Since 2004 there have been new products and soil mixes developed.

Some of these were installed in a new plot at the Bartlett Laboratory in 2014.

New Urban Plaza

Gravel Based Structural Soils

80% gravel, 20% soil.

Compacted to 95% Proctor. Based on Cornell Structural Soil

Sand Based Structural Soil

Gravel layer below and above sand, ring irrigation
Compacted to 95% Proctor

Silva Cells from Deep Root

Strata Cell from City Green

Craig Melvin

Filling Strata Cells

Stata Cell – vibrating to work soil into cells

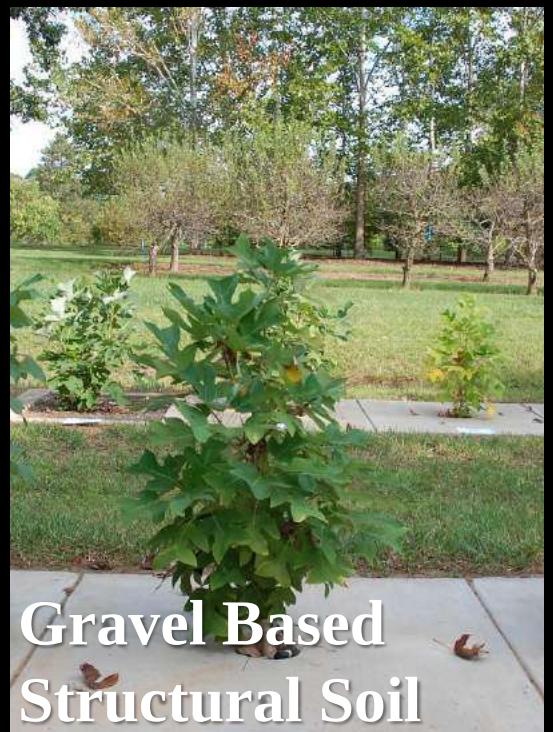
Installing concrete

Large differences in growth during the summer of 2015. One year after planting.


