



# **CITY OF BEACON**

## **STREET TREE INVENTORY**

**Inventory Conducted October 2013**

**Funded by USDA Forest Service**

Prepared by Hudson Valley Specialized Weekday Arborist Team (SWAT)  
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**Cornell University**  
Cooperative Extension  
**Dutchess County**

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# EXECUTIVE SUMMARY

Trees provide important contributions to a community. They offer environmental, economic, social, and aesthetic benefits. It is estimated that the value of a property with trees is 5-7% higher than one without trees. As an invaluable resource, the community forest needs to be properly managed and conserved. A street tree inventory is an essential component of a Community Forestry Management Plan. Only after a community knows the current state of its public trees can it develop a plan for their management. An inventory provides information on species, location, condition, and recommended management of existing trees as well as potential planting sites. It is a benchmark from which the community can begin the planning process.

The Hudson Valley Specialized Weekday Arborist Team (SWAT) of Cornell Cooperative Extension of Dutchess County conducted an inventory of street trees in the City of Beacon (the City) in September and October 2013. The SWAT project conducts inventories of public trees in grid or village-like settings. This was the first Hudson Valley project conducted in a city. Data on 1075 sites – both tree sites and potential planting sites – were recorded.

## Inventory Findings at a Glance

855	trees	
220	planting sites	
244	maples	
679	good condition	
7	dead or dying trees	
61	high priority prune	
134	consult recommended	
	Replacement value	\$4,920,096
	Estimated annual benefits	\$109,304

# METHODOLOGY

The USDA Forest Service i-Tree suite of software was used for inventory data analysis. SWAT team members collected initial data using iPad minis equipped with the i-Tree Streets PDA utility. This data was analyzed using i-Tree Streets. GPS coordinates of trees and planting sites were collected using Magellan Meridien Gold GPS receivers with an accuracy of 3 to 7 meters. SWAT teams were comprised of Master Gardeners, Bard College students (with experience working in the Bard Arboretum), Hudson River Clearwater interns, and a state forester.

Since road rights-of-way can vary, trees were considered *public* if they were located within approximately 10 feet of the edge of the road. The City identified the following area to be inventoried.

## **Parks**

- Memorial Park
- Municipal Center Park
- Municipal Plaza Park
- Riverfront Park
- South Avenue Park

## **Streets**

- Beekman Street
- Fishkill Avenue
- Glenford Avenue
- Hillside Road
- Jefferson Avenue
- Liberty Street
- North Avenue
- Pleasant View Avenue
- Red Flynn Drive
- Sargent Avenue
- Teller Avenue
- University Road
- Washington Avenue
- Verplanck Avenue

# DEFINITIONS

Following are the definitions of the data field columns in the inventory.

**ID** - A unique number was assigned to each tree and planting site.

**Street Number, Street Name** – This is the property address of the tree or planting site.

**Site Type** - Location of trees and planting sites were assessed by one of four ratings.

Lawn – lawn area

Plant strip <4 ft – area between road and sidewalk <4 ft

Plant strip >4 ft – area between road and sidewalk >4 ft

Cutout - tree pit in sidewalk or other impervious surface

Other

**Loc Site** – The location of the tree or planting site from the perspective of facing the front of the property is designated. This field is especially important for corner properties.

Front

Side

Rear

**Loc Num** - Site numbers were assigned to trees and planting spaces from left to right facing the property beginning with 1. For corner properties, numbering begins again with 1 for the side street.

**Species** - Trees were identified by their common names.

**DBH** - Trunk diameter at breast height (approximately 4.5 feet above the ground) was measured to the nearest inch. DBH is the most commonly used measure of tree size and age. It is not an absolute measure, however, as relationships between DBH and canopy spread or DBH and tree age vary by species.

**Mtnc Rec** - Tree maintenance recommendations were assessed by one of four ratings.

None - no maintenance necessary

Train - routine maintenance for a young tree

Routine Prune - routine maintenance of a mature tree

Hi Priority Prune - high priority

**Consult** - Based on the condition of the tree, further consultation by a certified arborist may be recommended.

**Wires** - The presence or absence of single or triple phase overhead utility wires was noted.

## DEFINITIONS (cont'd)

**Cond Wood** - The condition of a tree's wood was assessed by one of four ratings.

- Dead - extreme problems, wood dead or dying
- Poor - major problems
- Fair - minor problems
- Good - no apparent problems

**Cond Lvs** - The condition of a tree's leaves was assessed by one of four ratings.

- Dead - extreme problems, leaves dead or dying
- Poor - major problems
- Fair - minor problems
- Good - no apparent problems

**% Dead Wood** - Dead wood refers to branches over two inches in diameter that are dead, dying, or diseased. The percentage of deadwood in the tree canopy was assessed by one of five ratings.

- <10
- 10-25
- 25-50
- 50-75
- >75

**Latitude, Longitude** - Latitude and Longitude of tree sites and planting sites in decimal degrees were collected.

# INVENTORY SAMPLE

ID	Street Num	Street	Species	DBH	SiteType	Loc Site	Loc Num	MtncRec	Consult	Swalk Damg	Wires	Cond Wood	Cond Lvs	% Dead wood	Latitude	Longitude
1	144	Main St	Callery Pear	8	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50838	-73.97667
2	158	Main St	Callery Pear	5	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50839	-73.97642
3	160	Main St	Callery Pear	7	Cutout	Front	1	Routine Prune	No	No	No	Good	Good	<25	41.50837	-73.97604
4	170	Main St	Callery Pear	5	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50825	-73.97555
5	170	Main St	Callery Pear	4	Cutout	Front	2	None	No	No	No	Good	Good	<25	41.50820	-73.97543
6	174	Main St	Callery Pear	4	Cutout	Front	1	None	No	No	0	Good	Good	<25	41.50813	-73.97531
7	176	Main St	Callery Pear	8	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50807	-73.97519
8	180	Main St	Callery Pear	4	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50804	-73.97512
9	188	Main St	Callery Pear	4	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50785	-73.97483
10	190	Main St	Callery Pear	7	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50780	-73.97477
11	200	Main St	Callery Pear	7	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50763	-73.97441
12	200	Main St	Callery Pear	4	Cutout	Front	2	None	No	No	No	Good	Good	<25	41.50760	-73.97430
13	208	Main St	Callery Pear	4	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50732	-73.97385
14	220	Main St	Callery Pear	4	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50724	-73.97373
15	220	Main St	Plant Site No Wires	0	Cutout	Front	2	0	0	0	0	0	0	0	41.50705	-73.97341
16	226	Main St	Honeylocust	16	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50680	-73.97296
17	234	Main St	Callery Pear	4	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50675	-73.97284
18	240	Main St	Honeylocust	11	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50669	-73.97274
19	240	Main St	Honeylocust	3	Cutout	Front	2	None	No	No	No	Good	Good	<25	41.50665	-73.97268
20	246	Main St	London Plane	20	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50653	-73.97248
21	268	Main St	London Plane	21	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50641	-73.97221
22	268	Main St	Honeylocust	3	Cutout	Front	2	None	No	No	No	Good	Good	<25	41.50637	-73.97205
23	268	Main St	Honeylocust	3	Cutout	Front	3	None	No	No	No	Good	Good	<25	41.50638	-73.97204
24	268	Main St	Honeylocust	3	Cutout	Front	4	None	No	No	No	Good	Good	<25	41.50633	-73.97198
25	268	Main St	Honeylocust	3	Cutout	Front	5	None	No	No	0	Good	Good	<25	41.50631	-73.97194
26	268	Main St	Honeylocust	3	Cutout	Front	6	None	No	No	No	Good	Good	<25	41.50631	-73.97195
27	268	Main St	Honeylocust	3	Cutout	Front	7	None	No	No	No	Good	Good	<25	41.50630	-73.97189
28	268	Main St	Honeylocust	3	Cutout	Front	8	None	No	No	No	Good	Good	<25	41.50630	-73.97188
29	268	Main St	Honeylocust	3	Cutout	Front	9	None	No	No	No	Good	Good	<25	41.50628	-73.97179
30	268	Main St	Honeylocust	3	Cutout	Front	10	None	No	No	No	Good	Good	<25	41.50626	-73.97179
31	268	Main St	Honeylocust	3	Cutout	Front	11	None	No	No	No	Good	Good	<25	41.50625	-73.97176
32	268	Main St	Honeylocust	3	Cutout	Front	12	None	No	No	No	Good	Good	<25	41.50625	-73.97176
33	268	Main St	Honeylocust	3	Cutout	Front	13	None	No	No	No	Good	Good	<25	41.50619	-73.97172
34	268	Main St	Honeylocust	3	Cutout	Front	14	None	No	No	No	Good	Good	<25	41.50620	-73.97170
35	268	Main St	Honeylocust	3	Cutout	Front	15	None	No	No	No	Good	Good	<25	41.50620	-73.97160
36	268	Main St	Honeylocust	3	Cutout	Front	16	None	No	No	No	Good	Good	<25	41.50618	-73.97160
37	282	Main St	Pagoda Tree	5	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50584	-73.97118
38	286	Main St	London Plane	20	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50585	-73.97119
39	288	Main St	London Plane	16	Cutout	Front	1	None	Yes	No	No	Good	Good	<25	41.50565	-73.97079
40	294	Main St	London Plane	15	Cutout	Front	1	None	No	No	No	Good	Good	<25	41.50557	-73.97066
41	9	Teller Ave	Black Locust	1	Lawn	Front	1	None	No	No	No	Good	Good	<25	41.49963	-73.97038
42	9	Teller Ave	Black Locust	30	0	Front	2	None	No	No	No	Good	Good	<25	41.49967	-73.97023
43	9	Teller Ave	Black Locust	29	Lawn	Front	3	None	No	No	No	Good	Good	<25	41.49972	-73.97019
44	37	Teller Ave	Norway Maple	33	Lawn	Front	1	None	No	No	Yes	Good	Good	<25	41.50041	-73.96967
45	37	Teller Ave	Black Locust	40	Lawn	Front	2	None	No	No	No	Good	Good	<25	41.50048	-73.96954
46	67	Teller Ave	Sugar Maple	25	Lawn	Front	1	None	No	0	No	Good	Good	<25	41.50121	-73.96886
47	67	Teller Ave	Sugar Maple	25	Lawn	Front	2	None	No	No	No	Good	Good	<25	41.50128	-73.96880
48	67	Teller Ave	Sugar Maple	27	Lawn	Front	3	None	Yes	No	Yes	Good	Good	<25	41.50138	-73.96873
49			London Plane	17	Plant Strip >4'	Side	1	None	No	No	No	0	0	<25	41.50294	-73.96748
50			London Plane	16	Plant Strip >4'	Side	2	None	No	No	No	Good	Good	<25	41.50303	-73.96739

