



ROUNDTABLE: SEWER LINES AND TREES

Photos by Steve Cothrel and David Sivyer

Last fall, a lively discussion on the topic of sewer lines and tree roots took place on the SMA Listserve. Here, Society members David Sivyer, Scott Wheeler, Gordon Mann, and Jeff Heintz share their experiences.

David Sivyer
City Forester
City of Norfolk, Virginia

For municipal arborists in old cities, conflicts between trees and sanitary sewer pipes are commonplace. How these conflicts are resolved reveals much about community values and the relationship between the MA and the utility department.

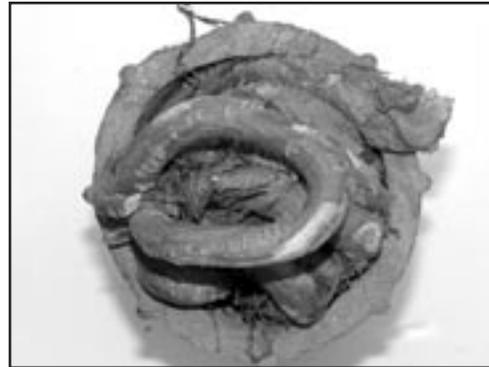
Founded in 1682, Norfolk has its share of both aging sewer infrastructure and old majestic trees. While trees have long been an important part of Norfolk's 120-plus neighborhoods, the city did not employ a city forester until 1988. The position was created at the request of City Council following a utility project that killed many hundred-year-old oak trees along a busy thoroughfare. With the support of Council and a visionary bureau and department head, we've built a strong municipal forestry infrastructure. We've also built lasting, positive interdepartmental and community relationships centered on valuing urban trees.

Most sewer/root conflicts in Norfolk are symptomatic of a defective sewer pipe, not a tree problem. Tree roots are opportunistic and grow where conditions are suitable. Leaking joints and cracks in old terra cotta sewer laterals servicing many of Norfolk's older homes create an inviting environment for root growth. It's been my observation that while it's true that root pressure may actually dislocate an otherwise secure terra cotta pipe joint, most root/sewer conflicts simply reveal the degradation of joint compounds brought about by pipe age, not tree roots.

In Norfolk, if a sewer obstruction occurs on the city side of a sewer lateral (from the city cleanout to the main), our utility department will repair or replace the city lateral. Often, this requires relocating



In some cases of tree/sewer line conflict, the tree loses out.



If a sewer pipe is broken and leaking, tree roots may take advantage of an opening.

the lateral to minimize impact to a city tree. Since our tree ordinance requires a tree permit for excavation within the critical root zone (CRZ—a.k.a., dripline) of a city tree, city arborists routinely work with the utility crews to evaluate repair options and ensure that construction methods protect adjacent city trees. In virtually every instance, there is a win-win solution that allows for the repair to be made without loss of or significant damage to the tree.

If the obstruction occurs on private property, it's the property owner's responsibility to repair or replace the defective pipe. We recommend owners use copper sulfate or like products only as a short-term stopgap until a proper repair can be made.

We do not remove healthy desirable city trees for sewer-root conflicts, nor does the city reimburse the property owner for any sewer maintenance or repair costs on private property.

In my seventeen years with Norfolk, I can't recall a single instance when a city tree had to be removed to solve a sewer lateral problem.

City utility personnel and contractors have become accustomed to our requirement for hand digging or trenchless construction when repairing or installing underground piping within the CRZ of city trees. Contractors routinely tunnel beneath sidewalk or curbing to minimize restoration costs to those hard features—why should tree roots be valued any less?

Norfolk's success in preserving trees is a function of a strong tree ordinance with clear permitting requirements, an effective site plan review process, reasonable tree protection and tree location standards, and mutual respect and shared interdepartmental values with regard to the importance of healthy and safe trees in our city. My department views engineers from utilities and public works not as adversaries, but rather as an important element of a professional team.

While the details of how these relationships are built are the subject for another *City Trees* Roundtable discussion, community values and interdepartmental relationships within any city will ultimately determine who wins the conflict between trees and other city infrastructure.

