Sidewalk and Tree Conflicts

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Roots and Sidewalks

Why do roots damage sidewalks?

- Roots grow where moisture, oxygen, density, nutrients allow,
- Good environment under some sidewalks – condensation,
- All concrete cracks – with or without trees,
- Normal cracks allow entry of water, oxygen and nutrients, which can intern provides a better environment for roots,
- Roots do have the ability to lift sidewalks even without crack .

Sidewalk Trials

Established 1996
Suburban sidewalk design and construction
London Planes

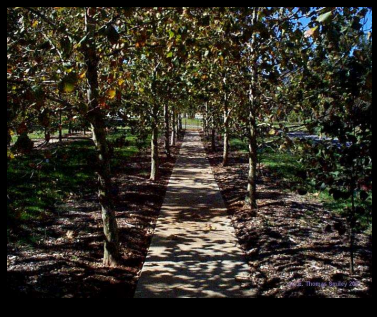
Treatments

Deep Root Barrier 18”
Black Poly 18”
Styrofoam 4”
Gravel 4”
Structural soil – Soil/Gravel Mix 4”
Control

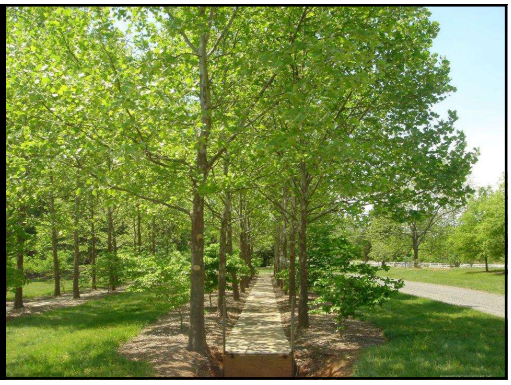
Sidewalk Plot

Sidewalk lifting appears in 2000

Four years after installation



Sidewalk Plot After 10 Years



Sidewalk Removal

Evaluating Root Growth Under Pavement

Sidewalk Results

Control – no barriers or subbase treatment

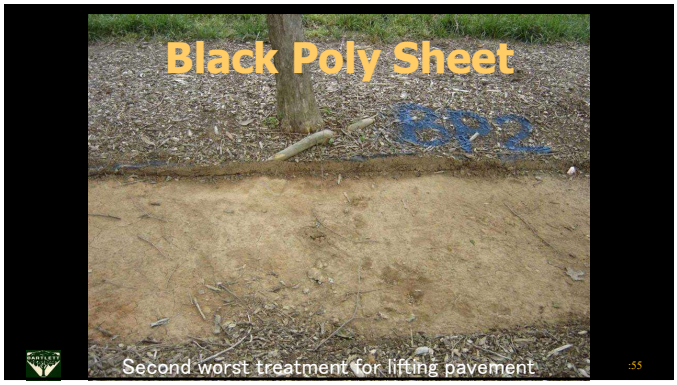
Sidewalk Results

Control – Not a good treatment – associated with lifting

Gravel Soil Mix

One of the Worst Treatments for sidewalk lifting – Need more than 4"

Control next to Gravel Soil Mix


Black Poly Sheet
BP2
Second worst treatment for lifting pavement
:55


Deep Root Barrier
DR2
One of the Best Treatments


Deep Root next to Control


Styrofoam
One of the Best Treatments


Styrofoam next to Control


Gravel (1-1.5", washed)
One of the Best Treatments
Fewer, smaller and deeper roots

Best treatments for reducing lifting and root growth under pavement:

- Gravel
- Styrofoam
- Deep Root Barriers

Do All Root Barriers Work the Same?