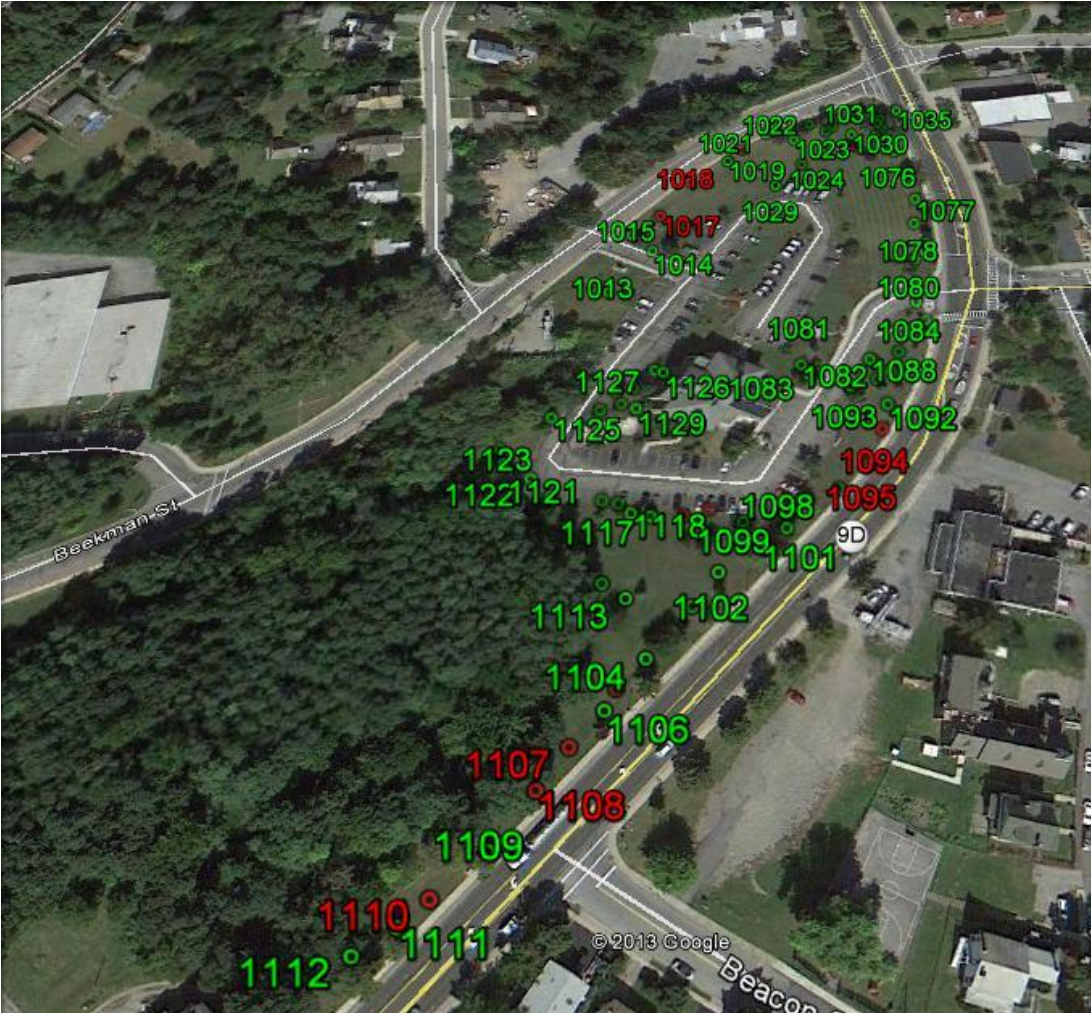
# INVENTORIED PARKS

## Municipal Center Park





# Municipal Plaza Park



# Memorial Park





# Riverfront Park

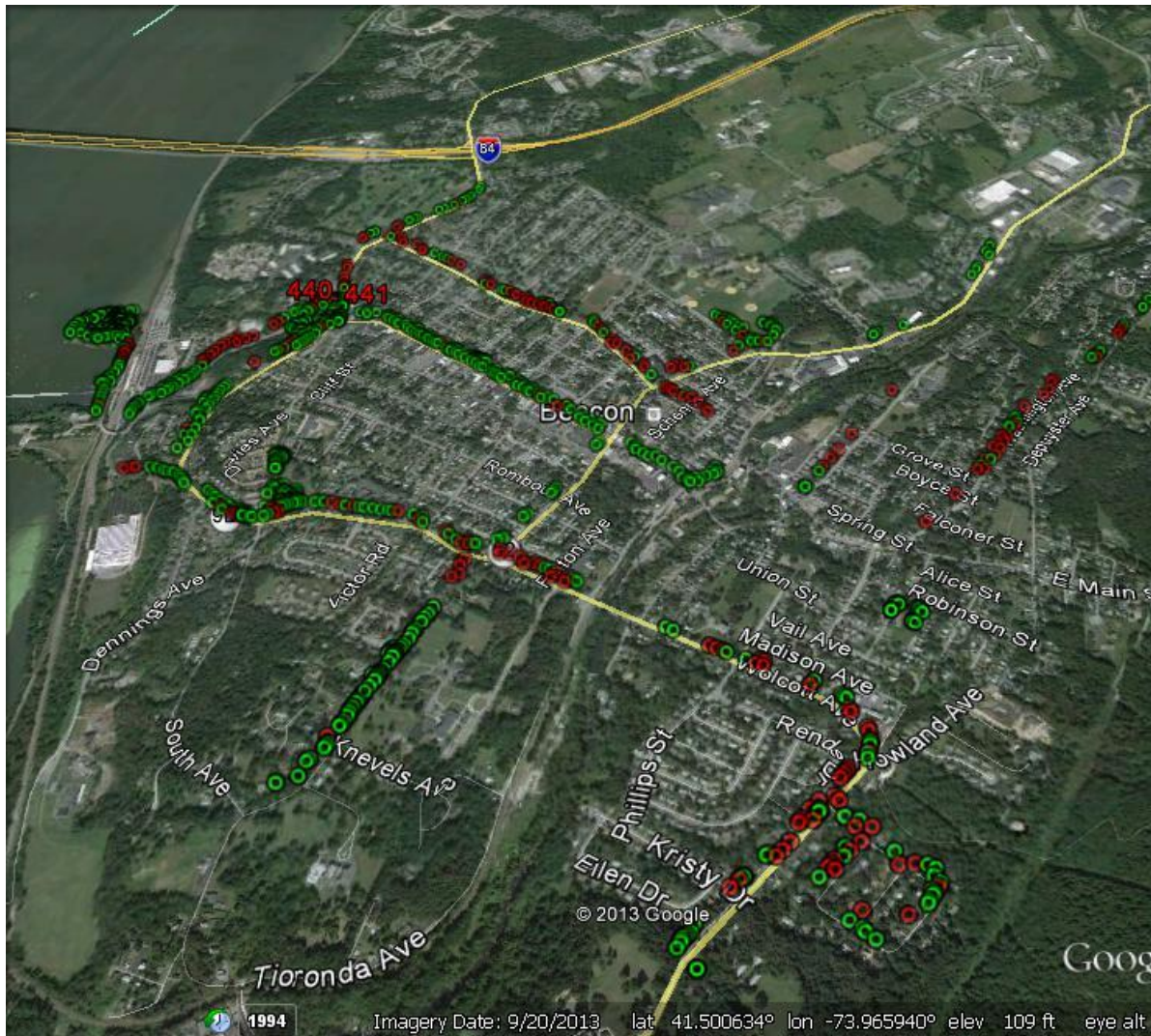


# South Avenue Park

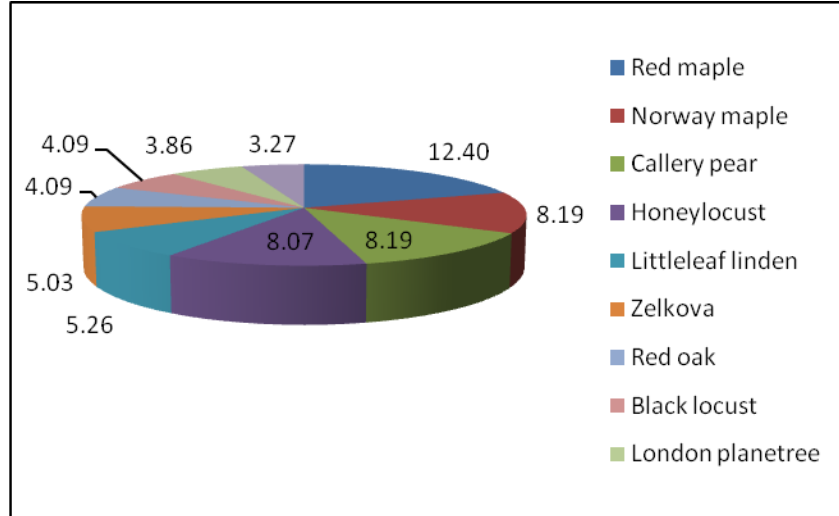




# ALL AREAS INVENTORIED



# SPECIES DISTRIBUTION TOP 10



Species	Percent
Red maple	12.40
Norway maple	8.19
Callery pear	8.19
Honeylocust	8.07
Littleleaf linden	5.26
Zelkova	5.03
Red oak	4.09
Black locust	4.09
London planetree	3.86
Black tupelo	3.27
Other Species	37.54