Sand Based
Structural Soil


Strata Cell


Silva Cell


Gravel Based
Structural Soil


Compacted Control


Control

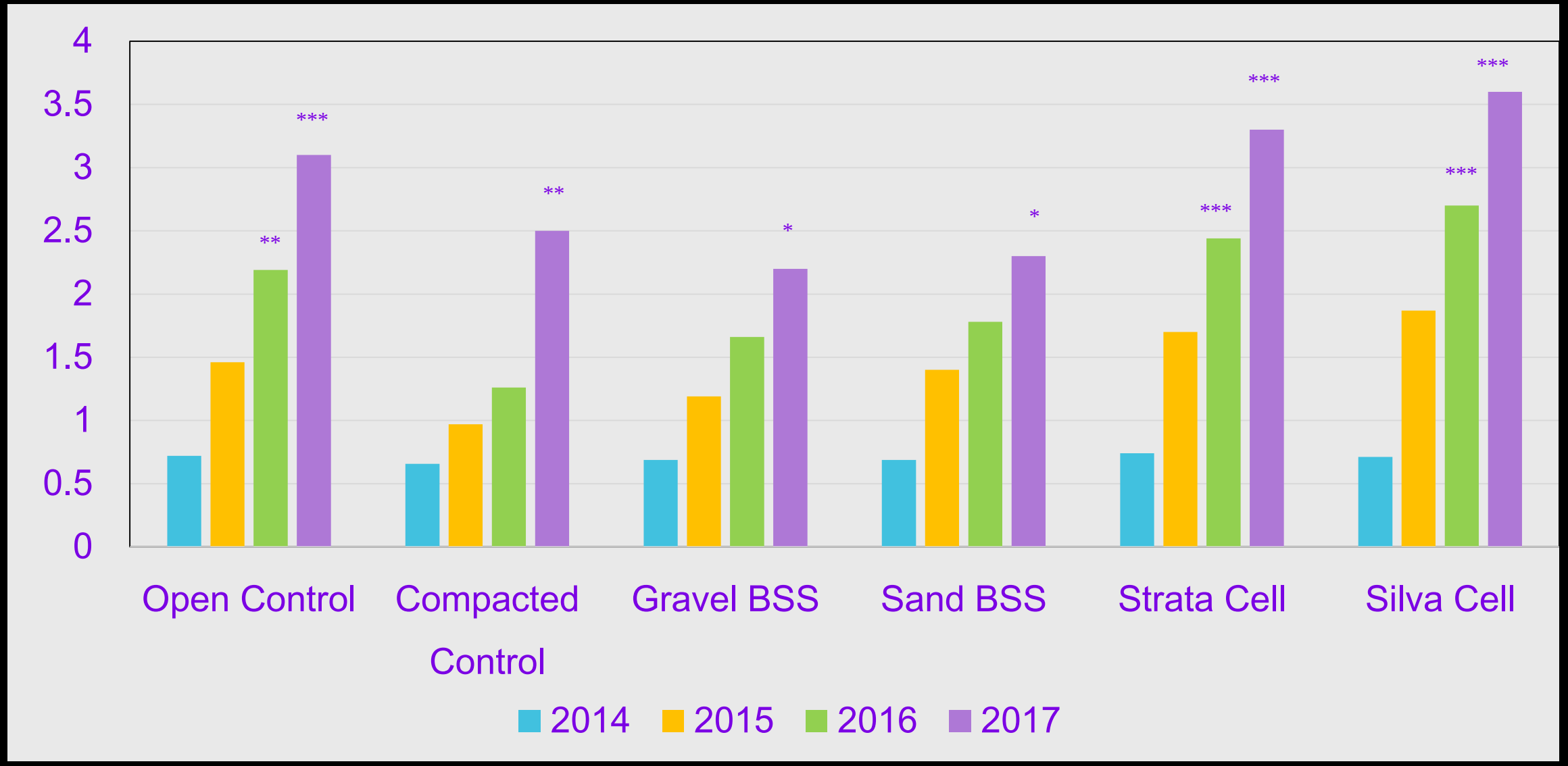
9 3 2015

Plot in Summer 2016

Soil Subsidence

Treatment	Subsidence in Inches
Compacted Control	0.0 a*
Gravel BSS	0.04 a
Sand BSS	0.12 a
Silva Cell	0.62 b
