Biophysical Limitations and Practices Involved with Tree Preservation

No. Va. Urban Forestry Roundtable
February 26, 2015
Essential components

- Pick young to middle-aged trees
- Appropriate genus/species
- Determine Rooting areas
- Groves vs. one
- Limit impacts to 1 or 2 sides only!!
- Good tree protection fencing
- Commitment from owner and builder/developer
- 5-year commitment to oversight and treatments
- Limited intervention in CRZ for 3 years +
Why trees die in construction projects.

- Excessive root loss in CRZ.
- Roots in MCZ are severed or damaged.
- Soil compaction. Highly dependent upon soil types.
- Excessive canopy loss.
- Changes to hydrology.
- Changes in tree (or forest) dynamics.
- Sun scalding.
- Edge effects.
- Lack of sufficient after care.
- Not good candidates to begin with.
CRZ and MCZ

- Critical Root Zone (Diameter x 1'-6'"
- Minimum Clearance Zone (Diameter x 9'-6'"

Dripline
root plates
Determining the CRZ

• State of Maryland, Tech. Manual - 1.5’ per inch of diameter, radially, or 1’ if affecting one side along forest
• DC regulations use 1’ per diameter inch.
• Other factors: species, age, position in landscape.
• CRZ is rarely a perfect circle
• Objective is to protect 70% of area.
• Determine appropriate CRZ.
TREE PRESERVATION IS RARELY A WORLD OF PERFECT CIRCLES

- Area = $\pi (R)^2$
- Example - 24” Diameter tree
- CRZ circle=24” x 1.5’=36’ radial
- $A=3.14 \times (36)^2=4,070$ sq.ft.
- 70% of 4070 = 2849 sq.ft.
- Try to find a tree preservation area that equals 2849 sq.ft.
Determining the MCZ

• Historically, the dimension has been determined by DBH x 0.5 x 1’
• Will vary substantially by genus, position in landscape (hill, competition), wind loading and any interference by hardscapes.
• Does not expand at same rate as diameter
• Several formulas are available
• Arborist News ----.June 2010
Trees with “higher” tolerance to construction damage

- Box elder
- Hackberry
- Persimmon
- Pines (most)
- White oak
- Willow oak
- Chesnut oak
- Black locust
- Silver maple
- Red maple
- American elm
- Sycamore
Trees with “moderate” tolerance

- Horsechestnut
- Serviceberry
- Am. Hornbeam
- Hickories
- Fringetree
- Dogwood
- Ash

- Carolina silverbell (*Halesia*)
- Witchhazel
- Eastern redcedar
- So. Magnolia
- Hornbeam
- Eastern White pine
- Sugar maple
Trees with “low” tolerance

- Yellowwood
- American Beech
- European Beech
- Black walnut
- Deciduous magnolias
- Sourwood
- Linden

- Tulip poplar
- Cherries, and other *Prunus* species.
Recovery times are based upon season of injury

- Dormant season - 1 year
- Fall season - 2 years
- Second half of growing season - 3 yrs., plus time to end of season.
- First half of growing season - (diffuse porous trees, Beech, T.Poplar, sycamore, maple) - 3 yrs. Plus end of season
- First half of growing season - (ring porous /gymnosperms, oak, elm, hickory, ash) - 4 years plus end of season.
- From, Dr. Kim Coder, UGA
PRE-CONSTRUCTION

- Conduct a tree inventory.
- Conduct a soil inventory.
- Determine the preservation candidates with conditions of good/fair, or better.
- Determine the CRZ and MCZ for each
- Assess impacts of site plan.
- Focus on preserving groves of trees, not individuals.
- * Completely* understand the utility plan.
More Pre-construction

• Assess preservation candidates for potential hazards.
• Prepare a tree care matrix that details any pre-construction treatments.
• Interact immediately with all parties that will impact tree preservation - architects, LA’s, storm water, sediment control, lighting, gas, sanitary, etc.
• Insist on several group meetings to discuss the potential impacts of each, especially those “last minute” needs such as irrigation, lighting, etc.
And, still more...