# COMPLETE TREE POPULATION

Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42	Total
<b>Broadleaf Deciduous</b>										
<b>Large (BDL)</b>										
Norway maple	0	1	22	22	14	9	2	0	0	70
Honeylocust	0	16	17	32	0	2	2	0	0	69
Zelkova	0	15	16	10	1	1	0	0	0	43
Red oak	0	11	5	4	6	0	3	1	5	35
Black locust	1	2	5	10	6	7	3	1	0	35
London planetree	0	0	0	10	14	6	1	1	1	33
Silver maple	0	0	1	1	4	6	4	3	4	23
Cottonwood	0	0	0	1	4	6	3	6	2	22
Sugar maple	0	1	2	6	3	6	1	1	1	21
Ash	0	1	4	12	1	2	0	0	0	20
Green ash	0	5	3	0	6	0	0	0	0	14
Hackberry	0	1	4	5	0	1	0	0	0	11
Linden	0	0	2	6	1	0	0	1	0	10
Black walnut	0	0	1	3	2	1	0	0	0	7
Pin oak	0	1	0	0	1	1	2	1	1	7
European larch	0	0	0	2	3	2	0	0	0	7
White oak	0	0	1	0	1	0	1	2	0	5
Black cherry	0	0	5	0	0	0	0	0	0	5
Basswood	0	0	0	0	2	1	0	1	0	4
Tree of heaven	0	0	1	0	3	0	0	0	0	4
American elm	0	0	0	1	0	1	0	0	1	3
American sycamore	0	0	0	1	2	0	0	0	0	3
Elm	0	0	0	0	2	0	0	1	0	3
Crimson king maple	0	1	1	0	0	0	0	0	0	2
Tulip tree	0	1	1	0	0	0	0	0	0	2
Ginkgo	0	1	0	1	0	0	0	0	0	2
Horsechestnut	0	0	0	0	0	1	0	0	0	1
Willow oak	0	0	0	0	0	0	0	0	1	1
Beech	0	0	0	0	0	0	0	0	1	1
Hickory	0	0	0	0	0	1	0	0	0	1
Eastern cottonwood	0	0	0	0	0	0	0	0	1	1
American chestnut	0	0	0	0	0	0	1	0	0	1
<b>Total</b>	<b>1</b>	<b>57</b>	<b>91</b>	<b>127</b>	<b>76</b>	<b>54</b>	<b>23</b>	<b>19</b>	<b>18</b>	<b>466</b>

## Broadleaf Deciduous

### Medium (BDM)

Red maple	0	8	35	47	13	1	0	2	0	106
Littleleaf linden	0	0	6	22	12	5	0	0	0	45
Black tupelo	0	0	4	22	1	1	0	0	0	28
Maple	0	0	1	7	3	1	0	0	0	12
Boxelder	0	0	4	3	0	0	0	0	0	7
Mulberry	0	0	0	4	0	1	0	0	0	5
Japanese 8 tree	0	3	0	1	0	0	0	0	0	4
Yellowwood	0	0	3	0	0	0	0	0	0	3
American hornbeam	0	1	0	1	0	0	0	0	0	2
Sassafras	0	1	0	0	0	0	1	0	0	2
Catalpa	0	0	0	0	1	0	0	0	0	1
Willow	0	0	0	0	0	0	0	1	0	1
<b>Total</b>	<b>0</b>	<b>13</b>	<b>53</b>	<b>107</b>	<b>30</b>	<b>9</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>216</b>

**Broadleaf Deciduous  
Small (BDS)**

Callery pear	0	30	30	10	0	0	0	0	0	70
Crabapple	0	12	4	1	3	0	0	0	0	20
Japanese tree lilac	0	4	0	0	0	0	0	0	0	4
Kwanzan cherry	1	1	2	0	0	0	0	0	0	4
Dogwood	0	1	2	0	0	0	0	0	0	3
Trident maple	0	0	0	3	0	0	0	0	0	3
Kousa dogwood	0	2	0	0	0	0	0	0	0	2
Serviceberry	0	0	0	2	0	0	0	0	0	2
Redbud	0	2	0	0	0	0	0	0	0	2
Plum	0	1	0	0	0	0	0	0	0	1
Apple	0	0	0	1	0	0	0	0	0	1
Cherry plum	0	1	0	0	0	0	0	0	0	1
<b>Total</b>	<b>1</b>	<b>54</b>	<b>38</b>	<b>17</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>113</b>

**Broadleaf Evergreen  
Medium (BEM)**

Magnolia	0	0	3	0	0	0	0	0	0	3
<b>Total</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Conifer Evergreen  
Large (CEL)**

Eastern white pine	0	1	9	5	0	0	3	0	0	18
Norway spruce	0	0	5	3	3	2	1	0	0	14
Spruce	0	3	3	0	2	0	0	0	0	8
Fir	0	3	1	0	1	0	0	0	0	5
Pine	0	0	1	0	1	2	0	0	0	4
Blue spruce	0	1	3	0	0	0	0	0	0	4
Balsam fir	0	1	0	0	0	0	0	0	0	1
Scotch pine	0	0	1	0	0	0	0	0	0	1
<b>Total</b>	<b>0</b>	<b>9</b>	<b>23</b>	<b>8</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>55</b>

**Conifer Evergreen  
Medium (CEM)**

CEM OTHER	0	0	0	1	0	0	0	0	0	1
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

**Palm Evergreen Small  
(PES)**

PES OTHER	0	0	1	0	0	0	0	0	0	1
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

<b>Grand Total</b>	<b>2</b>	<b>133</b>	<b>209</b>	<b>260</b>	<b>116</b>	<b>67</b>	<b>28</b>	<b>22</b>	<b>18</b>	<b>855</b>
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# STOCKING LEVEL

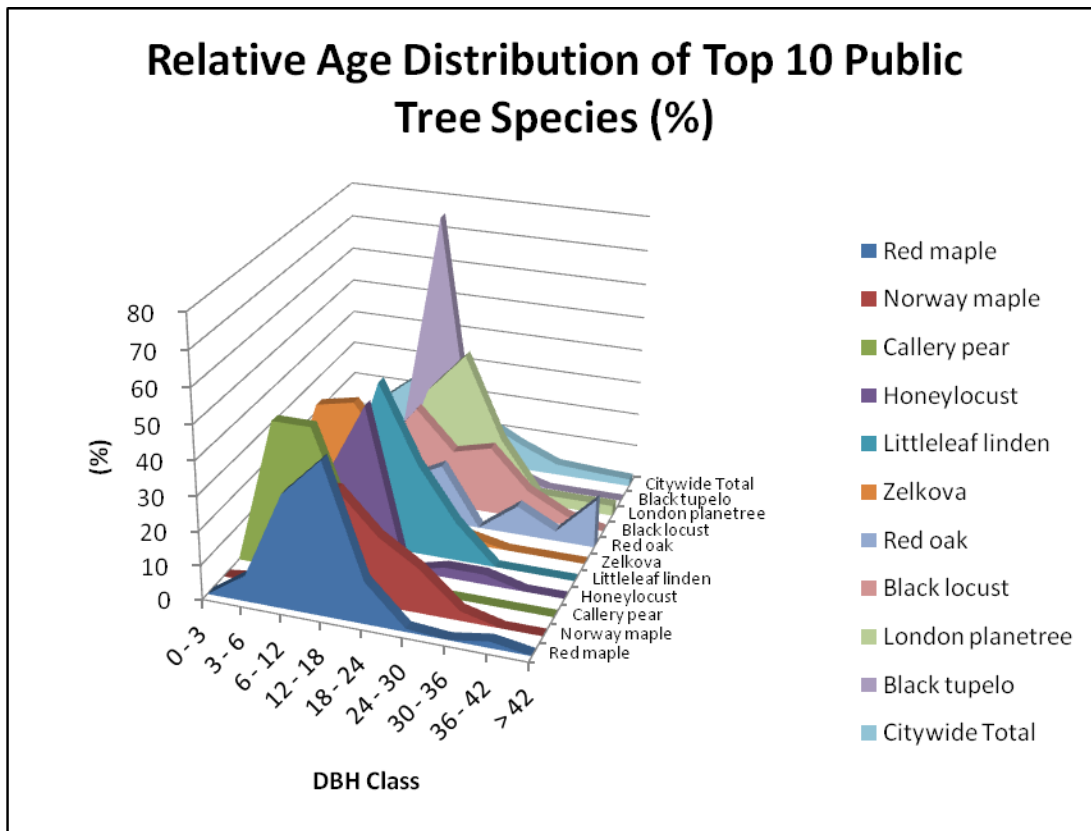
The stocking level is the percentage of available planting sites that are currently planted. The City's stocking level is about 80%. The national average is 60%.

