

Managing Infrastructure Conflicts with Trees



Trees provide quantifiable benefits in urban areas -- anywhere from a few to hundreds of dollars a year each. But when confronted with heaving sidewalks, dangling branches and clogged sewers, public entities and homeowners can only see the costs associated with a leafy canopy. ***Keeping trees from damaging infrastructure, while a challenge, is a goal that is within reach of cities, counties and individuals.***

Trees can affect infrastructure several ways. The first is damage to sidewalks, curbs, gutters, streets and other paved surfaces. Tree roots can infiltrate sewer lines. Trees grow into power lines and other overhead utilities, which creates major hazards. Finally, tree branches block signs, traffic lights and sight lines at traffic intersections and other potentially dangerous sites.

RIGHT TREE, RIGHT PLACE

As with most tree "problems," smart landscape design and tree selection is the key to preventing problems. Pavement damage can be greatly minimized or avoided by proper planning. ***If the planting area is less than three feet between paved areas, trees should be avoided.*** Large shrubs can be trained into small trees if desired.

Small trees can be an option if the area is three to four feet across, but for the best results, the planting area should be at least five to six feet for small trees (less than 30 feet at maturity) and at least eight feet for large trees.

STRUCTURAL SOIL

Structural soil, introduced in the 1990s by Cornell University, is a mixture of gravels, clay loam and hydrogel that supports tree growth in urban landscapes. ***Structural soils installed beneath sidewalks, streets and parking lots offers greater rooting volume for trees while maintaining compaction specifications.***

Trees can be selected to minimize root damage, as well as conflicts with power lines. Resources are available on the Internet to assist in proper tree selection; SelectTree (see link below) can even filter tree selection according to root damage potential.

Palms can be used in smaller parkway openings with less damage to hardscape. ***Slower-growing trees are usually less damaging than fast-growing trees.***

SAVING EXISTING SPECIMENS

Pruning can minimize conflicts with overhead wires, signage and underground root conflicts. A lopsided tree can be pruned to preserve its health and benefits. Many utilities use V-shaped pruning profiles to minimize conflicts with overhead wires, which can result in complaints about aesthetics but ultimately saves trees.

Pruning retards growth of not only root systems but also of the stems and branch systems that are removed. If more pruning is necessary, a thorough appraisal needs to be made regarding the ultimate safety of the tree. ***Do not heavily prune trees in an attempt to slow root growth or otherwise "fit" a large tree into a small space.***

To reduce growth, increase pruning frequency but not intensity. ***Several pruning cycles removing less than 20% of foliage are more effective than one severe pruning event.***

DOWN TO THE ROOTS

Tree root damage to sidewalks can be treated with several strategies. Many municipalities use root pruning to save sidewalks. Trees should be carefully evaluated for overall health before root pruning is attempted, as the potential to destabilize a tree can lead to a hazardous situation.

If root pruning is deemed necessary it should only be undertaken after considering the species tolerance for root loss, the room available for root growth and the species ability to compartmentalize decay. If the wrong species is planted in a narrow strip, perhaps removal and replacement is a better use of resources.



The right tree in the right place can prevent infrastructure damage. Photo Courtesy: PasadenaNow

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While some specialists recommend a greater distance, **a general rule of thumb is to root prune no closer to the trunk than five times its diameter.** Research by Dr. Thomas Smiley at Bartlett Tree Research showed that a very young tree can have all roots on one side pruned off completely using that rule with no impact on the tree's stability.

Although root pruning may slow sidewalk damage, less invasive techniques are recommended when possible.

SIDEWALK SOLUTIONS

Sidewalks that are lifted slightly can be ground down to minimize tripping hazards. **Sidewalks can be cut to "share" the space with a mature tree.** This is generally a temporary measure, as the tree will continue to grow. Sidewalks also need to have a minimum width to accommodate ADA (Americans with Disabilities Act) standards.

One step up from a cutout, a "meander," where the sidewalk is curved around the tree's trunk, can require major construction and permission from adjacent property owners (or conversely, the municipality). This technique can be both attractive and effective.

Sidewalks can also be ramped upwards to accommodate roots. Damaged concrete is removed, then a few inches of topsoil placed over the roots and a sand base installed over that. Then a new sidewalk is installed. The gentle grade over the roots keeps users safe, and the tree roots are not disturbed.

Root barriers are often specified by landscape architects and sometimes recommended in conjunction with root pruning. Physical barriers, usually panels made of heavy plastic, are used to either circle the tree's rootball or as liners for the planting pit. Another often-seen alternative is landscape fabric with nodules containing trifluralin, an herbicide, or coated with Spin Out, a root growth regulator.

The use of root barriers has been a point of contention. Root barriers reduce the amount of roots in a given space. Care must be taken if the top of the barrier is above grade. Mulch or topsoil often allows roots to grow over the barrier. **Because of increased incidence of root defects associated with some root barriers, they are not as commonly used or recommended as in the past.** Rather than install barriers, plant trees appropriate to the site.

INNOVATIVE REPLACEMENTS

Rubber sidewalks made their debut around 2000 and remain a popular option, now employed by more than 60 municipalities across the nation. These sidewalks are high-density and sturdy, and as an environmental bonus, are often made of recycled tires. Although the initial cost is higher than concrete, used in new installations they will reduce infrastructure damage. In a retrofit situation, rubber sidewalks can save tree roots while offering pedestrian safety.

Sidewalks are not the only infrastructure that can be damaged by tree roots; several of the solutions above can be considered for patios, driveways and even invasive roots in sewers. In addition, poured concrete can be replaced with interlocking pavers or bricks. Using sand instead of solid grout allows water and air to reach tree roots, and individual pavers can be replaced when the need arises.

As with most tree concerns, selecting the right tree for the right place is the preferred method to avoid conflicts. 🍂

Further Reading/Links

Root Growth Near Vertical Root Barriers after Seven Years

<http://joa.isa-arbor.com/request.asp?JournalID=1&ArticleID=3082&Type=2>

Healthy Trees, Smooth Sidewalks

<http://www.techtransfer.berkeley.edu/newsletter/07-1/sidewalks.php>

Root Pruning Guidelines

<http://hort.ufl.edu/woody/root-prune-guidelines.shtml>

Select Tree/Cal Poly Pomona

<http://selecttree.calpoly.edu/>



Six years after installation, a rubber sidewalk provides safety while the trees still provide shade. Courtesy: Walter Warriner, Consulting Arborist.