



Though built in 1991, this Bethesda, Md., bungalow has an established look because mature trees on the site were protected during construction.

PROTECTING TREES DURING SITE WORK

BY ALEX WILSON

There are plenty of good reasons to protect trees when building on previously undeveloped land. Healthy trees can shield a house from noise, block cold winter winds and hot summer sunlight, and make backyard recreational space more attractive. Strong, healthy trees also boost the value of a home or building lot, so preserving trees saves money that might otherwise be spent for landscaping. Given these benefits, it pays to put some effort into protecting what's already there.

Raising The Grade

Roots absorb oxygen, water, and nutrients — which the tree needs for growth and survival — from the surrounding soil. Raising the grade around a tree — even temporarily — can impede this absorption, effectively suffocating the roots (see Figure 1). The degree of damage depends on the type and depth of fill around the tree. A porous gravel or sand fill is less damaging than a more impervious clay fill. Even if the grade is not changed but an impervious layer is added, such as asphalt or concrete, the effect will be the same. (Planting a young tree in a predominantly paved area, however, such as in a city, is very different from paving around an existing tree, since the new tree's growing roots will adapt to the conditions as necessary.)

Many people build small wells around trees to prevent injury when raising the grade, but this seldom succeeds. Most of the root system is still prone to suffocation by the elevated grade because the roots extend well beyond the trunk and usually even beyond the "drip line" — the outermost edge of the tree's branches, or "crown." To be successful, especially in clay soil, a well needs to extend at least out to the drip line (Figure 2). If the grade must be changed and important trees need to be protected, a skilled arborist might be able to design a system of gravel fill, landscape fabric, and drainage tile to aerate the root system. But because such measures are expensive and cannot guarantee success, they are usually considered only as a last resort.

Injury From Surface Grading

When bulldozers or other heavy equipment nick or skin the trunk of a tree, the wound is obvious and highly visible. This kind of damage opens

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the tree to attack from insects, fungi, or disease. If skinning does take place, it can be treated by coating the wounded area with a compound available at a garden supply store. But skinning may not be as serious as the more hidden damage that grading does to roots.

Scraping topsoil. Woody plants, like trees and shrubs, have most of their roots in the top 18 inches of soil, with a large number of feeder roots located within the top 6 inches. Roots adapt to the ground they are growing in. On hilly ground, for example, a tree's roots will grow along just beneath the surface, rising and falling with the topography, with feeder roots extending almost to the surface. Consequently, even shallow scraping of topsoil around trees can cause considerable damage. Severing large roots close to the trunk is more damaging than severing smaller roots near the drip line, but both injure the tree. If you want to stockpile topsoil from the site for use in landscaping around the finished house, limit the scraping to the immediate excavation site.

Lawns. Most finish grading is done in preparation for planting lawns, but lawns can compound the injury to trees. Grasses are more successful competitors for nutrients than trees, especially in poor soils. In fact, some grass roots may extend even deeper than the feeder roots of trees. When you scrape off the topsoil around a tree in preparation for a lawn, you also remove many of the tree's feeder roots, increasing the odds that the grass you plant there will win in the competition for nutrients and water. Obviously, this can further damage the tree and threaten its survival.

Trenching And Compaction

Digging a trench near a tree is often the most damaging site work of all, since it severs all the roots that intersect the trench (Figure 3). How much injury trenching causes depends on the depth of the trench and its distance from the tree. Obviously, a trench right next to the trunk will do a lot more damage than a trench out near the drip line.

There are two ways to avoid damage from trenching: Relocate the trench, or tunnel under tree roots. Keep in mind that the extra cost of a longer trench or tunneling will usually be recovered through the direct economic value of the trees you save, either in reduced landscaping costs or resale value of the house. If your usual approach for a buried electric or gas line, for example, is to keep the run as short as possible to save money in materials and trenching, consider digging the trench around valuable trees. Tunneling under tree roots is more difficult and time consuming,

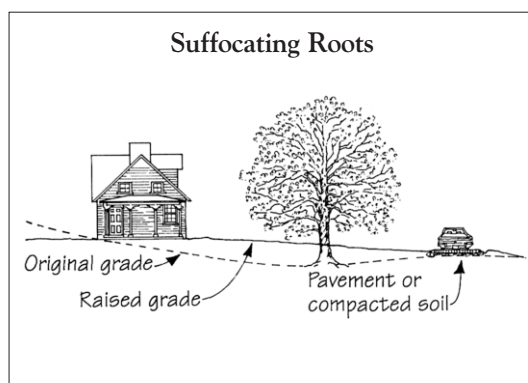


Figure 1. Paving over or compacting the soil around existing trees can suffocate the roots. Raising the grade — even temporarily — can have the same effect.