No. of Standard Unplanted Sites	Standard Error	No. of Standard Planted Sites	Standard Error	Total No. of Sites	Standard Error	Stocking (%)
220	(N/A)	855	(N/A)	1,075	(N/A)	79.53

# REPLACEMENT VALUE

DBH Class (m)									Total
0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	
325	60,326	348,851	1,215,006	1,015,425	817,724	518,722	500,145	434,573	4,920,096

# RELATIVE AGE DISTRIBUTION TOP 10



## DBH class (in)

Species	0 - 3	3 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	> 42
Red maple	0.00	7.55	33.02	44.34	12.26	0.94	0.00	1.89	0.00
Norway maple	0.00	1.43	31.43	31.43	20.00	12.86	2.86	0.00	0.00
Callery pear	0.00	42.86	42.86	14.29	0.00	0.00	0.00	0.00	0.00
Honeylocust	0.00	23.19	24.64	46.38	0.00	2.90	2.90	0.00	0.00
Littleleaf linden	0.00	0.00	13.33	48.89	26.67	11.11	0.00	0.00	0.00
Zelkova	0.00	34.88	37.21	23.26	2.33	2.33	0.00	0.00	0.00
Red oak	0.00	31.43	14.29	11.43	17.14	0.00	8.57	2.86	14.29
Black locust	2.86	5.71	14.29	28.57	17.14	20.00	8.57	2.86	0.00
London planetree	0.00	0.00	0.00	30.30	42.42	18.18	3.03	3.03	3.03
Black tupelo	0.00	0.00	14.29	78.57	3.57	3.57	0.00	0.00	0.00
Citywide Total	0.23	15.56	24.44	30.41	13.57	7.84	3.27	2.57	2.11

# IMPORTANCE VALUES

Species	Number of Trees	% of Total Trees	Leaf Area (ft <sup>2</sup> )	% of Total Leaf Area	Canopy Cover (ft <sup>2</sup> )	% of Total Canopy Cover	Importance Value
Red maple	106	12.40	266,624	10.56	78,513	9.42	10.79
Norway maple	70	8.19	147,352	5.83	63,932	7.67	7.23
Callery pear	70	8.19	69,243	2.74	27,151	3.26	4.73
Honeylocust	69	8.07	168,765	6.68	69,274	8.31	7.69
Littleleaf linden	45	5.26	95,316	3.77	37,850	4.54	4.53
Zelkova	43	5.03	76,176	3.02	26,664	3.20	3.75
Red oak	35	4.09	152,724	6.05	52,068	6.25	5.46
Black locust	35	4.09	175,485	6.95	51,118	6.13	5.73
London planetree	33	3.86	144,941	5.74	52,742	6.33	5.31
Black tupelo	28	3.27	77,603	3.07	23,377	2.81	3.05
Silver maple	23	2.69	173,963	6.89	45,779	5.49	5.02
Cottonwood	22	2.57	201,105	7.96	51,851	6.22	5.59
Sugar maple	21	2.46	111,221	4.40	24,968	3.00	3.29
Ash	20	2.34	55,109	2.18	20,390	2.45	2.32
Crabapple	20	2.34	14,677	0.58	5,693	0.68	1.20
Eastern white pine	18	2.11	25,120	0.99	10,068	1.21	1.44
Green ash	14	1.64	32,901	1.30	11,786	1.41	1.45
Norway spruce	14	1.64	25,526	1.01	10,602	1.27	1.31
Maple	12	1.40	25,503	1.01	11,590	1.39	1.27
Hackberry	11	1.29	30,098	1.19	10,194	1.22	1.23
Linden	10	1.17	29,738	1.18	8,633	1.04	1.13
Spruce	8	0.94	9,284	0.37	3,555	0.43	0.58
Black walnut	7	0.82	29,713	1.18	9,477	1.14	1.04
Boxelder	7	0.82	7,637	0.30	4,102	0.49	0.54
Pin oak	7	0.82	52,054	2.06	18,048	2.17	1.68
European larch	7	0.82	38,709	1.53	11,725	1.41	1.25
Fir	5	0.58	4,812	0.19	1,759	0.21	0.33
Black cherry	5	0.58	2,336	0.09	1,510	0.18	0.29
White oak	5	0.58	35,535	1.41	12,335	1.48	1.16
Mulberry	5	0.58	16,575	0.66	5,127	0.62	0.62
Blue spruce	4	0.47	3,173	0.13	1,096	0.13	0.24
Pine	4	0.47	8,827	0.35	3,727	0.45	0.42
Japanese 8 tree	4	0.47	5,189	0.21	1,259	0.15	0.27
Kwanzan cherry	4	0.47	1,194	0.05	785	0.09	0.20
Japanese tree lilac	4	0.47	802	0.03	590	0.07	0.19
Basswood	4	0.47	24,783	0.98	6,188	0.74	0.73
Tree of heaven	4	0.47	17,540	0.69	5,586	0.67	0.61
Magnolia	3	0.35	1,919	0.08	1,016	0.12	0.18
Trident maple	3	0.35	4,874	0.19	2,469	0.30	0.28
Yellowwood	3	0.35	4,889	0.19	1,258	0.15	0.23
Elm	3	0.35	22,829	0.90	7,190	0.86	0.71

## IMPORTANCE VALUES (cont'd)

Species	Number of Trees	% of Total Trees	Leaf Area (ft <sup>2</sup> )	% of Total Leaf Area	Canopy Cover (ft <sup>2</sup> )	% of Total Canopy Cover	Importance Value
American elm	3	0.35	26,294	1.04	7,907	0.95	0.78
American sycamore	3	0.35	10,239	0.41	4,060	0.49	0.41
Dogwood	3	0.35	1,135	0.04	752	0.09	0.16
Crimson king maple	2	0.23	930	0.04	542	0.07	0.11
American hornbeam	2	0.23	3,599	0.14	986	0.12	0.16
Tulip tree	2	0.23	2,001	0.08	739	0.09	0.13
Redbud	2	0.23	401	0.02	295	0.04	0.10
Ginkgo	2	0.23	1,629	0.06	805	0.10	0.13
Kousa dogwood	2	0.23	401	0.02	295	0.04	0.10
Sassafras	2	0.23	7,540	0.30	2,299	0.28	0.27
Serviceberry	2	0.23	1,851	0.07	948	0.11	0.14
Cherry plum	1	0.12	201	0.01	148	0.02	0.05
Scotch pine	1	0.12	918	0.04	332	0.04	0.06
CEM OTHER	1	0.12	779	0.03	530	0.06	0.07
Balsam fir	1	0.12	419	0.02	98	0.01	0.05
Apple	1	0.12	1,499	0.06	544	0.07	0.08
Hickory	1	0.12	8,188	0.32	2,236	0.27	0.24
Eastern cottonwood	1	0.12	11,582	0.46	2,783	0.33	0.30
Beech	1	0.12	11,582	0.46	2,783	0.33	0.30
Horsechestnut	1	0.12	4,156	0.16	1,081	0.13	0.14
Willow oak	1	0.12	15,492	0.61	3,526	0.42	0.38
PES OTHER	1	0.12	258	0.01	181	0.02	0.05
Plum	1	0.12	201	0.01	148	0.02	0.05
Willow	1	0.12	6,745	0.27	2,162	0.26	0.21
Catalpa	1	0.12	4,047	0.16	1,291	0.15	0.14
American chestnut	1	0.12	11,582	0.46	2,783	0.33	0.30
<b>Total</b>	<b>855</b>	<b>100.00</b>	<b>2,525,527</b>	<b>100.00</b>	<b>833,298</b>	<b>100.00</b>	<b>100.00</b>

# CONDITION

## Woody Condition

Condition	Tree Count	Standard Error	% of Zone	% of Public Trees
Dead or Dying	10 (N/A)		1.17	1.17
Poor	51 (N/A)		5.96	5.96
Fair	63 (N/A)		7.37	7.37
Good	731 (N/A)		85.50	85.50
Total	855 (N/A)		100.00	100.00

## Foliage Condition

Condition	Tree Count	Standard Error	% of Zone	% of Public Trees
Dead or Dying	8 (N/A)		0.94	0.94
Poor	23 (N/A)		2.69	2.69
Fair	58 (N/A)		6.78	6.78
Good	766 (N/A)		89.59	89.59
Total	855 (N/A)		100.00	100.00

# MAINTENANCE

## High Priority Prune

DBH Class (in)	Tree Count	Standard Error	% of Zone	% of Public Trees
0 - 3	0	(N/A)	0.00	0.00
3 - 6	1	(N/A)	0.12	0.12
6 - 12	10	(N/A)	1.17	1.17
12 - 18	12	(N/A)	1.40	1.40
18 - 24	8	(N/A)	0.94	0.94
24 - 30	11	(N/A)	1.29	1.29
30 - 36	7	(N/A)	0.82	0.82
36 - 42	8	(N/A)	0.94	0.94
> 42	4	(N/A)	0.47	0.47
<b>Total</b>	<b>61</b>	<b>(N/A)</b>	<b>7.13</b>	<b>7.13</b>

# CONSULT

The condition of **134 trees should be examined by a certified arborist**. Our teams may have detected a large cavity, presence of fungi, a large crack, or other evidence that the tree needs further assessment by a professional.