Open Control	0.87 b
Statacell	1.46 c
	*Values with the same letter are not significantly different S-N-K a= 0.05

Soil Under Pavement Trunk Diameter in inches



Plot Removal

October 23, 2017


34


9

Measuring Soil Moisture
at 15 cm intervals

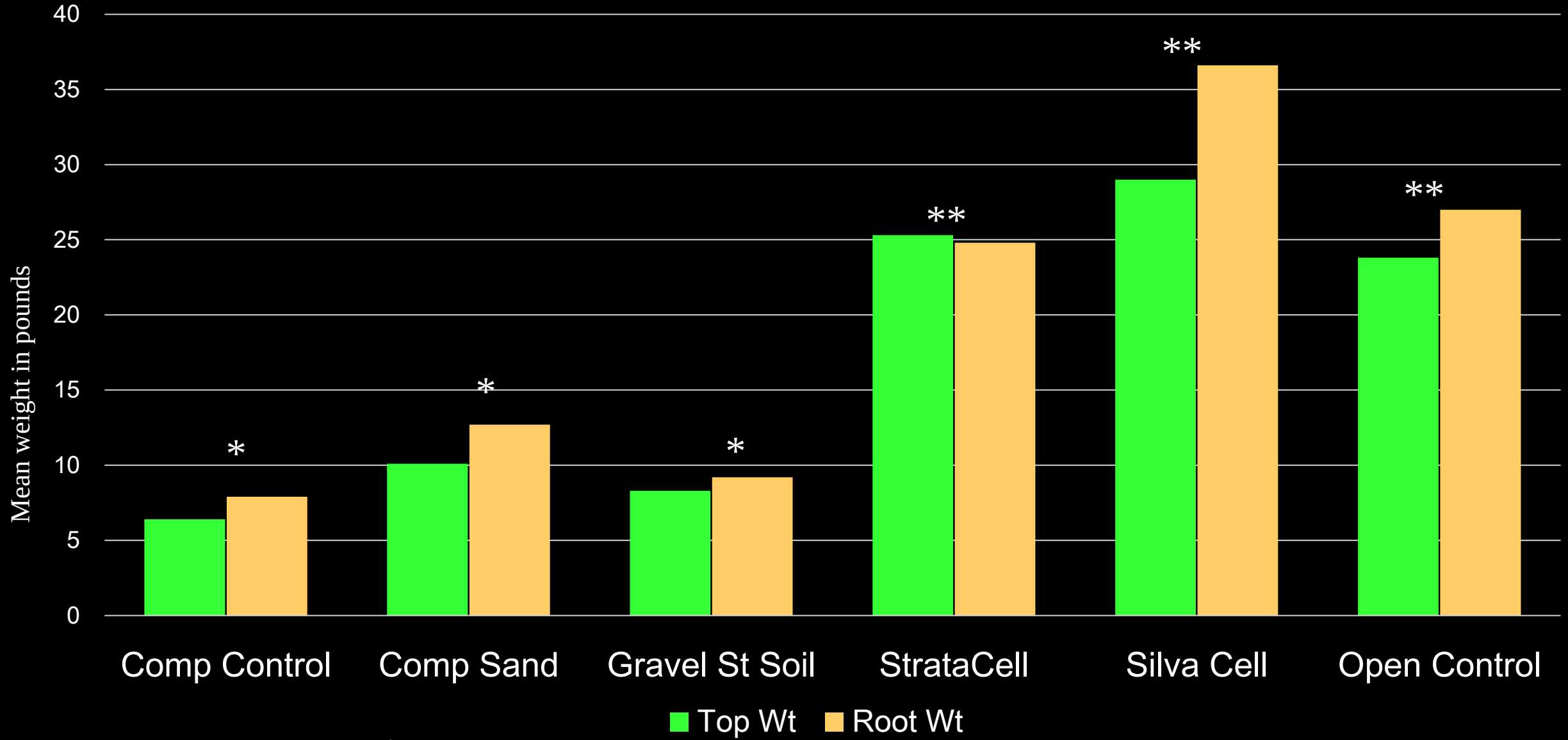
Soil Moisture (% volumetric)