Root Barrier Comparison

To compare root barriers:

1) Deep Root barrier
2) Deep Root with Spinout (copper)
3) Typar geotextile
4) Typar with Spinout
5) Biobarrier
6) Non-treated Control

Materials and Method

1 ½" caliper Willow oak (*Quercus phellos*)

60 trees

Planted November 8, 2000

15' spacing, 25' between rows

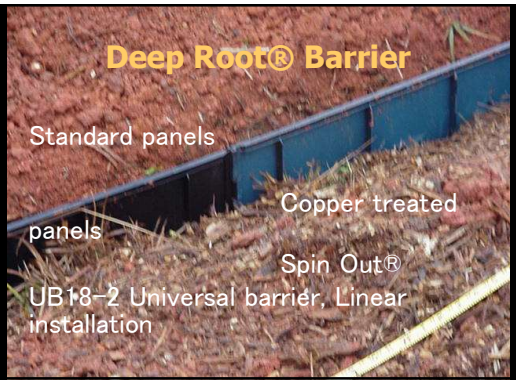
Root Barrier Installation

2' from trunk

On both sides of the tree

18" deep

10 replicates in 2 blocks



Reemay Inc. Biobarrier®

Non-woven polypropylene geotextile fabric with attached nodules containing trifluralin

EPA Class IV "practically nontoxic" herbicide

Texel Inc. TexR ®

Non-woven polypropylene/Polyester geotextile fabric with Spin Out ® resin coating ($6g/m^2$)

Spin Out ® is copper hydroxide $Cu(OH)_2$

Reemay Inc. Typar® Geotextile 3801

Non-woven polypropylene geotextile fabric

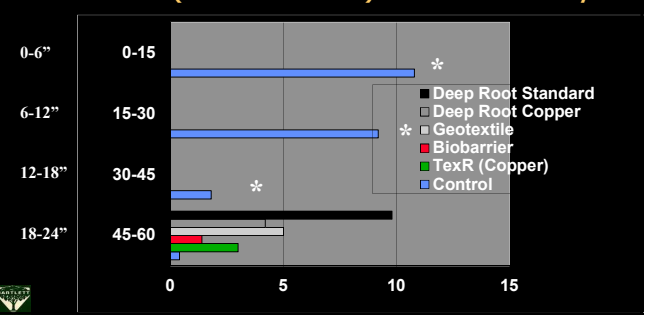
8 ounces (heavy weight)

Counting roots at the barrier line 2 and 7 years after installation

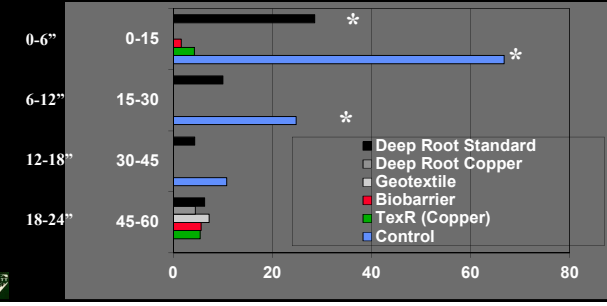
Control

Deep Root Barrier

Root Count (<10 mm dia) at Barrier- 2 yrs



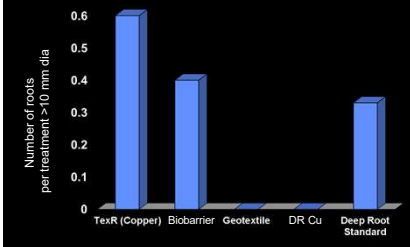
Root Count (<10mm) at Barrier- 7 yrs

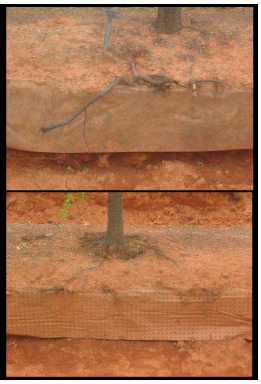


Root Barrier Penetration

A Rare Event

Root Barrier Overgrowth



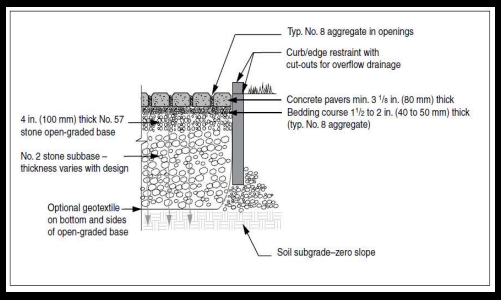


Fabric barriers tended to have more but difference were not significant

Conclusions

1) All root barriers tested significantly changed root growth patterns.
2) Chemically treated barriers slowed root undergrowth but little difference at 7 years.
3) Slightly more overgrowth with fabric barriers

Can treatments be combined?