DBH Class (in)	Tree Count	Standard Error	% of Zone	% of Public Trees
0 - 3	0	(N/A)	0.00	0.00
3 - 6	16	(N/A)	1.87	1.87
6 - 12	36	(N/A)	4.21	4.21
12 - 18	42	(N/A)	4.91	4.91
18 - 24	15	(N/A)	1.75	1.75
24 - 30	11	(N/A)	1.29	1.29
30 - 36	5	(N/A)	0.58	0.58
36 - 42	3	(N/A)	0.35	0.35
> 42	6	(N/A)	0.70	0.70
<b>Total</b>	<b>134</b>	<b>(N/A)</b>	<b>15.67</b>	<b>15.67</b>

# ANNUAL BENEFITS

## Annual Benefits of Public Trees by Species (\$/tree)

12/17/2013

Species	Energy	CO <sub>2</sub>	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error
Red maple	53.67	1.00	9.07	12.45	31.15	107.34	(N/A)
Norway maple	60.90	1.87	11.05	12.58	40.65	127.05	(N/A)
Callery pear	25.85	0.86	5.02	5.90	51.48	89.10	(N/A)
Honeylocust	64.50	1.28	11.07	12.52	43.32	132.68	(N/A)
Littleleaf linden	59.75	1.11	9.95	11.64	19.70	102.15	(N/A)
Zelkova	56.84	1.08	8.73	9.01	53.91	129.58	(N/A)
Red oak	67.63	2.40	14.01	22.67	50.15	156.86	(N/A)
Black locust	87.73	1.78	16.85	23.44	63.11	192.90	(N/A)
London planetree	94.26	2.16	16.12	23.14	44.62	180.30	(N/A)
Black tupelo	61.38	1.20	10.44	13.88	31.48	118.38	(N/A)
Silver maple	109.03	2.47	21.74	35.80	31.87	200.91	(N/A)
Cottonwood	118.87	2.15	25.38	40.48	44.69	231.56	(N/A)
Sugar maple	76.85	1.93	13.43	22.97	46.72	161.89	(N/A)
Ash	69.43	1.40	12.46	14.45	35.06	132.79	(N/A)
Crabapple	23.35	0.38	3.84	4.14	9.50	41.20	(N/A)
Eastern white pine	36.88	0.64	6.95	10.72	14.24	69.43	(N/A)
Green ash	55.19	1.13	9.89	12.13	32.90	111.24	(N/A)
Norway spruce	48.41	0.83	9.33	14.22	12.63	85.42	(N/A)
Maple	65.82	1.94	11.92	13.00	41.92	134.60	(N/A)
Hackberry	71.30	1.44	12.03	13.71	61.36	159.84	(N/A)
Linden	59.22	1.33	10.27	14.02	46.64	131.48	(N/A)
Spruce	28.53	0.52	5.28	8.73	16.05	59.11	(N/A)
Black walnut	87.16	1.81	16.13	20.71	69.29	195.09	(N/A)
Boxelder	44.18	1.06	7.52	7.26	26.15	86.18	(N/A)
Pin oak	110.03	4.21	23.77	39.00	67.35	244.35	(N/A)
European larch	97.32	2.01	19.02	26.37	73.09	217.81	(N/A)
Fir	22.71	0.42	4.13	7.09	16.08	50.43	(N/A)
Black cherry	25.52	0.55	3.92	3.37	8.70	42.07	(N/A)
White oak	106.83	4.02	22.87	37.29	66.24	237.24	(N/A)
Mulberry	71.04	1.42	12.48	16.81	30.66	132.41	(N/A)
Blue spruce	18.67	0.34	3.21	5.72	17.13	45.07	(N/A)
Pine	57.88	0.89	11.29	17.34	7.66	95.07	(N/A)
Japanese 8 tree	25.08	0.51	3.99	5.82	32.60	67.99	(N/A)
Kwanzan cherry	16.84	0.35	2.57	2.18	7.43	29.36	(N/A)
Japanese tree lilac	12.85	0.24	1.94	1.56	6.82	23.42	(N/A)
Basswood	90.96	1.79	16.78	27.36	43.17	180.06	(N/A)
Tree of heaven	87.72	1.81	16.30	21.40	70.47	197.71	(N/A)
Magnolia	23.26	0.54	5.01	5.53	37.57	71.90	(N/A)

## Annual Benefits of Public Trees by Species (\$/tree)

12/17/2013

Species	Energy	CO <sub>2</sub>	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error
Trident maple	60.15	1.56	10.67	10.49	35.20	118.08	(N/A)
Yellowwood	33.94	0.63	5.19	7.58	32.58	79.92	(N/A)
Elm	120.03	3.47	24.91	34.80	82.62	265.84	(N/A)
American elm	122.72	3.81	26.98	39.21	86.08	278.80	(N/A)
American sycamore	85.96	1.84	14.24	18.75	40.74	161.53	(N/A)
Dogwood	21.30	0.45	3.26	2.77	8.07	35.85	(N/A)
Crimson king maple	22.10	0.46	3.46	3.23	14.56	43.81	(N/A)
American hornbeam	37.91	0.75	6.26	8.57	32.25	85.75	(N/A)
Tulip tree	45.42	0.79	6.06	5.21	47.69	105.16	(N/A)
Redbud	12.85	0.24	1.94	1.56	6.82	23.42	(N/A)
Ginkgo	30.95	0.62	5.13	4.96	19.27	60.94	(N/A)
Kousa dogwood	12.85	0.24	1.94	1.56	6.82	23.42	(N/A)
Sassafras	63.96	1.30	12.55	18.96	28.04	124.81	(N/A)
Serviceberry	38.93	1.02	6.37	5.89	11.32	63.53	(N/A)
Cherry plum	12.85	0.24	1.94	1.56	6.82	23.42	(N/A)
Scotch pine	22.51	0.41	3.95	6.76	17.31	50.95	(N/A)
CEM OTHER	38.43	1.17	9.05	7.61	19.41	75.68	(N/A)
Balsam fir	7.13	0.13	0.98	2.60	16.60	27.44	(N/A)
Apple	44.61	0.89	7.64	8.27	14.31	75.71	(N/A)
Hickory	112.86	2.18	23.92	37.30	73.91	250.17	(N/A)
Eastern cottonwood	134.90	1.96	29.76	49.70	0.00	216.33	(N/A)
Beech	134.90	1.96	29.76	49.70	0.00	216.33	(N/A)
Horsechestnut	72.69	2.83	12.60	19.90	57.78	165.80	(N/A)
Willow oak	137.36	5.07	14.31	65.88	84.76	307.39	(N/A)
PES OTHER	13.84	0.17	2.60	2.52	0.00	19.13	(N/A)
Plum	12.85	0.24	1.94	1.56	6.82	23.42	(N/A)
Willow	115.69	1.57	23.38	34.86	0.00	175.50	(N/A)
Catalpa	83.24	1.42	14.84	20.84	29.78	150.11	(N/A)
American chestnut	125.63	2.78	28.61	49.70	56.14	262.86	(N/A)
Citywide Total	61.35	1.40	11.14	15.11	38.83	127.84	(N/A)



## Annual Energy Benefits of Public Trees

12/17/2013

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	8.5	1,188	3,196.7	4,501	5,689	(N/A)	12.4	10.8	53.67
Norway maple	6.4	899	2,389.4	3,364	4,263	(N/A)	8.2	8.1	60.90
Callery pear	2.8	396	1,003.8	1,413	1,810	(N/A)	8.2	3.4	25.85
Honeylocust	7.0	978	2,466.4	3,473	4,450	(N/A)	8.1	8.5	64.50
Littleleaf linden	4.1	579	1,498.7	2,110	2,689	(N/A)	5.3	5.1	59.75
Zelkova	3.5	496	1,383.8	1,948	2,444	(N/A)	5.0	4.7	56.84
Red oak	4.1	578	1,271.0	1,790	2,367	(N/A)	4.1	4.5	67.63
Black locust	4.8	677	1,699.9	2,393	3,071	(N/A)	4.1	5.9	87.73
London planetree	4.9	689	1,719.9	2,422	3,110	(N/A)	3.9	5.9	94.26
Black tupelo	2.7	373	955.7	1,346	1,719	(N/A)	3.3	3.3	61.38
Silver maple	4.0	560	1,383.3	1,948	2,508	(N/A)	2.7	4.8	109.03
Cottonwood	4.3	604	1,428.6	2,011	2,615	(N/A)	2.6	5.0	118.87
Sugar maple	2.4	341	904.2	1,273	1,614	(N/A)	2.5	3.1	76.85
Ash	2.1	301	772.4	1,088	1,389	(N/A)	2.3	2.6	69.43
Crabapple	0.6	82	273.2	385	467	(N/A)	2.3	0.9	23.35
Eastern white pine	1.1	149	365.7	515	664	(N/A)	2.1	1.3	36.88
Green ash	1.1	156	438.0	617	773	(N/A)	1.6	1.5	55.19
Norway spruce	1.1	150	374.8	528	678	(N/A)	1.6	1.3	48.41
Maple	1.2	171	439.4	619	790	(N/A)	1.4	1.5	65.82
Hackberry	1.2	168	438.0	617	784	(N/A)	1.3	1.5	71.30
Linden	0.9	131	327.4	461	592	(N/A)	1.2	1.1	59.22
Spruce	0.3	48	127.9	180	228	(N/A)	0.9	0.4	28.53
Black walnut	1.0	134	338.4	477	610	(N/A)	0.8	1.2	87.16
Boxelder	0.5	64	174.4	246	309	(N/A)	0.8	0.6	44.18
Pin oak	1.4	192	410.5	578	770	(N/A)	0.8	1.5	110.03
European larch	1.1	150	377.0	531	681	(N/A)	0.8	1.3	97.32
Fir	0.2	24	63.7	90	114	(N/A)	0.6	0.2	22.71
Black cherry	0.2	21	75.5	106	128	(N/A)	0.6	0.2	25.52
White oak	0.9	133	285.2	402	534	(N/A)	0.6	1.0	106.83
Mulberry	0.6	78	196.8	277	355	(N/A)	0.6	0.7	71.04
Blue spruce	0.1	15	42.2	59	75	(N/A)	0.5	0.1	18.67
Pine	0.4	50	129.1	182	232	(N/A)	0.5	0.4	57.88
Japanese 8 tree	0.1	20	56.9	80	100	(N/A)	0.5	0.2	25.08
Kwanzan cherry	0.1	11	39.9	56	67	(N/A)	0.5	0.1	16.84
Japanese tree lilac	0.1	9	30.5	43	51	(N/A)	0.5	0.1	12.85
Basswood	0.6	79	202.3	285	364	(N/A)	0.5	0.7	90.96
Tree of heaven	0.5	75	196.2	276	351	(N/A)	0.5	0.7	87.72
Magnolia	0.1	14	39.8	56	70	(N/A)	0.4	0.1	23.26
Trident maple	0.3	41	99.3	140	180	(N/A)	0.4	0.3	60.15
Yellowwood	0.1	18	59.3	84	102	(N/A)	0.4	0.2	33.94
Elm	0.6	84	196.1	276	360	(N/A)	0.4	0.7	120.03