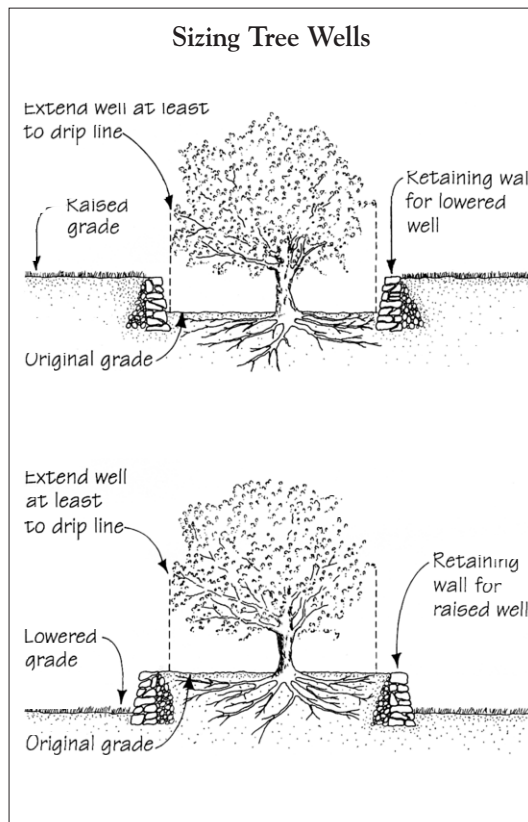


Figure 2. To protect a tree from a change in grade, a raised or lowered well must extend at least to the drip line.

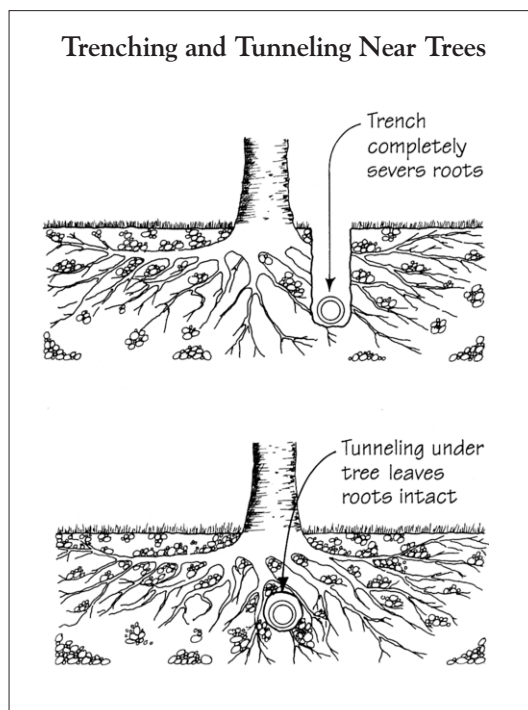


Figure 3. Digging a trench near a tree will completely sever the roots, especially if the trench runs close by the trunk (left). For a tree that increases real estate value, it might be worth the time and effort to tunnel under tree roots (below).

