TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE — SOIL CONSERVATION SERVICE

SEP 15 1987

Forestry Tech Note #39

Davis, California
August 1987

REGRADING AROUND TREES

Attached is an article from the April, 1987 issue of GROUNDS MAINTENANCE. The title of the article is "Regrading Around Trees", by John P. Baumgardt. This article is reprinted with permission of the author.

The information presented here is pertinent for landowners and developers planning construction on forested land. As the article states, the time to plan for tree survival is at the beginning of a project. With the value of mature landscape trees starting at $5,000, retention of existing trees is becoming extremely profitable.

Jack Bramhall
Area Forester

Attachment

REGRADING AROUND TREES

The only way to raise or lower the grade around a valuable specimen tree is to use a method that preserves the status quo so far as aeration and water tension are concerned.

By John Philip Baumgardt, *consultant for landscape design and horticulture*

Large trees sometimes get in the way of progress, as when a desirable specimen tree stands where several feet of fill must be added to complete the grade around a new building.

Adding fill or removing soil around mature trees—any change of grade—is tricky business. A more subtle problem can arise from recontouring that leaves the tree in a depression.

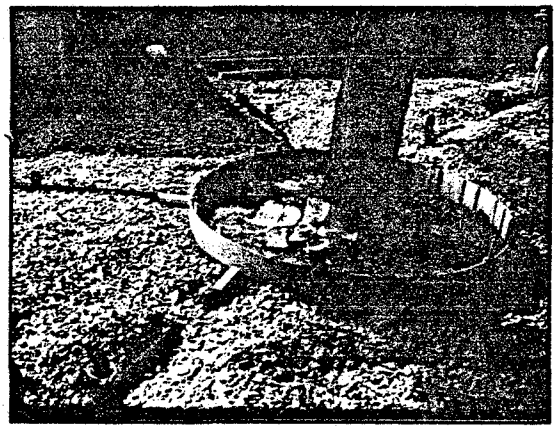
Tree roots are sensitive to *any* change in the status quo. The tree's extensive root system, which extends laterally about the same distance from the trunk as the spread of its branches, develops largely in the top 2 feet of soil that is properly aerated and moist.

Grade changes

What happens when we change the grade around a tree? Adding a layer of soil is like putting your head under a blanket. Only a little oxygen gets through, not enough to sustain life. You can come out from under that blanket when the air is used up, but the tree roots have no such choice. They deteriorate, the plant goes into stress, the life processes of the entire organism are disorganized, and the tree dies.

Removing soil creates similar

Continued...



Lines of 6-in. perforated drainage tubing with flues to the surface lead out from the tree well like spokes of a wheel. The #3 aggregate will be spread over the lines. The finished installation (below) shows the tree well and the flue openings (circled) that supply the tree with oxygen.

METHODOLOGY CAN VARY

Depending on the depth of fill, you can modify the basic technique as long as you provide for ample air to reach the tree's root zone.

The following technique was used to preserve a pin oak—a tree sensitive to changes in grade. In this case, the grade change was only about 15 inches on one side of the tree and slightly less on the other.

First, the grass was removed and phosphate applied. A 6-in. layer of brick rubble was added, and 18-in. lengths of solid plastic pipe were stood in this at 4-ft. intervals. A 1-in. layer of pea gravel covered the rubble and an inch of fine river sand topped the gravel.

Specially amended soil was used to bring the earth up to final grade. It consisted of a blend of two parts good loam, one part each of coarse brown peat and coarse sand plus phosphate at the rate of 2 pounds per cubic yard. The fill was hand-raked and seeded, then rolled with a wet-sand-filled hand roller.

On the other side of the tree, the grade was carried to within about 8 feet of the trunk and then gently sloped to almost the original grade, leaving the tree in a shallow bowl. In heavy soil this would not be good, but in this case the soil was well-drained. Pin oaks are, after all, bottomland trees. A planting of lilyturf (*Liriope spicata*) disguises the depression.

Later, it was discovered that the pipes created a mowing problem. A clever gardner suggested filling them with 1-in. aggregate and then carefully wriggling them out of the soil, leaving a column of aggregate for aeration. Now, 11 years later, that tree still looks fine—no chlorosis and no die-back at the top.

