construction can be deadly to nearby trees. Unless the damage is extreme, the trees may not die immediately but could decline over several years. With this delay in symptom development, you may not associate the loss of the tree with the construction. It is possible to preserve trees on building sites if the right measures are taken. The most important step is to hire a professional arborist during the planning stage. An arborist can help you decide which trees can be saved and can work with the builder to protect the trees throughout each construction phase.

The City of Louisville's City Forester, Chris Lichty is available for advice and consultation during this process and can be reached at (303) 335-4733. The Planning Department can also assist during this process and can be reached at (303) 335-4592.

While allowing for reasonable improvement of land within the City, it is the stated public policy of the City to add to the Tree population within the City, where possible, and to maintain, to the greatest extent possible, existing Trees within the City. The planting of additional Trees and the preservation of existing Trees in the City is intended to accomplish, where possible, the following objectives:

- (A) To preserve Trees as an important public resource enhancing the quality of life and the general welfare of the City and enhancing its unique character and physical, historical and esthetic environment;*
- (B) To preserve the essential character of those areas throughout the community which are heavily wooded and in a more natural state;*
- (C) To enhance and preserve the air quality of the City through the filtering effect of Trees on air pollutants;*
- (D) To reduce noise within the City through the baffle and barrier effect of Trees on the spread of noise;*
- (E) To reduce topsoil erosion through the soil retention effect of Tree roots;*
- (F) To reduce energy consumption through the wind break and shade effects of Trees when they are properly placed on the Lot;*
- (G) To preserve and enhance nesting areas for birds and other wildlife which in turn assist in the control of insects;*
- (H) To reduce storm water runoff and the costs associated therewith and replenish ground water supplies; and*
- (J) To protect and increase property values.*

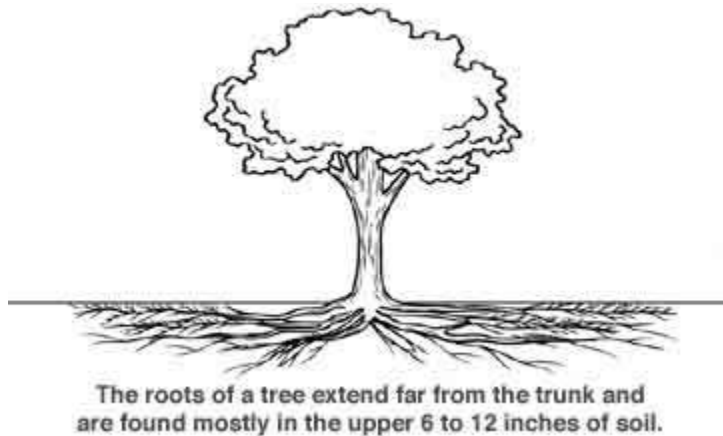
How Trees Are Damaged During Construction

Physical Injury to Trunk and Crown

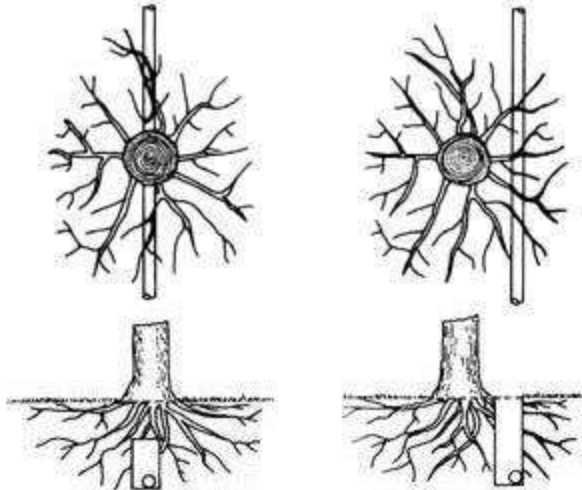
Construction equipment can injure the aboveground portion of a tree by breaking branches, tearing the bark, and wounding the trunk. These injuries are permanent and, if extensive, can be fatal.

Cutting of Roots

The digging and trenching that are necessary to construct a house and install underground utilities will likely sever a portion of the roots of many trees in the area. It is easy to appreciate the potential for damage if you understand where roots grow. The roots of a tree are found mostly in the upper 6 to 12 inches of the soil. In a mature tree, the roots extend far from the trunk. In fact, roots typically are found growing a distance of one to three times the height of the tree. The amount of damage a tree can suffer from root loss depends, in part, on how close to the tree the cut is made. Severing one major root can cause the loss of 5 to 20 percent of the root system.



Another problem that may result from root loss caused by digging and trenching is that the potential for the trees to fall over is increased. The roots play a critical role in anchoring a tree. If the major support roots are cut on one side of a tree, the tree may fall or blow over. Less damage is done to tree roots if utilities are tunneled under a tree rather than across the roots.



Less damage is done to tree roots if utilities are tunneled under a tree (left, top and bottom) rather than across roots (right, top and bottom).

Soil Compaction

An ideal soil for root growth and development is about 50 percent pore space. These pores—the spaces between soil particles—are filled with water and air. The heavy equipment used in construction com-pacts the soil and can dramatically reduce the amount of pore space. This compaction not only inhibits root growth and penetration but also decreases oxygen in the soil that is essential to the growth and function of the roots.

Smothering Roots by Adding Soil

Most people are surprised to learn that 90 percent of the fine roots that absorb water and minerals are in the upper 6 to 12 inches of soil. Roots require space, air, and water. Roots grow best where these requirements are met, which is usually near the soil surface. Piling soil over the root system or increasing the grade smothers the roots. It takes only a few inches of added soil to kill a sensitive mature tree.