Rob Burk PE

Part 2. Assessing tree roots and root damage

Root cuts are common in urban areas

Root Cutting: How close should you get?

Root cutting research at the Bartlett Lab

1) Linear root cuts – how close can we cut without affecting stability?
2) Individual root cuts at the trunk– how many roots can we cut?


There are two factors we need to look at:

Tree Health – is the tree likely to die if the roots are cut?

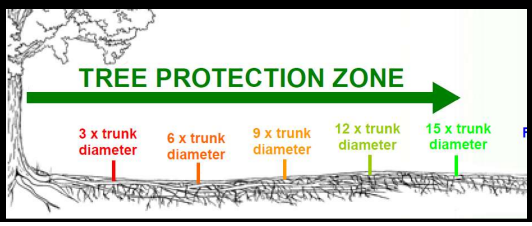
Tree Stability – Is the tree likely to fall over if the roots are cut?

Checking the TPZ distances

Dr. Andrew Koeser, Univ. of Florida

Live oak trees with root cuts all of the way around

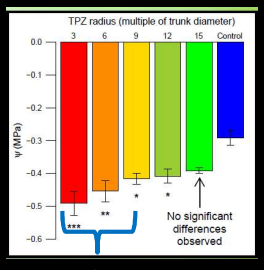
Looked at water potential and growth



Root cutting results

Found water impacts at distances from 3–12 x DBH

Growth Impact at 3–9 x DBH



Growth Impact Found here

Stability of Root Cut Trees

Using a Stump Cutter to Severe the Root System of each Tree

Linear Cuts

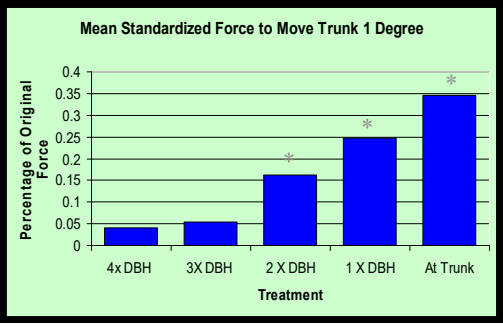
Across the root system

Linear cut close to trunk

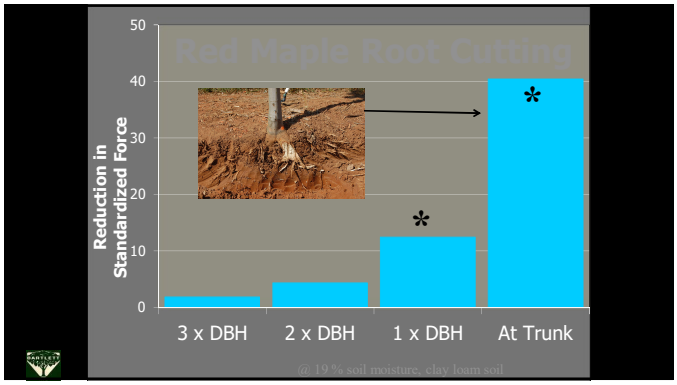
Cut at Trunk

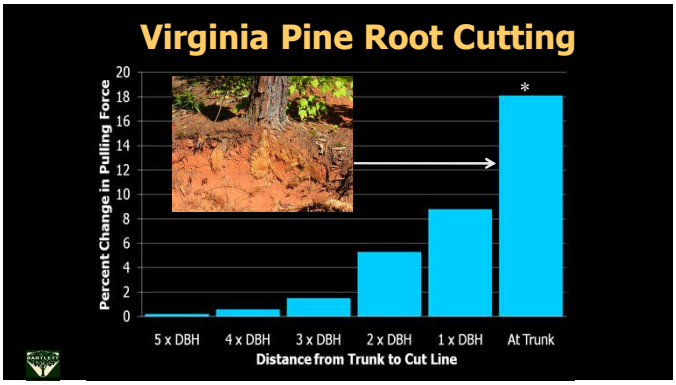
Pull testing

Linear Root Cuts on Willow oak

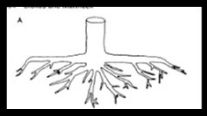


Repeating the Trial on Red maple





Are there root system differences among species?