True, the tree is babied. Every March, a Ross Root Feeder with high phosphate (transplant-type) cartridges is used shallowly to encourage roots to come up through the aggregate, closer to the surface. In dry summer weather, a general light sprinkling is done for the same reason. Last year, a little exploratory digging just inside the dripline exposed a few small roots about 6 inches from the soil surface—at just the right level.

Regrading

(Continued from page 54)

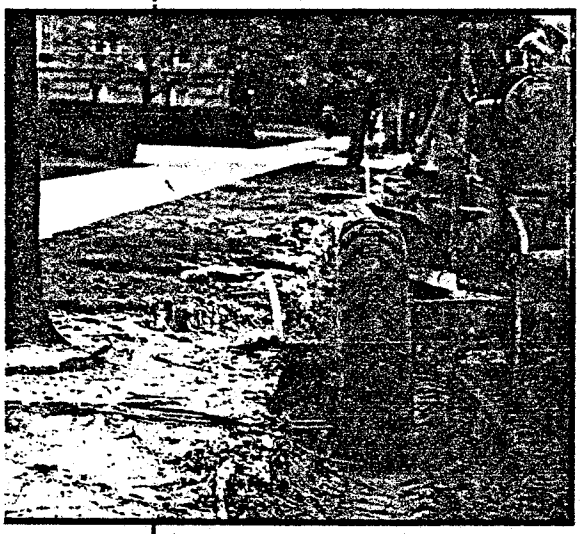
stress, usually dehydration. Normally the roots are stratified at a level at which the soil is just moist enough to supply ample solution containing dissolved minerals and oxygen for metabolic needs, as well as water for photosynthesis in the leaves. When soil is peeled away, drying extends deeper. Normal root activities slow or stop, and the tree goes into stress and dies.

These same problems occur when grade changes are made some distance away. If grading leaves the tree in a basin, water tends to collect. The effect is the same as adding a thick layer of impervious soil. The roots smother.

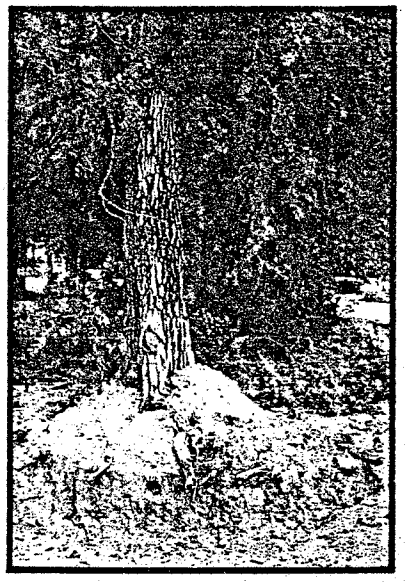
Grading that leaves the tree on an elevated knoll so its personal water table drops considerably creates trouble, too. The roots dry out, and the plant is stressed to death.

Continued...

DON'T MURDER TREES

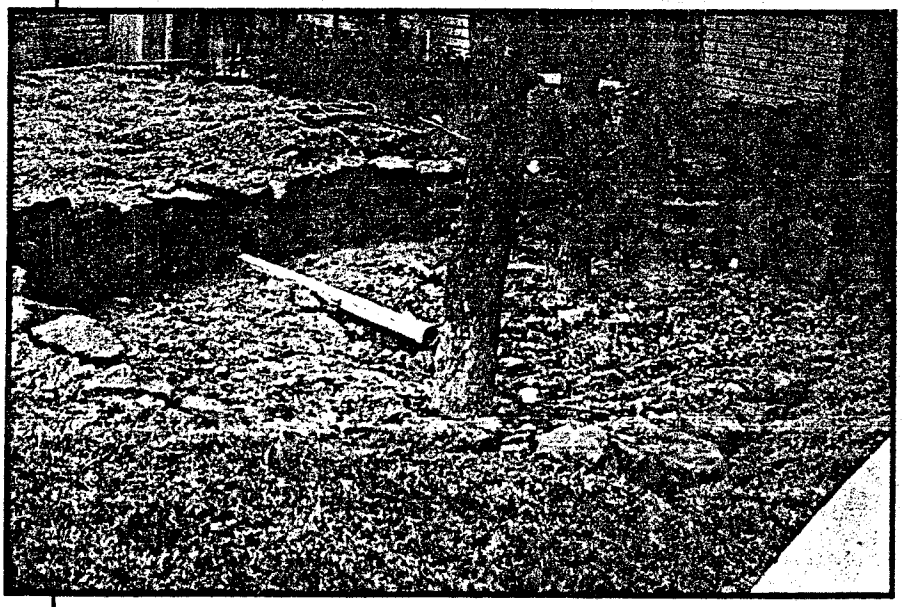


It's murder to strip roots and compact soil around trees during regrading. Heavy equipment and careless grading are the culprits.