## Annual Energy Benefits of Public Trees

12/17/2013

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
American elm	0.7	92	196.4	276	368	(N/A)	0.4	0.7	122.72
American sycamore	0.4	55	143.7	202	258	(N/A)	0.4	0.5	85.96
Dogwood	0.1	11	37.8	53	64	(N/A)	0.4	0.1	21.30
Crimson king maple	0.1	8	25.9	36	44	(N/A)	0.2	0.1	22.10
American hornbeam	0.1	16	42.4	60	76	(N/A)	0.2	0.1	37.91
Tulip tree	0.1	17	52.4	74	91	(N/A)	0.2	0.2	45.42
Redbud	0.0	4	15.2	21	26	(N/A)	0.2	0.0	12.85
Ginkgo	0.1	14	34.2	48	62	(N/A)	0.2	0.1	30.95
Kousa dogwood	0.0	4	15.2	21	26	(N/A)	0.2	0.0	12.85
Sassafras	0.2	28	70.7	100	128	(N/A)	0.2	0.2	63.96
Serviceberry	0.1	15	44.3	62	78	(N/A)	0.2	0.1	38.93
Cherry plum	0.0	2	7.6	11	13	(N/A)	0.1	0.0	12.85
Scotch pine	0.0	5	12.7	18	23	(N/A)	0.1	0.0	22.51
CEM OTHER	0.1	10	20.1	28	38	(N/A)	0.1	0.1	38.43
Balsam fir	0.0	1	4.1	6	7	(N/A)	0.1	0.0	7.13
Apple	0.1	9	25.2	36	45	(N/A)	0.1	0.1	44.61
Hickory	0.2	25	62.1	87	113	(N/A)	0.1	0.2	112.86
Eastern cottonwood	0.2	32	72.8	102	135	(N/A)	0.1	0.3	134.90
Beech	0.2	32	72.8	102	135	(N/A)	0.1	0.3	134.90
Horsechestnut	0.1	15	41.0	58	73	(N/A)	0.1	0.1	72.69
Willow oak	0.3	37	71.0	100	137	(N/A)	0.1	0.3	137.36
PES OTHER	0.0	3	8.0	11	14	(N/A)	0.1	0.0	13.84
Plum	0.0	2	7.6	11	13	(N/A)	0.1	0.0	12.85
Willow	0.2	26	63.5	89	116	(N/A)	0.1	0.2	115.69
Catalpa	0.1	17	47.0	66	83	(N/A)	0.1	0.2	83.24
American chestnut	0.2	29	68.5	96	126	(N/A)	0.1	0.2	125.63
<b>Total</b>	<b>81.6</b>	<b>11,435</b>	<b>29,133.7</b>	<b>41,020</b>	<b>52,455</b>	<b>(N/A)</b>	<b>100.0</b>	<b>100.0</b>	<b>61.35</b>

## Annual Stormwater Benefits of Public Trees

12/17/2013

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	164,952	1,320	(N/A)	12.4	10.2	12.45
Norway maple	110,092	881	(N/A)	8.2	6.8	12.58
Callery pear	51,616	413	(N/A)	8.2	3.2	5.90
Honeylocust	107,986	864	(N/A)	8.1	6.7	12.52
Littleleaf linden	65,475	524	(N/A)	5.3	4.1	11.64
Zelkova	48,441	388	(N/A)	5.0	3.0	9.01
Red oak	99,167	793	(N/A)	4.1	6.1	22.67
Black locust	102,539	820	(N/A)	4.1	6.3	23.44
London planetree	95,459	764	(N/A)	3.9	5.9	23.14
Black tupelo	48,566	389	(N/A)	3.3	3.0	13.88
Silver maple	102,933	823	(N/A)	2.7	6.4	35.80
Cottonwood	111,309	890	(N/A)	2.6	6.9	40.48
Sugar maple	60,292	482	(N/A)	2.5	3.7	22.97
Ash	36,119	289	(N/A)	2.3	2.2	14.45
Crabapple	10,340	83	(N/A)	2.3	0.6	4.14
Eastern white pine	24,115	193	(N/A)	2.1	1.5	10.72
Green ash	21,222	170	(N/A)	1.6	1.3	12.13
Norway spruce	24,892	199	(N/A)	1.6	1.5	14.22
Maple	19,494	156	(N/A)	1.4	1.2	13.00
Hackberry	18,852	151	(N/A)	1.3	1.2	13.71
Linden	17,527	140	(N/A)	1.2	1.1	14.02
Spruce	8,728	70	(N/A)	0.9	0.5	8.73
Black walnut	18,123	145	(N/A)	0.8	1.1	20.71
Boxelder	6,350	51	(N/A)	0.8	0.4	7.26
Pin oak	34,121	273	(N/A)	0.8	2.1	39.00
European larch	23,073	185	(N/A)	0.8	1.4	26.37
Fir	4,429	35	(N/A)	0.6	0.3	7.09
Black cherry	2,109	17	(N/A)	0.6	0.1	3.37
White oak	23,303	186	(N/A)	0.6	1.4	37.29
Mulberry	10,508	84	(N/A)	0.6	0.7	16.81
Blue spruce	2,861	23	(N/A)	0.5	0.2	5.72
Pine	8,672	69	(N/A)	0.5	0.5	17.34
Japanese 8 tree	2,908	23	(N/A)	0.5	0.2	5.82
Kwanzan cherry	1,089	9	(N/A)	0.5	0.1	2.18
Japanese tree lilac	780	6	(N/A)	0.5	0.0	1.56
Basswood	13,682	109	(N/A)	0.5	0.8	27.36
Tree of heaven	10,701	86	(N/A)	0.5	0.7	21.40
Magnolia	2,075	17	(N/A)	0.4	0.1	5.53
Trident maple	3,934	31	(N/A)	0.4	0.2	10.49
Yellowwood	2,843	23	(N/A)	0.4	0.2	7.58
Elm	13,050	104	(N/A)	0.4	0.8	34.80
American elm	14,705	118	(N/A)	0.4	0.9	39.21
American sycamore	7,032	56	(N/A)	0.4	0.4	18.75
Dogwood	1,039	8	(N/A)	0.4	0.1	2.77
Crimson king maple	807	6	(N/A)	0.2	0.0	3.23
American hornbeam	2,142	17	(N/A)	0.2	0.1	8.57
Tulip tree	1,303	10	(N/A)	0.2	0.1	5.21

## Annual Stormwater Benefits of Public Trees

12/17/2013

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Redbud	390	3	(N/A)	0.2	0.0	1.56
Ginkgo	1,240	10	(N/A)	0.2	0.1	4.96
Kousa dogwood	390	3	(N/A)	0.2	0.0	1.56
Sassafras	4,740	38	(N/A)	0.2	0.3	18.96
Serviceberry	1,473	12	(N/A)	0.2	0.1	5.89
Cherry plum	195	2	(N/A)	0.1	0.0	1.56
Scotch pine	845	7	(N/A)	0.1	0.1	6.76
CEM OTHER	951	8	(N/A)	0.1	0.1	7.61
Balsam fir	325	3	(N/A)	0.1	0.0	2.60
Apple	1,033	8	(N/A)	0.1	0.1	8.27
Hickory	4,663	37	(N/A)	0.1	0.3	37.30
Eastern cottonwood	6,213	50	(N/A)	0.1	0.4	49.70
Beech	6,213	50	(N/A)	0.1	0.4	49.70
Horsechestnut	2,487	20	(N/A)	0.1	0.2	19.90
Willow oak	8,235	66	(N/A)	0.1	0.5	65.88
PES OTHER	315	3	(N/A)	0.1	0.0	2.52
Plum	195	2	(N/A)	0.1	0.0	1.56
Willow	4,358	35	(N/A)	0.1	0.3	34.86
Catalpa	2,604	21	(N/A)	0.1	0.2	20.84
American chestnut	6,213	50	(N/A)	0.1	0.4	49.70
<b>Citywide total</b>	<b>1,614,831</b>	<b>12,919</b>	<b>(N/A)</b>	<b>100.0</b>	<b>100.0</b>	<b>15.11</b>

