The Importance of Urban Tree Canopy

Tree Plans, Planting, and Specifications
The Cleveland Tree Plan

Summary

Table 1. Cleveland’s Urban Tree Canopy (UTC) Compared to Other Cities

<table>
<thead>
<tr>
<th>Location</th>
<th>UTC</th>
<th>Year</th>
<th>UTC Goal</th>
<th>Goal Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pittsburgh, PA</td>
<td>40%</td>
<td>2011</td>
<td>60%</td>
<td>20-year plan (2031)</td>
</tr>
<tr>
<td>Cincinnati, OH</td>
<td>38%</td>
<td>2011</td>
<td>Increase</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Louisville, KY</td>
<td>37%</td>
<td>2013</td>
<td>40%</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>35%</td>
<td>2009</td>
<td>40%</td>
<td>20-year plan (2029)</td>
</tr>
<tr>
<td>Boston, MA</td>
<td>29%</td>
<td>2006</td>
<td>49%</td>
<td>10-year plan (2016)</td>
</tr>
<tr>
<td>Lexington, KY</td>
<td>25%</td>
<td>2013</td>
<td>30%</td>
<td>ongoing</td>
</tr>
<tr>
<td>New York, NY</td>
<td>24%</td>
<td>2006</td>
<td>30%</td>
<td>2036</td>
</tr>
<tr>
<td><strong>Cleveland, OH</strong></td>
<td>19%</td>
<td>2013</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chicago, IL</td>
<td>17%</td>
<td>2007</td>
<td>25%</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Indianapolis, IN</td>
<td>14%</td>
<td>2008</td>
<td>19%</td>
<td>10-year plan (2018)</td>
</tr>
</tbody>
</table>
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Why Trees?

Over 100 years trees appreciate

Other infrastructure depreciates
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Why Trees?

In Cleveland that means $28 million in annual benefits

- 1.8 billion gallons of rainwater every year (value: $11 million).
- Saves residents and business owners $3.5 million in energy costs each year.
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Why Trees?

In Cleveland that means $28 million in annual benefits

- 1.8 billion gallons of rainwater every year (value: $11 million).
- Saves residents and business owners $3.5 million in energy costs each year.

Table 3. Annual Tree Benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Quantity</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORMWATER: Reduction of Runoff</td>
<td>1,792,333,232</td>
<td>gals.</td>
<td>$10,753,999</td>
</tr>
<tr>
<td>ENERGY: Savings from Avoided Cooling</td>
<td>31,677,030</td>
<td>kWhs</td>
<td>$3,484,473</td>
</tr>
<tr>
<td>PROPERTY: Increases in Property Values</td>
<td>-</td>
<td>$</td>
<td>$4,469,333</td>
</tr>
<tr>
<td>HEALTH: Less Incidents of Adverse Health</td>
<td>1,204</td>
<td>incidents</td>
<td>$6,871,291</td>
</tr>
<tr>
<td>AIR: Carbon Monoxide (CO) Removed</td>
<td>12,740</td>
<td>lbs.</td>
<td>$8,471</td>
</tr>
<tr>
<td>AIR: Nitrogen Dioxide (NO₂) Removed</td>
<td>116,690</td>
<td>lbs.</td>
<td>$34,684</td>
</tr>
<tr>
<td>AIR: Ozone (O₃) Removed</td>
<td>493,640</td>
<td>lbs.</td>
<td>$1,247,940</td>
</tr>
<tr>
<td>AIR: Sulfur Dioxide (SO₂) Removed</td>
<td>54,640</td>
<td>lbs.</td>
<td>$7,616</td>
</tr>
<tr>
<td>AIR: Dust, Soot, Other Particles Removed (PM₁₀)</td>
<td>150,900</td>
<td>lbs.</td>
<td>$471,292</td>
</tr>
<tr>
<td>Carbon Sequestered</td>
<td>41,683</td>
<td>tons</td>
<td>$807,130</td>
</tr>
<tr>
<td><strong>Total Annual Benefits</strong></td>
<td></td>
<td></td>
<td><strong>$28,156,229</strong></td>
</tr>
<tr>
<td>Carbon Storage Over Canopy’s Lifetime (not an annual benefit)</td>
<td>1,292,522</td>
<td>tons</td>
<td><strong>$25,027,531</strong></td>
</tr>
<tr>
<td><strong>Total Benefits Overall</strong></td>
<td></td>
<td></td>
<td><strong>$53,183,760</strong></td>
</tr>
</tbody>
</table>
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The Way Forward: Action Steps

