Challenges of Urban Tree Care

Many of the urban challenges trees face begin with the construction process. At the beginning of parking lot construction, topsoil is generally removed. The subgrade is then compacted, followed by layers of crush and run stone, asphalt or concrete that are spread and also compacted. If municipal compaction specifications are adhered to, the resulting soil mix under the pavement is generally impenetrable to roots due to mechanical impediment. It also limits root growth due to low available oxygen.

A tree located in south Lincoln — lateral growth of the tree roots is causing uneven displacement of sidewalk sections.

Trees planted near pavement often suffer due to root damage and soil volume restriction. The lateral growth of shallow tree roots causes sidewalks to crack and heave, creating "lips" or "stub-toe" spots because of uneven displacement of adjoining sections of concrete. This root vs. pavement conflict is one of the most pervasive problems in urban forestry. Removal and/or replacement of trees and repair of paved surfaces can strain limited municipal funds. In addition, city governments may be found liable in damage suits where injuries occur as a result of pavement hazards.

Selecting appropriate trees for parking lots and other paved areas is challenging. Paved surfaces are engineered to quickly shed water, often in directions that either deprive trees of adequate soil moisture or leave their roots submerged in excess water. Heat from parking lots and other pavement is exacerbated by the solar heat sink of the pavement, with adjacent buildings and cars adding to the stress. Limited soil volumes confine roots, restricting root growth, reducing anchorage, and often supplying inadequate moisture and nutrients. The stress of compaction and low soil fertility, coupled with other physical, environmental and human forces acting against trees makes parking lots and paved areas unfriendly to trees. These factors combined make 7–10 years the average life expectancy of most urban trees.

Where trees will be installed into parking lot "islands" which create a pseudo-container for roots, design these islands with as much soil volume as possible. Ideally, the roots should be able to grow at least to the drip line or crown edge of the tree at maturity. A soil volume of two to three cubic feet per one square foot of crown spread is recommended. Where soil volumes are restrictive, select smaller tree species or cultivars that are especially heat and drought tolerant.

Maintain two to three inches of mulch within the drip line of the tree, replenishing as needed. Keep the mulch from contacting the tree trunk, and minimize the number of competing plants within this mulched area.

Whenever possible, design permanent drip or pop-up irrigation systems. Restricted root systems, reflected heat and dry summers create extreme drought stress for trees in parking lots and other paved areas. Avoid cutting tree roots when irrigation is installed after trees are established. Be sure the amount of irrigation is appropriate for the tree species because irrigation quantities needed for turf maintenance are generally excessive for trees.

Fertilize if tree growth (pale and small leaves or stunted twigs) and/or soil or plant tissue analyses indicate nutrient deficiencies. Application of a controlled-release nitrogen fertilizer may be needed every year or two if no turf fertilizer is applied and if soil volumes for root growth are restrictive.

Select salt tolerant tree species for parking lots and paved areas where deicing salts may accumulate or drain over tree roots. (DJ)

Vegetative Filter Strips Conserve Soil, Water

Vegetative filter strips, sometimes referred to as grass filter strips or grass buffer strips, are areas seeded to close-growing or sod-farming grasses at locations where runoff water leaves a field within and next to cropland. They are designed to filter out the sediment, organic material, nutrients and chemicals carried in runoff water. Vegetative filter strips also are placed along water courses, streams, ponds and lakes to protect surface water. Grass filters can be used to filter wastewater from agricultural processing facilities.

Photo courtesy of USDA Natural Resources Conservation Service

Vegetative filter strips work in conjunction with terraces to keep sediment and other contaminants from migrating into adjacent waterway.

Vegetative filter strips capture sediment and organic material by slowing runoff water leaving a field. As water is slowed, larger soil and organic particles rapidly settle out. Smaller clay particles need a longer flow distance to settle out in the filter. Therefore, a larger strip width is needed for removing finer soils. Filter strips work best when water flows at a shallow, uniform depth across the filter. If water becomes concentrated in small channels, the effectiveness of the strip is drastically reduced. Filter strips also work best on relatively flat slopes.

Vegetative filter strips are a best management practice for reducing runoff of some agricultural nonpoint source contaminants, such as soil nutrients, organic material and pesticides bound to soil particles. They should be considered part of a conservation system. Filters, however, cannot remove all runoff water contaminants. They are less effective at removing nutrients and pesticides in solution, that is, those dissolved in water and not attached to soil.

Vegetative filter strips are most effective at removing sediment, nitrogen, phosphorous and pesticides bound to soil particles. Recent research at the University of Nebraska-Lincoln evaluated filter strips using simulated rainfall and runoff on silty clay loam soils with six to seven percent slopes and land area ratios of 15 acres of cropland to one acre of filter. Results indicate a 25-foot wide grass filter strip can reduce off-site movement of total nitrogen, atrazine and alachlor by 70 percent and total phosphorous by 85 percent. The reduction in the amounts of herbicide and nitrogen leaving the field resulted from increased infiltration within the filter strip which lessened the amount of runoff water leaving the filter. Total phosphorous reduction was a result of sediment removal. Research with both natural rainfall and rainfall simulators in Indiana, Virginia, Maryland and Iowa has shown for silt-loam soils with slopes ranging from 3-12 percent, filter strips can remove 56-97 percent of sediment, depending on filter strip width and the area draining to the filter strip. Under these controlled experimental conditions, removal rates are best with shallow, uniform flow across the filter and relatively small drainage areas. Actual field removal rates will depend on many factors and will likely be less than experimental rates. (DJ)

WATERWHEEL

Well Location

Note: This is part of a series of articles related to rural water issues.

Keeping your well water free of harmful contaminants is a top priority — for your health and for the environment. How you manage your well and activities on or near your property, may affect well water quality.

About 95 percent of rural residents use private wells to supply drinking water. These wells, which tap into local groundwater, are designed to provide clean, safe drinking water. However, improperly constructed or poorly maintained wells can create a pathway for fertilizers, bacteria, pesticides or other materials to enter the water supply. Once in groundwater, contaminants can flow from your property to a neighbor's well, or from a neighbor's property to your well.

When possible, locate a well where surface water (storm water runoff, for example) drains away from it. If a well is downhill from a leaking fuel storage tank, septic system or overfertilized farm field, it runs a greater risk of becoming contaminated than a well on the uphill side of these pollution sources. In areas where the water table is near the surface, groundwater often flows in the same direction as surface water. Surface slope, however, is not always an indicator of groundwater flow.

The following separation distances are required or recommended in Nebraska based on our soil and subsurface geology characteristics.

10 feet

- depression could retain stagnant water
- pump pits and tank pits
- sewer lines
- frost-proof hydrants
- cistern

25 feet

- animal barn pen with concrete floor

10–50 feet

- sewer lines within this distance must be watertight when subjected to pressure equivalent of a column of water 10 feet high

50 feet

- septic tank
- sewage holding tank
- animal shelter or yard

100 feet

- cesspool or seepage pit
- privy
- any other subsurface disposal system
- any known or suspected source of contamination or pollution
- gasoline and liquid petroleum products