## Annual Air Quality Benefits of Public Trees

12/17/2013

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total Standard (\$ Error)	% of Total Trees	Avg. \$/tree
	O <sub>3</sub>	NO <sub>2</sub>	PM <sub>10</sub>	SO <sub>2</sub>		NO <sub>2</sub>	PM <sub>10</sub>	VOC	SO <sub>2</sub>							
Red maple	42.0	18.1	21.0	7.0	475	73.5	4.8	2.8	37.2	513	-11.2	-26	195.2	962 (N/A)	12.4	9.07
Norway maple	35.6	15.4	17.5	5.8	400	55.3	3.6	2.1	28.2	387	-5.4	-12	158.1	774 (N/A)	8.2	11.05
Callery pear	16.3	7.1	8.0	2.8	183	23.9	1.5	0.9	12.4	168	0.0	0	72.9	351 (N/A)	8.2	5.02
Honeylocust	35.3	14.3	16.8	5.4	386	58.8	3.8	2.2	30.6	413	-15.4	-36	151.9	764 (N/A)	8.1	11.07
Littleleaf linden	20.3	8.6	9.8	3.1	225	35.2	2.3	1.4	18.1	247	-10.3	-24	88.5	448 (N/A)	5.3	9.95
Zelkova	14.3	6.0	6.9	2.2	158	31.2	2.0	1.2	15.5	217	0.0	0	79.4	375 (N/A)	5.0	8.73
Red oak	27.9	12.0	13.9	4.6	315	32.9	2.1	1.2	18.1	234	-25.3	-58	87.4	490 (N/A)	4.1	14.01
Black locust	27.5	11.5	13.2	4.2	304	40.7	2.6	1.6	21.2	286	0.0	0	122.5	590 (N/A)	4.1	16.85
London planetree	28.3	11.9	13.7	4.4	313	41.3	2.7	1.6	21.6	290	-31.1	-72	94.2	532 (N/A)	3.9	16.12
Black tupelo	12.5	5.4	6.2	2.1	141	22.6	1.5	0.9	11.7	159	-3.3	-8	59.6	292 (N/A)	3.3	10.44
Silver maple	25.5	11.0	12.5	4.2	286	33.4	2.2	1.3	17.5	235	-9.2	-21	98.3	500 (N/A)	2.7	21.74
Cottonwood	27.9	11.7	13.4	4.3	308	35.4	2.3	1.3	18.9	250	0.0	0	115.2	558 (N/A)	2.6	25.38
Sugar maple	13.9	6.0	6.8	2.3	156	21.0	1.4	0.8	10.7	146	-8.9	-21	53.9	282 (N/A)	2.5	13.43
Ash	11.0	4.6	5.3	1.7	121	18.2	1.2	0.7	9.4	128	0.0	0	52.1	249 (N/A)	2.3	12.46
Crabapple	3.4	1.5	1.7	0.6	38	5.6	0.4	0.2	2.6	38	0.0	0	15.9	77 (N/A)	2.3	3.84
Eastern white pine	7.6	3.7	4.8	2.1	99	8.9	0.6	0.3	4.7	62	-15.9	-37	16.8	125 (N/A)	2.1	6.95
Green ash	6.3	2.7	3.1	1.0	70	9.8	0.6	0.4	4.9	68	0.0	0	28.8	138 (N/A)	1.6	9.89
Norway spruce	8.1	3.8	5.1	2.2	105	9.0	0.6	0.3	4.7	63	-16.1	-37	17.7	131 (N/A)	1.6	9.33
Maple	6.5	2.8	3.2	1.1	72	10.4	0.7	0.4	5.4	73	-0.9	-2	29.3	143 (N/A)	1.4	11.92
Hackberry	5.5	2.3	2.6	0.8	61	10.2	0.7	0.4	5.3	72	0.0	0	27.8	132 (N/A)	1.3	12.03
Linden	4.6	2.0	2.2	0.7	51	7.9	0.5	0.3	4.1	55	-1.7	-4	20.6	103 (N/A)	1.2	10.27
Spruce	2.7	1.3	1.7	0.7	35	3.0	0.2	0.1	1.5	21	-5.9	-14	5.4	42 (N/A)	0.9	5.28
Black walnut	5.1	2.1	2.5	0.8	56	8.1	0.5	0.3	4.2	57	0.0	0	23.5	113 (N/A)	0.8	16.13
Boxelder	2.3	1.0	1.1	0.4	26	4.0	0.3	0.2	2.0	28	-0.3	-1	10.9	53 (N/A)	0.8	7.52
Pin oak	9.7	4.2	4.8	1.6	109	10.8	0.7	0.4	6.0	77	-8.6	-20	29.5	166 (N/A)	0.8	23.77
European larch	6.3	2.6	3.0	1.0	70	9.0	0.6	0.3	4.7	63	0.0	0	27.6	133 (N/A)	0.8	19.02
Fir	1.3	0.6	0.8	0.4	17	1.5	0.1	0.1	0.7	10	-3.0	-7	2.5	21 (N/A)	0.6	4.13
Black cherry	0.8	0.4	0.4	0.1	9	1.5	0.1	0.1	0.7	10	0.0	0	4.1	20 (N/A)	0.6	3.92
White oak	6.6	2.8	3.3	1.1	75	7.5	0.5	0.3	4.1	53	-5.9	-14	20.3	114 (N/A)	0.6	22.87
Mulberry	2.7	1.2	1.4	0.5	31	4.7	0.3	0.2	2.4	33	-0.7	-2	12.7	62 (N/A)	0.6	12.48
Blue spruce	0.8	0.4	0.5	0.2	11	1.0	0.1	0.0	0.5	7	-2.0	-5	1.5	13 (N/A)	0.5	3.21
Pine	2.8	1.4	1.8	0.8	37	3.0	0.2	0.1	1.6	21	-5.6	-13	6.1	45 (N/A)	0.5	11.29
Japanese S tree	0.7	0.3	0.3	0.1	8	1.3	0.1	0.0	0.6	9	-0.2	-1	3.2	16 (N/A)	0.5	3.99
Kwanzan cherry	0.4	0.2	0.2	0.1	5	0.8	0.1	0.0	0.4	5	0.0	0	2.1	10 (N/A)	0.5	2.57
Japanese tree lilac	0.3	0.1	0.2	0.1	4	0.6	0.0	0.0	0.3	4	0.0	0	1.6	8 (N/A)	0.5	1.94
Basswood	3.3	1.4	1.6	0.5	37	4.8	0.3	0.2	2.5	34	-1.4	-3	13.2	67 (N/A)	0.5	16.78