Scott D. Wheeler
Tree & Parks Supervisor
City of Newport, RI

In Newport, we only allow the removal of a tree that is in conflict with a sewer line if there is no other possible way to replace the blocked sewer line given the proximity of the tree and the available space. If the sewer line can be rerouted or root damage will not structurally compromise the tree, the tree stays. Unfortunately, with our narrow colonial streets, there is often simply insufficient space.

In marginal cases, the tree can often be saved and a new sewer line installed by hand digging around the major structural roots. Unfortunately, from experience I know when a contractor offers to “hand dig,” the translation is that they will dig with a backhoe until they find the roots, and then they will excavate by hand around the mangled root remains.

Our recent purchase of an air excavation tool was partially motivated by the desire to work with private contractors to expose the primary structural roots and reduce the number of trees requiring removal. The technology works very well, but too few contractors have air excavation tools to require its use. Our hope is that as more firms are exposed to the usefulness of air excavation tools, they will acquire them.

Gordon Mann
Public Works Superintendent
City of Redwood City, CA

In Redwood City, we have mostly city-owned sewer utility (85%), with the remaining 15% of the city covered by the county-owned sewer utility. We practice the same sewer/tree policy with both utilities.

City policy around trees has been formulated to consider the investment and most easily replaced asset involved in a problem or conflict. In a young tree/sewer conflict, it may be appropriate to remove and replace the young tree during the repair. The tree can often be replanted in a better location farther from the sewer. In an older tree/sewer conflict, it is usually easier and more appropriate to replace the sewer and retain the tree.

In deciding whether to retain the tree, we consider the condition of the tree—is it worth keeping in the inventory? We also consider the distance of the tree from the sewer line—can the repair be completed without destroying the tree?



A sewer lateral in a potentially uneasy coexistence with white oak roots

We have observed, based on thousands of sewer repairs, that tree roots do proliferate within sewer pipes. However, the trees have rarely caused the damage to the pipe to create the “right of entry.” Anecdotally, our sewer crew operators estimate that only about 2% of the damage to the pipe is *caused* by the tree.

If a pipe is damaged or leaking and thus encourages the roots to enter, Redwood City doesn’t treat the tree as being at fault. If the root grows under or next to the pipe and the radial growth expansion of the root causes a pipe offset that causes the leak or damage, the tree is considered responsible. This determination isn’t made until excavation and investigation is performed.

The key policy points or approaches to consider include, if possible, requiring excavation to occur without cutting roots and utilizing techniques that are less dam-

aging to roots during excavation or pipe installation, such as hand digging and tunneling around roots, air or hydraulic excavation, and trenchless pipe installation. Some communities may be able to require permits and permit conditions for the above.

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This sewer line excavation was done by hand, but air excavation tools are gaining popularity.



Sewer line trenching

Once it's known that there are roots in a sewer pipe, there are routine maintenance steps that can be performed, from mechanical root clearance or cleaning to chemical root killing. Routine maintenance can prevent a situation from "suddenly" resulting in a stoppage or blockage of pipe flow.

Redwood City has paid a small percentage of claims resulting from a city-owned tree's roots in a sewer line. However, the claim resolution has been based more on the specific situation circumstances than just the cause of the blockage.

Jeff Heintz
Assistant City Forester
City of Bismarck, North Dakota

Heated discussions regarding tree roots in sewers often focus on tree removal, the cutting of the invading roots, or the application of chemical treatment to try and correct the situation. Removal of a tree near the clogged sewer line may or may not stop the blockage, since roots of same species can often graft together and created a shared root system. (This was made evident with the domino-like transmission of Dutch elm disease through joined underground root systems.)

Roots can also travel long distances from the parent plant, making identification of the offending tree difficult. Augers, root saws, and high-pressure flushers can be used to physically remove roots from inside sewer pipes. With regard to chemical treatments, downstream pollution, wastewater treatment issues, and environmental impacts have heightened the concern over the use of chemical removal of roots from sewers.