Treatment	Surface	15cm	30 cm	45 cm
Comp Control	33***	34**	30**	20
Comp Sand	13*	15*	17*	13
Gravel St Soil	NA	NA	NA	NA
StrataCell	22**	19*	20**	20
Silva Cell	23**	23*	24**	19
Open Control	29***	23*	25**	19

Removed plot and Weighed tops and roots

Which Weighs More, the tops or roots?

Weight of the Tops* and Roots



* Branches and trunk weight with all leaves removed.

Successful Suspended Pavement, Uptown Charlotte

Comparison of Willow oak planted the same year in a suburban neighborhood vs. Uptown

Uptown

Ridgeloch Neighborhood

Measurements

Summer 2013

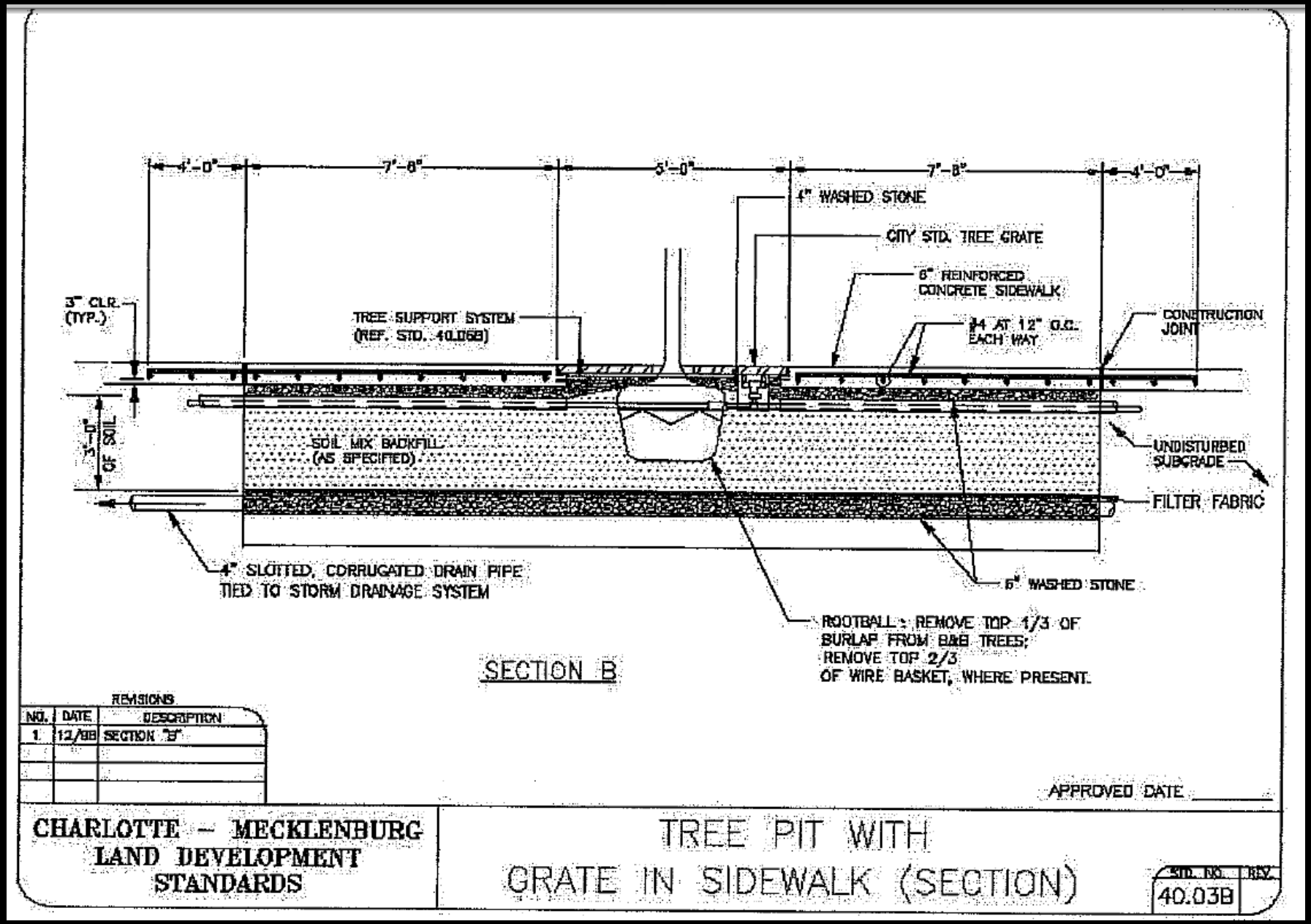
30 years

DBH

Height (laser)

Results

Location	DBH inches	Height feet	Condition 1= Good 2=Fair 3=Poor	Number of trees
Uptown	18	70.2	1.45*	151
Ridgeloch				161



Installed fall/winter 1983

Overall Research Results

Greatest tree growth with:

Supported Pavement (including concrete, Silva Cells and StrataCells)

Open surface

Least tree growth with:

Structural soil (gravel, expanded slate)