- Establish your tree protection limits, and be sure that you know the LOD’s.
- Perform the root pruning, as needed, and when appropriate.
- Chose a fencing type that cannot be moved.
- Attach signage to fencing
- Add mulching to trees, where needed.
- Address any tree care needs up front including pruning of limbs, TGR’s, soil amendments and aeration, compost teas, fertilization.
- Establish a system for getting water to trees whose roots are cut.
- Provide for root protection, as needed.
- Establish a monitoring program, and determine who does this, and who pays.
- All of this is spelled out in the construction specifications documents, which you want to prepare.
Work around them, or move them...
Root pruning

- Seasonal timing of pruning.
- Trencher
- Vibratory plow
- Air-spade
- Be certain that it’s needed.
Air-spade tool

- High pressure air gun
- Blows dirt away without damaging roots
- Good for exploration of roots for pruning, utility line installation, pier footings, etc.
Tree protection fencing

- Fencing should be permanent.
- SSF is best
- Chain link w/posts set in ground is also good.
- Chain link in blocks is okay, but can be moved.
- 14-Gauge wire
- Orange blaze w/supports.
More fencing
Orange blaze fencing

- Make it substantial
- Signage is very important, and required in most jurisdictions
- Spanish translation usually required.
Mulch

• Critical component.
• How much?
• What type - wood chips, shredded hardwood?
• Is it critical to “age” wood chips?
• Installed at 2”-4” in depth. More is bad.
• Who installs, and who removes it afterwards?
Soil aeration and amendments

- Vertical mulching - creates grid of holes 18” deep, backfilled with mixture.
- Radial trenching - creates trenches along major roots, backfilled with mixture.
- Radial trenching seems to be better.
Tree growth regulators (TGR’s)

- Paclobutrazol
- ‘Cambistat’
- Inhibits vegetative growth - stem elongation, leaf thickness
  - Re-directs energy from stem elongation to fibrous root growth
  - Effective for 3 growing seasons.
Compost teas

- New to tree protection
- Jury is still out
- Adds nutrients, quickly to soil
- Adds micro-organisms
- Must be applied correctly
Fertilization

- Over used
- Must be careful with older trees
- Limit Nitrogen to larger trees
- Timing is important
- Know your component ratios, typical is 32-7-7.
Root protection/aeration matting

- Root protection matting - temporary
- Root aeration matting - permanent
- Nice tools if used appropriately
- Must be installed/used appropriately
Three most important treatments

• WATER
• WATER, and...
• WATER

• Drip irrigation
• Avoid overhead sprinklers
• Important to monitor moisture levels!
Endicott Hills, Bethesda
BB&T Bank, Annapolis
1801 Foxhall, WDC
WNC- amphitheatre
Thank you!
Why you need Tree Preservation Planning
WHY DOES TREE PRESERVATION PLANNING MATTER?

Trees typically represent 20% of the value of a property value\(^1\).

At the expense of many projects bottom line, TREE PROTECTION is too often ignored, disorganized, or uninformed.

Comprehensive tree plan is one of the most overlooked portions of the design and construction process.

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1. Arbor Day Foundation
The Risks to the Trees Are:

1. Hidden
   Damage is often done to underground root systems which spread far from the trunk.

2. High Cost
   A single mature tree is valued at $20k and could cost nearly $10k to remove

3. Irreversible
   Once damaged many trees cannot recover. Replanted trees will take decades to match the existing tree’s size and value

“As one of the most qualified consulting arborists in the area, Keith Pitchford, of Pitchford Associates has provided a variety of services to Go Ape Treetop Adventure... it is imperative that all trees are appropriately monitored and identified as appropriate for use. Go Ape trusts and looks to Pitchford Associates for this council as part of our ongoing business management.

D. D’Agostino, Director, US Operations, GoApe Treetop Adventure
You wouldn’t install plumbing, wiring, lighting, or HVAC without detailed plans, drawings, and contractual responsibility.

Yet in total project value the trees are worth TWICE as much the cost of the plumbing, wiring, lighting and HVAC COMBINED.¹

SO, make sure you have a plan and program to take care of the largest single value item on your construction project.