Illustrations by Pamela Smith

HOW TO SAVE TREES ON THE JOB SITE

- ▶ Inventory any large or unusual trees, shrubs, and wetland areas prior to siting a building. For best results, hire a professional arborist, forester, or landscape architect.
- ▶ Flag important trees and low branches that might be damaged needlessly when dumping fill, excavating, or delivering construction materials.
- ▶ Hire an excavation contractor who understands the value of protecting native vegetation and will work with you to ensure that damage is minimal. Choosing a small contracting firm often has advantages, since the same person who meets with you is likely to do the work.
- ▶ Erect a clearly visible fence around building areas, including driveways and leach fields. Allow room for the excavator to work — at least 15 feet between the house and fence. This will minimize soil compaction and damage to vegetation in that range. Also, do not permit parking of construction equipment or workers' vehicles in areas where soil compaction can injure vegetation.
- ▶ Don't spend too much time and money trying to save trees and shrubs that have only marginal chances of surviving the site work. In general, plan to remove all trees and shrubs within 15 or 20 feet of building excavations. But if there's a special tree that you want to save within the 15- to 20-foot range, an arborist can help you evaluate its chances for survival.
- ▶ If the grade needs to be raised or lowered near the house, build raised or lowered wells to save valuable trees. To improve chances of success, extend the well out as far as the drip line. On shallow ledge and heavy clay soils, the well may need to extend even farther.
- ▶ Limit the scraping of topsoil to the area that will be excavated for the building. Stockpile the topsoil away from trees in a flat location that will be easily accessible later, without having to disturb or compact soil to reach it.
- ▶ On sloping sites, use terracing or retaining walls to maintain grades as close to the original as possible. It is especially important on steep sites to keep trees healthy because their roots help prevent erosion.
- ▶ If the building site was created out of dense woodland, watch for excessive sunlight exposure and drying in the remaining trees. To reduce sun shock, thin deciduous trees during the winter months, when they will be acclimated to higher sunlight levels.

Blow-down is very common on land that has been heavily cleared. If you want to clear a large wooded area but leave a few large trees standing, call in an expert for advice before felling trees — the biggest, tallest trees on a site may not be the best candidates. An arborist should be able to select the trees most likely to survive sun shock and the loss of structural support of nearby trees.
- ▶ To help injured trees recover, mulch around the trunks as far out as the drip line, water regularly, fertilize, and thin the crown. Hire a professional to advise on treatments.
- ▶ Unless absolutely necessary, do not stump an area that will remain predominantly wooded. Pulling stumps with an excavator or backhoe will damage nearby trees and soil ecosystems. Instead, remove the soil around the base of the stump by hand and use a chain saw to cut the stump off flush or slightly below grade.

— A.W.

but you can use a power soil auger to speed things up.

When roots are accidentally severed during trenching or tunneling, cut the ends cleanly with a saw or clippers. Then refill the trench as soon as possible to keep the surrounding soil from drying out and further damaging the remaining roots.

Soil compaction. Both vehicle and foot traffic can compact soil, reducing its ability to absorb surface water and to provide oxygen to tree roots. When growing tree roots encounter compacted soil, they often turn away just as they will from barriers such as boulders or a foundation wall. Compaction is likely to be most severe in heavy clay soils because they are poorly drained and poorly aerated.

First Aid

Determining the exact cause of tree damage is often extremely difficult. The symptoms from different types of injury are the same, so you can usually determine the cause only by figuring out what type of site work was done. But if you can discover the cause, you can take corrective measures to improve the tree's chance of survival.

When roots are injured or severed, estimate the extent of the damage. If 20% of the root system is damaged, for example, thin the crown to compensate. Otherwise, the crown will require more water and nutrients than the roots can provide, a condition known as rootshoot imbalance, which can result in dieback.

You can also apply phosphate fertilizers, which aid root development, although this should be done by a professional arborist. Avoid fertilizers high in nitrogen until a few years after root damage has occurred to prevent unbalanced shoot development.

Finally, mulch the area under the drip line to reduce competition from grasses for nutrients and water, and to improve oxygen absorption. If the soil has been compacted, aerate it to a depth of about 8 inches with a crowbar or needle-type soil aerator.

All injured trees should be watered regularly during dry periods to compensate for reduced water uptake by the roots.

For More Information

For additional information on avoiding and repairing damage to trees during construction, consult *Diseases of Shade Trees*, by Dr. Terry A. Tattar (revised 1989, Academic Press; 800/321-5068). ■

Alex Wilson publishes *Environmental Building News*, a bimonthly newsletter on sustainable construction materials and methods for builders and designers.