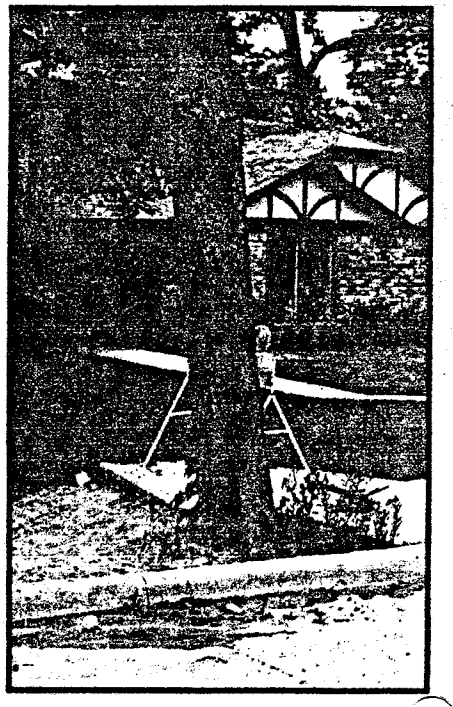


Death from exposure results when roots are torn away from trees.

A desperate effort to save these "victims" may be too little too late. Steps to preserve the trees should have been taken before the soil line was disturbed.



A poorly constructed tree well will not provide enough help for these trees.



This is the scene of a crime. The victi suffocated after its roots were covered with pavement.

Regrading

(Continued from page 56)

Avoiding stress

If you must have 3 or 4 feet of fill, you have to come up with a method of delivering normal volumes of air and water to the tree's roots. All work must be done so the existing roots suffer as little as possible.

Avoid excess soil compaction by using the smallest equipment possible. Do not allow trucks to run over the soil within 15 feet of the dripline, and do not stack construction materials within this area.

•Carefully peel away sod from the tree's trunk to several feet beyond the dripline.

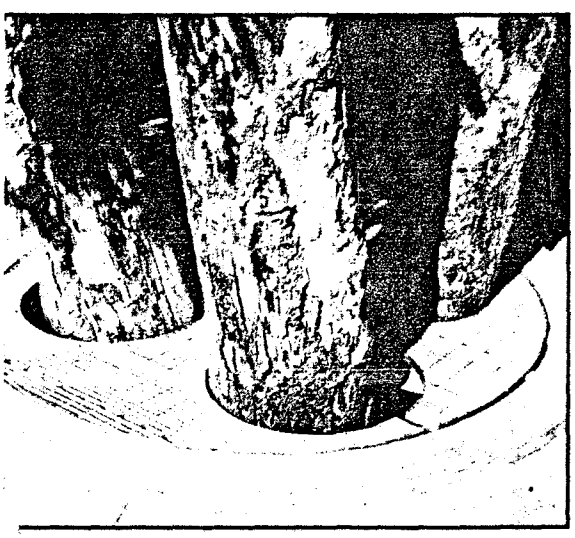
•Apply a high phosphate fertilizer to encourage the root growth to move upward.

•Select a chemically neutral aggregate. Chunky broken granite or brick will do; limestone will not because it will sharply alter the soil pH.

Building the well

Because soil cannot be piled up around the trunk, you will have to build a well around it. The inner diameter of the well should be at least twice the diameter of the tree trunk. A 30-in. tree would need a well with a *minimum* diameter of 5 feet; twice that would be better.

When you establish the distance from the trunk at which the well will be located, dig a shallow trench—12- to 15-in. wide and 2- to 8-in. deep, depending on root depth—around the tree. Do this job carefully by hand so you do not sever any major roots. Clean up the sides and bottom of the trench so they are straight and level.



Tree grates over tree wells protect against the accumulation of debris and damage caused by children, pets and vehicles.