- Action #8: Institute policy changes supportive of urban forestry
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The Way Forward: **Action Steps**

- Action #9: Plant with a purpose: trees for neighborhood equity
Action #9: Plant with a purpose: trees for neighborhood equity
Table 3. Top 10% of Species that Contribute Stormwater Retention Benefits for Cleveland, Ohio

<table>
<thead>
<tr>
<th>Species</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer × freemanii</td>
<td>Platanus × acerifolia</td>
</tr>
<tr>
<td>Aesculus flava</td>
<td>Quercus shumardii</td>
</tr>
<tr>
<td>Aesculus glabra</td>
<td>Taxodium distichum</td>
</tr>
<tr>
<td>Ginkgo biloba</td>
<td>Tilia americana</td>
</tr>
<tr>
<td>Liquidambar styraciflua</td>
<td>Tilia cordata</td>
</tr>
<tr>
<td>Liriodendron tulipifera</td>
<td>Tilia tomentosa</td>
</tr>
<tr>
<td>Magnolia acuminata</td>
<td>Ulmus americana</td>
</tr>
<tr>
<td>Metasequoia glyptostroboideas</td>
<td>Zelkova serrata</td>
</tr>
</tbody>
</table>
The Cleveland Tree Plan
How Can You Make a Difference?

- Select Qualified Arborists

Certified Arborists
Board Certified Master Arborists
ISA

Registered Consulting Arborist
RCA

Accredited
Tree Care Industry Association
Confidence
Planting

- Inspect your trees before planting!
- Tree planting is short
- Tree lives are long
- Do it right the first time – tag your trees!
Plant Selection

• Match the tree to the site

• Select healthy/quality trees

• Inspect the root ball
Plant Selection

- Inspect branches, trunk, and roots
- Look for circling roots
- These can lead to girdling roots
Plant Selection

- Inspect branches, trunk, and roots
- Look for circling roots
- These can lead to girdling roots
Plant Selection

• Inspect branches, trunk, and roots
• Look for circling roots
• These can lead to girdling roots
Plant Selection

• Inspect structure (central leader)

• Look for pests/diseases

• No injuries to trunk or root collar
Stock Type

- **Bare root**
- **Pro:** small/light/see all roots
- **Con:** dry out easily/dormant planting season
Stock Type

• Containerized/container grown

• Pro: easy to move/relatively light

• Con: Substrate grown/circling or girdling roots
Stock Type

- Containerized/container grown
- Often have excessive or defective roots
- Substrate grown
Stock Type

- **Balled and Burlapped (B&B)**
- **Pro**: soil-based root ball
- **Con**: heavy/lose 90% of roots/deep roots/hidden issues
Stock

- Balled and Burlapped (B&B)
  - Pro: soil-based root ball
  - Con: heavy/lost 90% of roots/deep root issues

Wire basket
Stock Type

- Balled and Burlapped (B&B)

- Pro: soil-based root ball

- Con: heavy/lose 90% of roots/deep roots/hidden issues
Stock Type

• Balled and Burlapped (B&B)

Pro:

Soil-based root ball

Con:

Heavy/lose 90% of roots/deep roots/hidden issues/Deep roots
Planting Techniques

• Locate utilities

• Above and below ground

• Practice ‘Right Tree Right Place’
Planting Techniques

- Shallow/Wide planting hole

3x widest dimension of root ball.
Planting Techniques

- Too deep!
Planting Techniques

• Too deep!
Planting Techniques

- Root flare near grade
Planting Techniques

• Root flare near grade
Planting Techniques

- Do not over-dig!
Planting Techniques

• Remove planting materials
Planting Techniques

- Correct root defects
Planting Techniques

- Correct root defects
Planting Techniques

• Check drainage/no gravel
  (perched water table)
Planting Techniques

- Fill in with site soil
- 2-3x root ball
Planting Techniques

• Top-dress with compost/woodchips
Planting Techniques

• Top-dress with compost/woodchips
Transplanting

- Root pruning
- Trees can be **hardened off** to help acclimation
- **Drum lace** large root balls