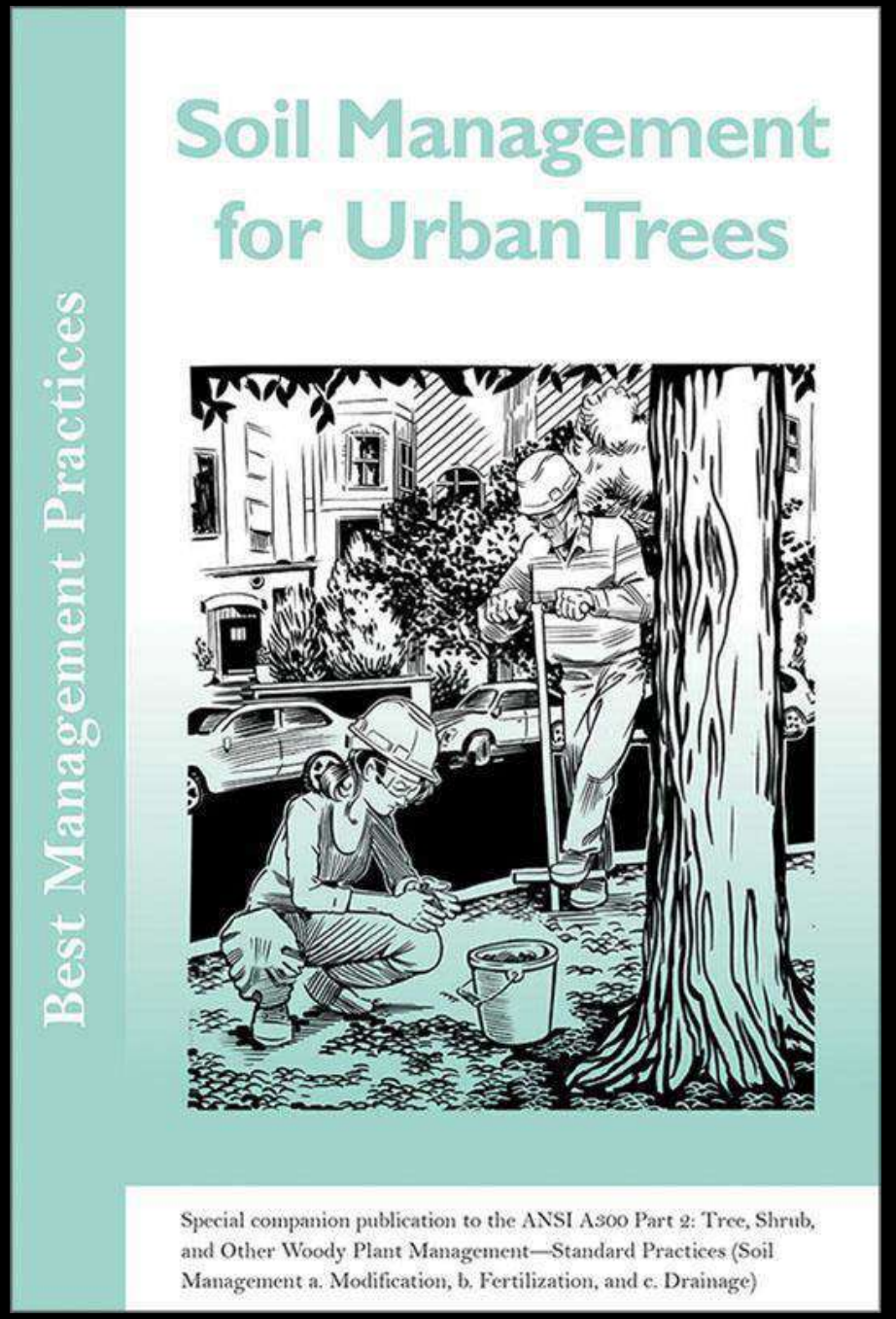
Compacted soil (including sand and loam)

ISA BMP for Soil Management

Published in 2014

Bryan Scharenbroch senior author

Available from the Chapter or ISA Champaign for about $10 for member



Results of pavement / root interactions

Why do roots damage sidewalks?

- Roots grow where moisture, oxygen, density, nutrients allow
- Good environment under some pavement – condensation
- Normal cracks allow entry of water, oxygen and nutrients
- Root diameter increases rapidly near the trunk ZRT

Sidewalk Trials

Established 1996

Suburban sidewalk design and construction

London Planes

Treatments

Deep Root Barrier
450mm 18”

Black Poly 450mm 18”

Styrofoam 100mm 4”

Gravel 100mm 4”

Structural soil -
Soil/Gravel Mix 100mm

Control

Sidewalk Plot

- Sidewalk lifting appears in 2000
- Four years after installation


Sidewalk Plot After
10 Years
warrenbosch@comcast.net

Sidewalk Removal

Evaluating Root Growth Under Pavement

Sidewalk Results

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
Second worst treatment for lifting pavement


Deep Root Barrier
One of the Best Treatments


Deep Root next to Control


Styrofoam
One of the Best Treatments

Styrofoam next to Control

Gravel (25-40mm,1-1.5”, washed)

One of the Best Treatments

Fewer, smaller and deeper roots

Best treatments for reducing lifting and root growth under pavement Reducing Sidewalk Lifting