Exposure to the Elements

Trees in a forest grow as a community, protecting each other from the elements. The trees grow tall, with long, straight trunks and high canopies. Removing neighboring trees or opening the shared canopies of trees during construction exposes the remaining trees to sunlight and wind. The higher levels of sunlight may cause sunscald on the trunks and branches. Also, the remaining trees are more prone to breaking from wind or ice loading.

Getting Advice

Hire a professional arborist in the early planning stage. Many of the trees on your property may be saved if the proper steps are taken. Allow the arborist to meet with you and your building contractor. Your arborist can assess the trees on your property, determine which are healthy and structurally sound, and suggest measures to preserve and protect them.

One of the first decisions is determining which trees are to be preserved and which should be removed. You must consider the species, size, maturity, location, and condition of each tree. The largest, most mature trees are not always the best choices to preserve. Younger, more vigorous trees usually can survive and adapt to the stresses of construction better. Try to maintain diversity of species and ages. Your arborist can advise you about which trees are more sensitive to compaction, grade changes, and root damage.

Planning

Your arborist and builder should work together in planning the construction. The builder may need to be educated regarding the value of the trees on your property and the importance of saving them. Few builders are aware of the way trees' roots grow and what must be done to protect them. Sometimes small changes in the placement or design of your house can make a great difference in whether a critical tree will survive. An alternative plan may be less damaging to the root system. For example, bridging over the roots may substitute for a conventional walkway. Because trenching near a tree for utility installation can be damaging, tunneling under the root system may be a good option.

Erecting Barriers

Because our ability to repair construction damage to trees is limited, it is vital that trees be protected from injury. The single most important action you can take is to set up construction fences around all of the trees that are to remain. The fences should be placed as far out from the trunks of the trees as possible. As a general guideline, allow 1 foot of space from the trunk for each inch of trunk diameter. The intent is not merely to protect the aboveground portions of the trees but also the root systems. Remember that the root systems extend much farther than the drip lines of the trees. Instruct construction personnel to keep the fenced area clear of building materials, waste, and excess soil. No digging, trenching, or other soil disturbance should be allowed in the fenced area. Protective fences should be erected as far out from the trunks as possible in order to protect the root system.

Limiting Access

If at all possible, it is best to allow only one access route on and off the property. All contractors must be instructed where they are permitted to drive and park their vehicles. Often this same access drive can later serve as the route for utility wires, water lines or the driveway.



Protective fences should be erected as far out from the trunks as possible in order to protect the root systems.

Specify storage areas for equipment, soil, and construction materials. Limit areas for burning (if permitted), cement wash-out pits, and construction work zones. These areas should be away from protected trees.

Specifications

Get it in writing. All of the measures intended to protect your trees must be written into the construction specifications. The written specifications should detail exactly what can and cannot be done to and around the trees. Each subcontractor must be made aware of the barriers, limitations, and specified work zones. It is a good idea to post signs as a reminder.

Fines and penalties for violations should be built into the specifications. Not too surprisingly, subcontractors are much more likely to adhere to the tree preservation clauses if their profit is at stake. The severity of the fines should be proportional to the potential damage to the trees and should increase for multiple infractions.

Maintaining Good Communications

It is important to work together as a team. You may share clear objectives with your arborist and your builder, but one subcontractor can destroy your prudent efforts. Construction damage to trees is often irreversible.

Visit the site at least once a day if possible. Your vigilance will pay off as workers learn to take your wishes seriously. Take photos at every stage of construction. If any infraction of the specifications does occur, it will be important to prove liability.

Final Stages

It is not unusual to go to great lengths to preserve trees during construction, only to have them injured during landscaping. Installing irrigation systems and rototilling planting beds are two ways the root systems of trees can be damaged. Remember also that small increases in grade (as little as 2 to 6 inches) that place additional soil over the roots can be devastating to your trees. Careful planning and communicating with landscape designers and contractors is just as important as avoiding tree damage during construction.

Post-Construction Tree Maintenance

Your trees will require several years to adjust to the injury and environmental changes that occur during construction. Stressed trees are more prone to health problems such as disease and insect infestations. Talk to your arborist about continued maintenance for your trees. Continue to monitor your trees, and have them periodically evaluated for declining health or safety hazards.

Despite the best intentions and most stringent tree preservation measures, your trees still might be injured from the construction process. Your arborist can suggest remedial treatments to help reduce stress and improve the growing conditions around your trees.

Definitions

The ISA (International Society of Arboriculture) has an online dictionary for arboricultural terms:

<http://www.isa-arbor.com/Dictionary/>

CALIPER: The diameter of a Tree trunk six inches (6") above the existing grade or proposed planted grade. Caliper is usually used in reference to nursery stock for new plantings.

DIAMETER BREAST HEIGHT OR "DBH": The diameter of a Tree measured at four and one-half feet (4-1/2') above the existing grade at the base of the Tree.

ROOT ZONE: The area inscribed by an imaginary line on the ground beneath a Tree having its center point at the center of the trunk of the Tree and having a radius equal to one foot (1') for every inch of DBH.

TREE PRESERVATION PLAN: A written plan having text and/or graphic illustrations indicating the methods which are to be used to preserve existing Trees during construction and shall include a Tree Survey.

References

Trees & Building Sites

Official Publication of The International Society of Arboriculture

Edited by Dr. Gary W. Watson and Dr. Dan Neely

Copyright 1995, 191 pp.

Trees and Development

A Technical Guide to Preservation of Trees During Land Development

Nelda Matheny and James R. Cox

Copyright 1998, 184 pp.

***The Landscape Below Ground* (I, II and III)**

Proceedings of an International Workshop on Tree Root Development in Urban Soils

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