“Tote seen working with Pitchford and Associates for nearly 10 years and the experience has been first class. Keith and his team have been professional, responsive and thoughtful. They have helped me navigate the challenges associated with a large scale, environmentally sensitive project with intense public scrutiny. They have worked collaboratively with our landscape architect and government officials to do help us implement an environmentally appropriate and financially sensible plan. I can definitely recommend using Pitchford and Associates.”

Matt Valentini, Vice President, The JBG Companies, Bethesda, MD
Our Tree Protection Program has two goals:

1. Preserving the maximum value of the trees on site
2. Controlling tree preservation costs for the development project.

The Result: on average we save 75-95% of the designated trees.

"Streetscape Partners is involved Pitchford Associates, on two of our large-scale development projects in the Washington, DC region. There are tree conflicts on both sites. We rely on Keith's input to chose the best tree preservation candidates, and to assist us in developing design strategies and tree care programs for their survival. It is reassuring to know that the trees, which add so much value to our projects, are in such good hands."  
H. Katz, Dir. Acquisitions and Development, Streetscape Partners, Rockville, MD
Plan Early, Monitor, and Collaborate

Our approach focuses on early planning and regular monitoring throughout the project.

We collaborate with the entire development team to create a framework that prevents damage before it occurs.

“Keith Pitchford perfectly combines a deep working knowledge of trees with an understanding of how their preservation can be core to success of a construction project in their vicinity. The implementation of his tree preservation strategies will ensure that mature trees have a high chance of survival which adds immediate stature and value to any completed project. He is a great communicator and a critical team member on projects within the urban forest.”

A. Barnes,
Barnes Vanze Architects,
Washington, D.C. and Middleburg, VA
The 5 Steps of Our Tree Protection Program:

1. **Inventory** - Determines which trees are the best candidates to save

2. **Design** - Work with multiple parties to incorporate tree preservation into the design and build plan

3. **Implementation** - Install tree protection elements and access corridors to prevent damage to trees and root systems

4. **Monitor** - Regular visits during construction to assure plans are being followed

5. **Transition** - Project review and develop plan for post construction care
Based upon a hypothetical residential re-development project that began in January 2014.
DO THE MATH!

An effective tree Preservation program can be one of the best investments you can make. With 1-3% of overall project cost protects an asset that is worth upwards of 20% of the property value.

Example Project: Re-development of single family house in Bethesda with 3 oak trees

<table>
<thead>
<tr>
<th>Pitchford Tree Plan</th>
<th>Disorganized Effort</th>
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</thead>
<tbody>
<tr>
<td><strong>Cost:</strong> $1500-$3500</td>
<td><strong>Cost:</strong> $30k-$40k in removal costs and fines</td>
</tr>
<tr>
<td><strong>Services:</strong> Evaluation, implementation, and monitoring</td>
<td><strong>Services:</strong> Late stage treatment attempts and eventual tree removal</td>
</tr>
<tr>
<td><strong>Result:</strong> $60k-$75K in value protected</td>
<td><strong>Result:</strong> Dead trees, a major hit to bottom line and an upset customer.</td>
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"Keith Pitchford has been the consulting arborist to the Washington National Cathedral horticultural staff since 2000. He has served a number of directors in this role providing annual tree inspections, risk assessments and tree protection efforts for the church's many projects. We have been fortunate to have his expertise, professionalism and guidance over these past 14 years. I would happily endorse his services to any other property manager, or individuals interested in successful tree preservation and assessments."

About Us:

Pitchford Associates provides arboricultural and environmental consulting from offices in Washington, D.C. and Charlottesville, VA. Established in 1997 to provide consulting services to both residential and commercial clients. Services range from tree protection strategies for master plan communities, to individual tree risk assessments, valuations and appraisals for the builder, homeowner or engineer.

Featured clients include the White House grounds, U.S. Capitol grounds, the Washington National Cathedral, Dumbarton Oaks, Tudor Place Historic Home and Garden, and many other important landscapes in the Washington metropolitan area. Residential tree protection projects include Phillips Park and 1801 Foxhall Road in the Wesley Heights area of Washington, and large-scale residential development projects that are on-going in Bethesda and Annapolis, Maryland.