Gravel

Styrofoam

Deep Root Barriers

For more information

Paper in Arboriculture and Urban Forestry

Also see Dr. Ed Gilman's paper

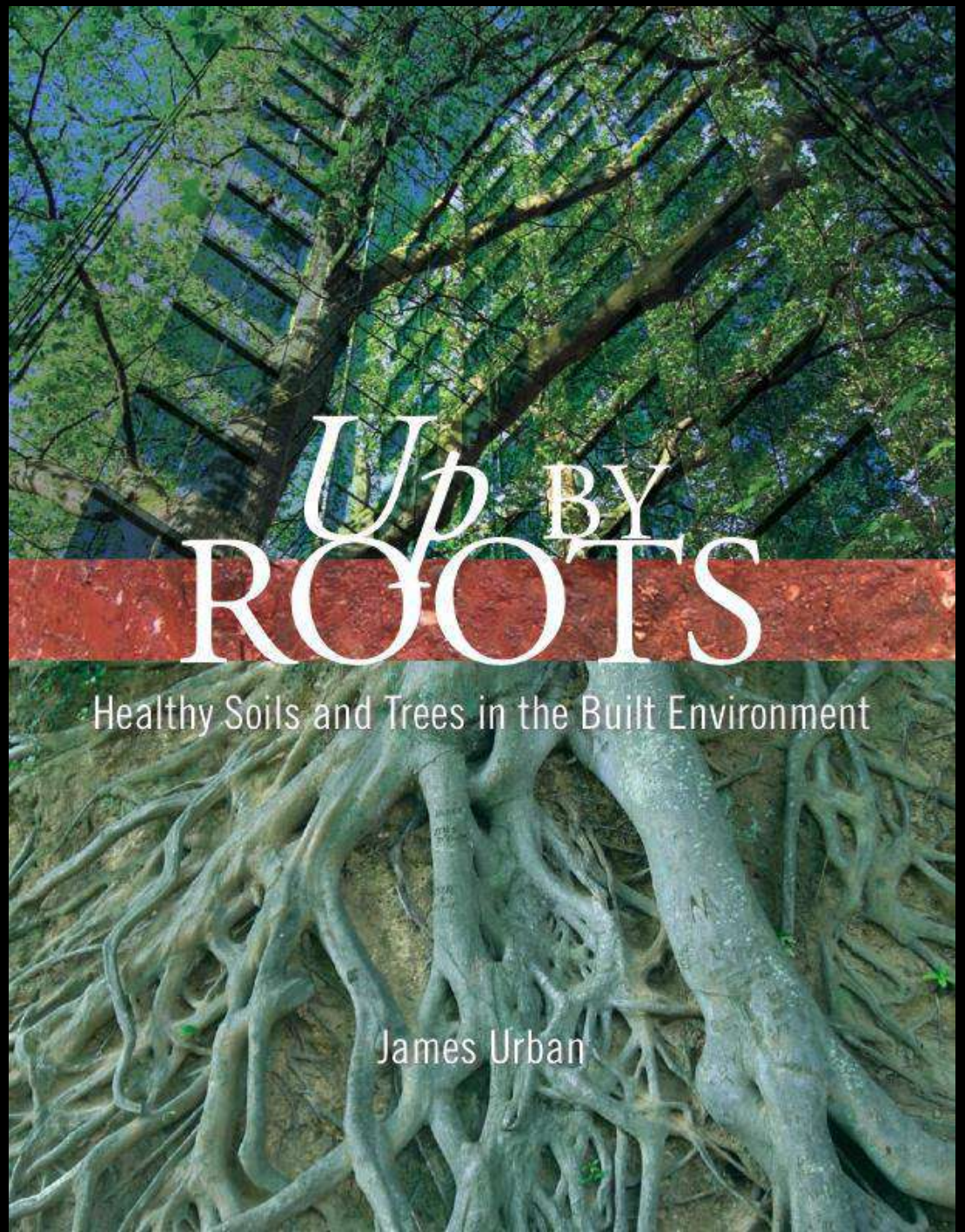
Arboriculture & Urban Forestry 2008. 34(3):179–183.

Comparison of Methods to Reduce Sidewalk Damage from Tree Roots

E. Thomas Smiley

Abstract. Tree roots growing under sidewalks are known to crack or lift pavement often creating a tripping hazard for pedestrians. This experiment was conducted to determine the long-term effects of below- and alongside-pavement treatments on tree root development and sidewalk damage. London U.K. plane trees (*Platanus* × *acerifolia*) were planted next to sidewalks at the Bartlett *Platanus occidentalis* from #15 containers were planted 0.75 m (30 in) from sidewalks and irrigated regularly to encourage rapid growth. Identical studies were installed on one well-drained and one poorly drained site located about 18 km (11.2 miles) apart. Barriers included 30 cm (12 in) deep DeepRoot, Biobarrier®, polyethylene (6 mil), a clean gravel layer (15 cm [6 in] deep; 2 to

to the soil surface after growing under vertical barriers. Barker (1995a, 1995b) showed that in an alluvial, well-drained, silty clay loam soil, roots deflected down by a polyethylene plastic sheet did not grow up toward the soil surface within 1 m (3.3 ft) of the barrier