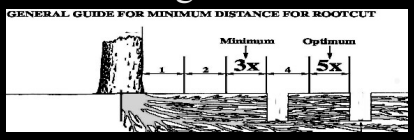
Root System Configurations (after Kostler et al. 1968).

A. Deep root or Heart root system

B. Horizontal, lateral or plate root system

C. Tap root system

Root Cutting: One side cuts



It is best to keep all cuts outside dripline.

5X DBH is likely to be a sustainable distance for many species. There are significant species differences.

3 X DBH is as close as you should ever recommend

Within 1 to 1.5 x DBH consider tree removal when high value targets are present

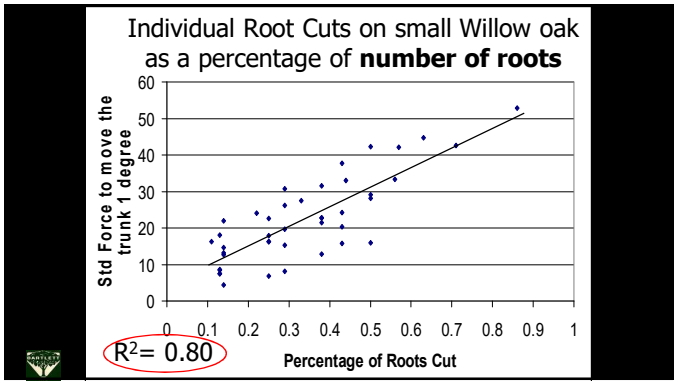
Use greater distances if large tree, leaning trees, trees with root rot etc.

Cutting Individual Roots

Roots were cut one at a time until roots were severed from 50% of the trunk circumference

Roots cut on the side opposite of the pull force (tension side)

Red Maple with 50% of trunk circumference with roots cut



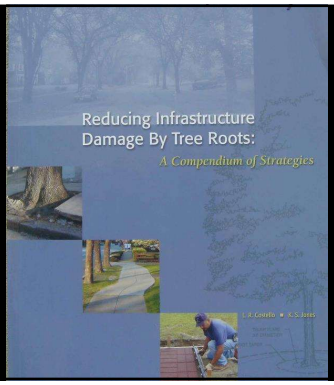
Individual Root Cuts

- Results are highly variable, one root cut can have 5 to 25% change
- Best not to cut any roots at the trunk
- More than 1/3 will significantly increase likelihood of failure

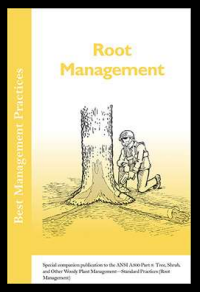
Good Source for Sidewalk Information

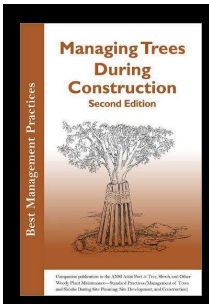
Dr. Larry Costello and Katherine Jones

Available from your ISA Chapter or ISA International



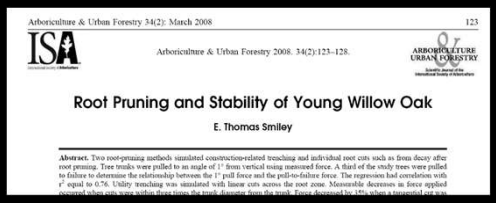
Want more information on Root Management?





Available from your ISA Chapter or ISA-Arbor.com

For more information:



Questions or Comments?

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