Photos courtesy GardenWeb and Tree PGH
Transplanting

• Root pruning
• Trees can be hardened off to help acclimation
• Drum lace large root balls

Table 2. Examples of recommended minimum root ball sizes for field-grown nursery trees. The European standard is based on trunk circumference (cm). The American standard (ANSI Z60.1) is based on trunk diameter. Some values have been rounded to merge the two standards into one table. Smaller root balls recommended in the European standard may be explained by frequent transplanting during nursery production and measurement higher on the trunk.

<table>
<thead>
<tr>
<th>Maximum Trunk Size</th>
<th>Times Transplanted</th>
<th>Minimum Root Ball Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caliper¹</td>
<td>Girth¹,²</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>cm</td>
</tr>
<tr>
<td>1.0</td>
<td>2.5</td>
<td>3.1</td>
</tr>
<tr>
<td>1.5</td>
<td>3.8</td>
<td>4.7</td>
</tr>
<tr>
<td>2.0</td>
<td>5.1</td>
<td>6.3</td>
</tr>
<tr>
<td>2.5</td>
<td>6.4</td>
<td>7.9</td>
</tr>
<tr>
<td>3.0</td>
<td>8.0</td>
<td>9.8</td>
</tr>
<tr>
<td>4.0</td>
<td>9.6</td>
<td>11.8</td>
</tr>
<tr>
<td>4.5</td>
<td>11.1</td>
<td>13.8</td>
</tr>
<tr>
<td>5.0</td>
<td>12.7</td>
<td>15.7</td>
</tr>
<tr>
<td>6.5</td>
<td>15.9</td>
<td>19.7</td>
</tr>
<tr>
<td>7.5</td>
<td>19.1</td>
<td>23.6</td>
</tr>
</tbody>
</table>
Transplanting

• **Tree spade** used for digging

• Take care when transporting

• Protect your investment
Transplanting

- Tree spade used for digging
- Take care after planting
Early Care

- Planting is just the start!
- **Transplant shock** can cause increased mortality
- Just add water!
  Be sure to repeat
Early Care

- Fertilization
- Mulching
- Staking or Guying
Early Care

- Fertilization
- Mulching
- Staking or Guying
Early Care:

• Fertilization
• Mulching
• Staking or Guying
Early Care

• Tree wrap

• Root collar guards

Photos of wraps/guards courtesy A.M. Leonard
Early Care

- Tree wrap
- Root collar guards

Photos of wraps/guards courtesy A.M. Leonard
Early Care

- Pruning
- Yes, just a small amount at planting
- Include dead or broken branches too

Photos courtesy Dr. Ed Gilman
- Early Care
  - Pruning
    - Yes, just a small amount at planting
    - Include dead or broken branches too
Early Care

- Use ANSI A300 for planning specifications
- Tree planting best management practices too!
- Include detailed drawings too
Early Care

- Use ANSI Z60 for planning specifications.
- Tree planting best management practices too!
- Include detailed drawings too.

Central leader. (See crown observations detail).

Trunk caliper shall meet ANSI Z60 current edition for root ball size.
Root ball modified as required.

Round-topped soil berm 4" high x 8" wide above root ball surface shall be constructed around the root ball. Berm shall begin at root ball periphery.

Finished grade. Modified soil. Depth varies. (See soil preparation plan).

Existing soil.

Bottom of root ball rests on existing or recompacted soil.

Top of root ball shall be flush with finished grade.
Prior to mulching, lightly tamp soil around the root ball in 6" lifts to brace tree. Do not over compact. When the planting hole has been backfilled, pour water around the root ball to settle the soil.

4" layer of mulch. No more than 1" of much on top of root ball. (See specifications for mulch).

Notes:
1. Trees shall be of quality prescribed in crown observations and root observations details and specifications.
2. See specifications for further requirements related to this detail.

TREE w/ BERM (EXISTING SOIL MODIFIED)
Questions? Happy Planting!

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http://www.holdenarb.org/resources/communityforestry.asp
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Questions?