Up By Roots:

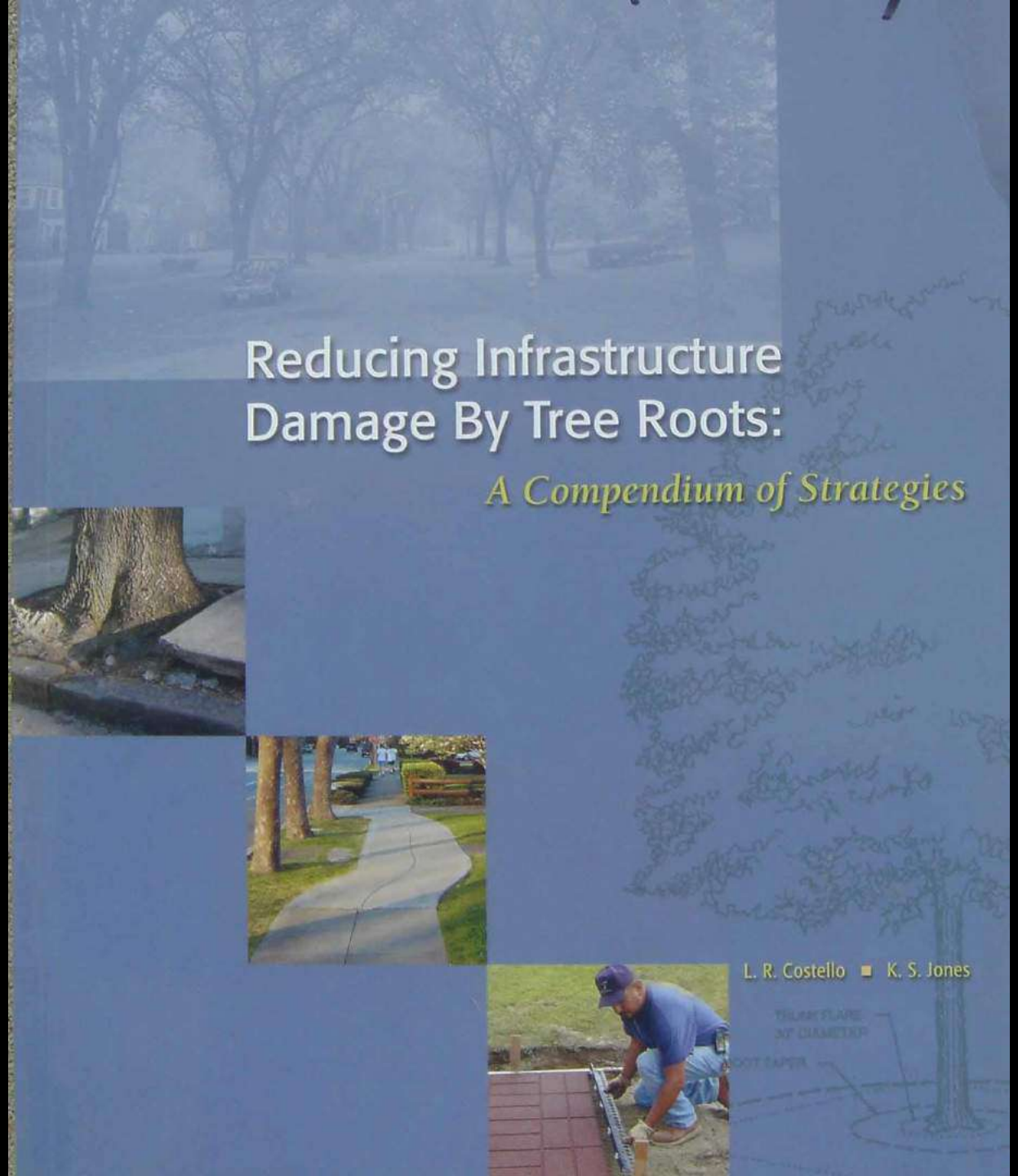
Healthy Soils and Trees In the Built Environment

by James Urban

Available at

ISA-Arbor.com

Good Source for Sidewalk Information



Questions or Comments?

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