Cutting and chemical control methods only temporarily solve a perennial problem. Repeated applications are necessary to keep

the lines open and flowing. Unfortunately, gaps in the pipe joints or cracks in the pipe will allow roots to re-invade the failing sewer line. The long-term solution of rebuilding the compromised line can initially be a financial burden to the municipality and private property owner, yet I believe it to be the best practice in the long run.

Chemical control by homeowners often consists of a copper sulfate formulation applied to the sewer line to destroy the invading root tissue. This is the same root pruning technique used in the nursery trade with copper-lined containers to keep plant roots from growing outside of the pot or root circling. With sewer lines, the absorbing end of the root dies from the toxicity of the copper, destroying the obstruction blocking the pipe.

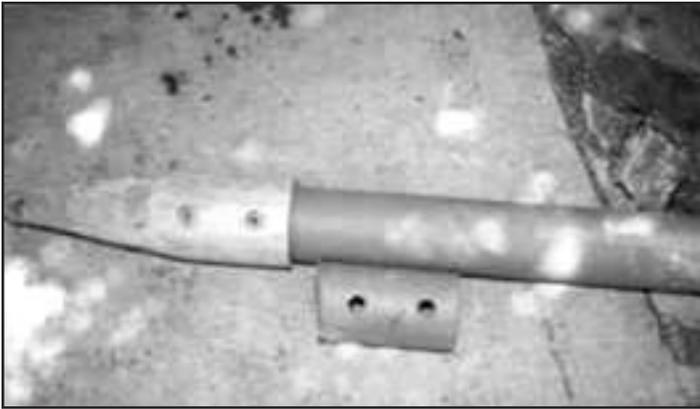
But unfortunately, copper sulfate flushed down the toilet or added to the sewer cleanout only comes in contact with root tissue that is lying at the bottom of the pipe. If the root enters the sewer pipe from the top or sides of the pipe, root elimination may be impossible with copper sulfate.

Recently, some areas of the country have banned the use of copper sulfate chemical control in the sanitary sewer or storm sewer system due to the downstream water pollution potential.

Bismarck Municipal Utility Operations Director Keith Demke says,



Conventional sewer line repair can decimate trees, both above and below ground.



Pipe bursting head. Pipe bursting expands underground space to allow contractors to both break the existing pipe and pull the new pipe through.

“I am not very comfortable with recommending that citizens use copper sulfate for root control. We do regulate copper discharges by industrial users of our system because of a federal requirement that we do so. We don’t have a problem with copper at this point, but it is a metal that is not completely removed by the treatment process and consequently goes to the river in our discharge. What is removed ends up in our sludge (biosolids) and is applied to cropland. So there are practical limits to what we can accept in our system before we have problems. I would not propose that we prohibit anyone from using copper sulfate, I just wouldn’t encourage it.”

The ultimate solution to the problem of roots in sewers is the replacement or repair of the damaged pipe. Unfortunately, open excavation can lead to extensive root disturbance and nearby tree loss. New methods of minimal site disturbance for pipe replacement are the burst pipe method, relining the pipe, the injection of polyurethane grouting, and slip lining.

Pipe bursting involves replacement of an existing pipe, by pneumatic or hydraulic means, with a new pipe of the same or larger diameter inserted with minimal excavation. Relining and injection grouting are usually performed on the larger diameter sewer mains, yet relining is making headway in the residential smaller-pipe-diameter market. In residential slip lining, a PVC pipe can be slid inside of the old clay tile as long as the diameter of the original pipe is large enough to accommodate the new plastic sleeve. These methods of sewer repair keep roots from re-entering the sewer line at the old breaks, eliminating the need to excavate the entire sewer lateral and thus saving the tree root systems growing near the sewer lines.

Roots in sewers will be a problem whenever old construction techniques are encountered. It is our duty as MAs to conscientiously make recommendations that will ensure not only tree health and safety, but also human well being.

And just in case you’re interested, while writing this I found a fascinating study of the history of the world’s sewers, at www.sewerhistory.org. The site even offers a traveling display of photos and artifacts that is very popular at public works conventions. I guess it takes all kinds of folks with all kinds of interests to keep the world flowing. 🍃



Sewer line work can be devastating for street tree roots.