Working by hand, this worker carefully removes soil from around the tree's delicate root system during the construction of McDonald's corporate headquarters in Oak Brook, Ill. The project preserved hundreds of native trees.

Using an auger, bore holes 18- to 20-in. below the bottom of the trench for footings. The depth of the footing may vary in different parts of the country, but it should extend below the frost line after the new fill is in place. Bore the holes between and away from the main roots, spacing them evenly around the circle.

Fill the holes with concrete and allow it to set. Next, fill the trench with concrete and allow it to set. Mesh or rods may be used to reinforce the concrete, if desired.

When the footing is firmly set, you are ready to begin building the well wall. Bring 2 inches of aggregate up to the area where you will build the wall.

Installing tile

At this point, install 3- or 4-in. tile every few feet, laying it so it extends through the well wall. (To my knowledge plastic pipe has not been used for this, but there seems to be no reason why it would not work.)

Install the pipe fields over the surface of the aggregate, laying the tiles close together to prevent silt from washing in, and extend the lines out from the center like spokes of a wheel. Cover the joints of the tiles or the lines of perforated plastic pipe with strips of tar paper, landscape fabric or similar material that will guard against silt.

Add more aggregate around and at least 2 inches over the tiles. In silty or clay soils the depth may be increased to 12 inches.

Meanwhile, build up the wall, bringing the construction to the top of the aggregate. Top with pea gravel to filter out soil and a layer of sand for additional filter. Finish off with porous, open soil. Do not compact it as it goes down. At this point, we want everything as loose as possible.

This simple plan may be adequate, but you can improve the system by adding branches halfway out. You can use perforated plastic pipe successfully here. Cut holes in the sides of the larger pipes and insert the smaller perforated pipes into the holes. Again cover the tops of the system with a material to prevent silt from washing into the lines.

Why not establish a rough grade, then plant a quick-covering ground cover? You could use periwinkle (*Vinca minor* in the North and *V. major* in the South) on the rough-graded soil. Then, in 3 or 4 years when you are sure the tree is going to live, lift the ground cover and use it elsewhere. Level the now-subsided soil, and establish a suitable turf.

Finishing touches

When the job is finished, you will see only the masonry wall around the tree trunk, with the open tile holes near the bottom. These openings allow air to move into the tile field over the entire root system, diffusing it through the aggregate and into the soil over the tree's roots.

As a finishing touch, you can add a metal grid—two halves braced on inside metal legs—to keep children, pets and trash out of the well.

This is just one example of successful manipulation of a complicated system for protecting valuable trees when fill becomes

Continued on page 118

Regrading

(Continued from page 58)

essential. Methodology can vary. The real point is to make provision for ample outside air to reach the tree's root zone.

Reducing the grade

A more dire problem involves reducing the grade. There really is no successful way you can remove soil from over tree roots and keep the tree. Provided the change of grade does not have to extend to within the dripline, you can grade away as much soil as you wish and still save the tree.

The best way is to work in a perfect circle. Find the farthest reach of the dripline, add a few feet, and use this measurement for a radius around the entire tree trunk.

Cut vertically at this circumference, and remove soil outside the circle to the new grade. Returning to the vertical cut, dig a trench to below the frost line for a footing. Build a heavy retaining wall on the footing. This will give you a tree on a pedestal, which may or may not fit into the general landscape scheme.

Lowering the grade around a tree necessitates removing soil from beyond the dripline to the new grade and building a heavy retaining wall. Be sure to provide adequate drainage in the wall as shown in the above photo.

To avoid the maintenance headache of having to hoist a mower onto the wall to mow the now-isolated patch of grass, replace the grass with a ground cover planting. Especially effective is a low, creeping plant that will drape down over the wall to break up the stark lines of the masonry.

There are ways to both raise and lower the grade around a valuable specimen tree. The way to do it is to use a method that will preserve the status quo of aeration and water tension.

A final approach is to have a meeting of architects, landscape designers and owners. When they agree that a fine tree or trees must be preserved, the real answer is to design around them. The best management so far as a tree is concerned is *no* change in grade. □

Photo credits: Theodore Brickman Co., Long Grove, Ill.; David L. Morgan, Texas A&M University Research and Extension Center at Dallas; Bob Ray, consulting arborist, Louisville, Ky.; *Grounds Maintenance.*