## Annual Air Quality Benefits of Public Trees

12/17/2013

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total Standard (\$)	Error	% of Total Trees	Avg. \$/tree
	O <sub>3</sub>	NO <sub>2</sub>	PM <sub>10</sub>	SO <sub>2</sub>		NO <sub>2</sub>	PM <sub>10</sub>	VOC	SO <sub>2</sub>								
Tree of heaven	3.0	1.3	1.4	0.5	33	4.6	0.3	0.2	2.3	32	0.0	0	13.6	65 (N/A)	0.5	16.30	
Magnolia	0.8	0.4	0.5	0.2	10	0.9	0.1	0.0	0.4	6	-0.5	-1	2.8	15 (N/A)	0.4	5.01	
Trident maple	1.4	0.6	0.7	0.2	15	2.4	0.2	0.1	1.3	17	-0.2	0	6.6	32 (N/A)	0.4	10.67	
Yellowwood	0.7	0.3	0.3	0.1	8	1.2	0.1	0.0	0.6	8	-0.2	0	3.1	16 (N/A)	0.4	5.19	
Elm	3.7	1.5	1.7	0.6	40	4.9	0.3	0.2	2.6	35	0.0	0	15.5	75 (N/A)	0.4	24.91	
American elm	4.0	1.6	1.9	0.6	44	5.2	0.3	0.2	2.9	37	0.0	0	16.8	81 (N/A)	0.4	26.98	
American sycamore	2.2	0.9	1.1	0.3	24	3.4	0.2	0.1	1.7	24	-2.2	-5	7.8	43 (N/A)	0.4	14.24	
Dogwood	0.4	0.2	0.2	0.1	5	0.8	0.0	0.0	0.3	5	0.0	0	2.0	10 (N/A)	0.4	3.26	
Crimson king maple	0.3	0.1	0.1	0.0	3	0.5	0.0	0.0	0.2	4	0.0	0	1.4	7 (N/A)	0.2	3.46	
American hornbeam	0.5	0.2	0.3	0.1	6	1.0	0.1	0.0	0.5	7	-0.2	0	2.5	13 (N/A)	0.2	6.26	
Tulip tree	0.4	0.2	0.2	0.1	4	1.1	0.1	0.0	0.5	8	0.0	0	2.6	12 (N/A)	0.2	6.06	
Redbud	0.2	0.1	0.1	0.0	2	0.3	0.0	0.0	0.1	2	0.0	0	0.8	4 (N/A)	0.2	1.94	
Ginkgo	0.4	0.2	0.2	0.1	5	0.8	0.1	0.0	0.4	6	-0.1	0	2.1	10 (N/A)	0.2	5.13	
Kousa dogwood	0.2	0.1	0.1	0.0	2	0.3	0.0	0.0	0.1	2	0.0	0	0.8	4 (N/A)	0.2	1.94	
Sassafras	1.2	0.5	0.6	0.2	14	1.7	0.1	0.1	0.9	12	-0.3	-1	5.0	25 (N/A)	0.2	12.55	
Serviceberry	0.5	0.2	0.3	0.1	6	1.0	0.1	0.0	0.5	7	0.0	0	2.7	13 (N/A)	0.2	6.37	
Cherry plum	0.1	0.0	0.0	0.0	1	0.2	0.0	0.0	0.1	1	0.0	0	0.4	2 (N/A)	0.1	1.94	
Scotch pine	0.3	0.1	0.2	0.1	3	0.3	0.0	0.0	0.1	2	-0.6	-1	0.5	4 (N/A)	0.1	3.95	
CEM OTHER	0.4	0.2	0.3	0.1	5	0.6	0.0	0.0	0.3	4	-0.1	0	1.8	9 (N/A)	0.1	9.05	
Balsam fir	0.1	0.0	0.0	0.0	1	0.1	0.0	0.0	0.0	1	-0.3	-1	0.1	1 (N/A)	0.1	0.98	
Apple	0.3	0.1	0.2	0.1	4	0.6	0.0	0.0	0.3	4	0.0	0	1.6	8 (N/A)	0.1	7.64	
Hickory	1.2	0.5	0.6	0.2	13	1.5	0.1	0.1	0.8	11	0.0	0	4.9	24 (N/A)	0.1	23.92	
Eastern cottonwood	1.5	0.6	0.7	0.2	17	1.9	0.1	0.1	1.0	13	0.0	0	6.1	30 (N/A)	0.1	29.76	
Beech	1.5	0.6	0.7	0.2	17	1.9	0.1	0.1	1.0	13	0.0	0	6.1	30 (N/A)	0.1	29.76	
Hornchestnut	0.6	0.3	0.3	0.1	7	0.9	0.1	0.0	0.5	6	-0.3	-1	2.5	13 (N/A)	0.1	12.60	
Willow oak	1.9	0.8	0.9	0.3	21	2.0	0.1	0.1	1.2	15	-9.3	-22	-2.0	14 (N/A)	0.1	14.31	
PES OTHER	0.1	0.1	0.1	0.0	2	0.2	0.0	0.0	0.1	1	-0.2	0	0.4	3 (N/A)	0.1	2.60	
Plum	0.1	0.0	0.0	0.0	1	0.2	0.0	0.0	0.1	1	0.0	0	0.4	2 (N/A)	0.1	1.94	
Willow	1.2	0.5	0.6	0.2	13	1.6	0.1	0.1	0.8	11	-0.3	-1	4.7	23 (N/A)	0.1	23.38	
Catalpa	0.7	0.3	0.3	0.1	8	1.1	0.1	0.0	0.5	7	-0.2	0	3.0	15 (N/A)	0.1	14.84	
American chestnut	1.5	0.6	0.7	0.2	17	1.7	0.1	0.1	0.9	12	0.0	0	5.9	29 (N/A)	0.1	28.61	
Citywide total	457.6	195.8	226.8	75.9	5,147	691.0	44.7	26.4	358.2	4,850	-203.1	-469	1,873.2	9,529 (N/A)	100.0	11.14	

## Annual CO Benefits of Public Trees

12/17/2013

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$)	Total Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	12,612	42	-4,792	-1,092	-4	25,536	84	32,264	106 (N/A)		12.4	8.9	1.00
Norway maple	24,747	82	-3,635	-865	-3	19,319	64	39,567	131 (N/A)		8.2	10.9	1.87
Callery pear	9,986	33	-287	-80	0	8,518	28	18,137	60 (N/A)		8.2	5.0	0.86
Honeylocust	9,156	30	-2,810	-628	-2	21,017	69	26,734	88 (N/A)		8.1	7.4	1.28
Littleleaf linden	6,376	21	-3,136	-587	-2	12,438	41	15,091	50 (N/A)		5.3	4.2	1.11
Zelkova	4,808	16	-1,047	-312	-1	10,661	35	14,111	47 (N/A)		5.0	3.9	1.08
Red oak	16,956	56	-3,386	-490	-2	12,417	41	25,497	84 (N/A)		4.1	7.0	2.40
Black locust	7,901	26	-3,129	-497	-2	14,556	48	18,831	62 (N/A)		4.1	5.2	1.78
London planetree	8,630	28	-1,299	-551	-2	14,810	49	21,590	71 (N/A)		3.9	5.9	2.16
Black tupelo	3,862	13	-1,404	-315	-1	8,022	26	10,165	34 (N/A)		3.3	2.8	1.20
Silver maple	8,054	27	-2,376	-532	-2	12,040	40	17,186	57 (N/A)		2.7	4.7	2.47
Cottonwood	4,528	15	-2,714	-475	-2	12,980	43	14,319	47 (N/A)		2.6	3.9	2.15
Sugar maple	6,800	22	-1,513	-346	-1	7,325	24	12,265	40 (N/A)		2.5	3.4	1.93
Ash	2,902	10	-663	-225	-1	6,471	21	8,485	28 (N/A)		2.3	2.3	1.40
Crabapple	915	3	-235	-128	0	1,768	6	2,319	8 (N/A)		2.3	0.6	0.38
Eastern white pine	761	3	-278	-198	-1	3,203	11	3,488	12 (N/A)		2.1	1.0	0.64
Green ash	1,748	6	-172	-134	0	3,353	11	4,796	16 (N/A)		1.6	1.3	1.13
Norway spruce	697	2	-228	-183	-1	3,224	11	3,510	12 (N/A)		1.6	1.0	0.83
Maple	4,297	14	-767	-155	-1	3,680	12	7,054	23 (N/A)		1.4	1.9	1.94
Hackberry	1,813	6	-516	-109	0	3,605	12	4,792	16 (N/A)		1.3	1.3	1.44
Linden	1,924	6	-602	-128	0	2,822	9	4,017	13 (N/A)		1.2	1.1	1.33
Spruce	346	1	-59	-63	0	1,037	3	1,260	4 (N/A)		0.9	0.3	0.52
Black walnut	1,677	6	-614	-94	0	2,872	9	3,840	13 (N/A)		0.8	1.1	1.81
Boselder	1,292	4	-342	-62	0	1,370	5	2,258	7 (N/A)		0.8	0.6	1.06
Pin oak	5,885	19	-928	-154	-1	4,133	14	8,935	29 (N/A)		0.8	2.5	4.21
European larch	2,035	7	-896	-112	0	3,235	11	4,262	14 (N/A)		0.8	1.2	2.01
Fir	175	1	-27	-33	0	515	2	629	2 (N/A)		0.6	0.2	0.42
Black cherry	533	2	-120	-34	0	458	2	837	3 (N/A)		0.6	0.2	0.55
White oak	4,033	13	-681	-107	0	2,850	9	6,095	20 (N/A)		0.6	1.7	4.02
Mulberry	789	3	-255	-66	0	1,679	6	2,148	7 (N/A)		0.6	0.6	1.42
Blue spruce	138	0	-25	-24	0	328	1	416	1 (N/A)		0.5	0.1	0.34
Pine	130	0	-55	-64	0	1,071	4	1,082	4 (N/A)		0.5	0.3	0.89
Japanese S tree	265	1	-65	-22	0	434	1	613	2 (N/A)		0.5	0.2	0.51

## Annual CO Benefits of Public Trees

12/17/2013

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Kwanzan cherry	255	1	-52	-18	0	240	1	425	1 (N/A)		0.5	0.1	0.35
Japanese tree lilac	143	0	-16	-14	0	183	1	297	1 (N/A)		0.5	0.1	0.24
Basswood	959	3	-411	-82	0	1,699	6	2,165	7 (N/A)		0.5	0.6	1.79
Tree of heaven	1,009	3	-362	-55	0	1,605	5	2,197	7 (N/A)		0.5	0.6	1.81
Magnolia	245	1	-33	-21	0	295	1	487	2 (N/A)		0.4	0.1	0.54
Trident maple	826	3	-244	-34	0	873	3	1,422	5 (N/A)		0.4	0.4	1.56
Yellowwood	250	1	-53	-21	0	393	1	570	2 (N/A)		0.4	0.2	0.63
Elm	1,824	6	-412	-62	0	1,807	6	3,157	10 (N/A)		0.4	0.9	3.47
American elm	2,067	7	-509	-66	0	1,971	7	3,463	11 (N/A)		0.4	1.0	3.81
American sycamore	610	2	-85	-43	0	1,193	4	1,674	6 (N/A)		0.4	0.5	1.84
Dogwood	249	1	-52	-17	0	229	1	409	1 (N/A)		0.4	0.1	0.45
Crimson king maple	155	1	-30	-10	0	166	1	281	1 (N/A)		0.2	0.1	0.46
American hornbeam	183	1	-58	-15	0	347	1	457	2 (N/A)		0.2	0.1	0.75
Tulip tree	134	0	-14	-10	0	367	1	476	2 (N/A)		0.2	0.1	0.79
Redbud	72	0	-8	-7	0	91	0	148	0 (N/A)		0.2	0.0	0.24
Ginkgo	141	0	-43	-15	0	295	1	379	1 (N/A)		0.2	0.1	0.62
Kousa dogwood	72	0	-8	-7	0	91	0	148	0 (N/A)		0.2	0.0	0.24
Sassafras	271	1	-65	-29	0	609	2	787	3 (N/A)		0.2	0.2	1.30
Serviceberry	493	2	-183	-23	0	332	1	619	2 (N/A)		0.2	0.2	1.02
Cherry plum	36	0	-4	-3	0	46	0	74	0 (N/A)		0.1	0.0	0.24
Scotch pine	41	0	-8	-7	0	99	0	125	0 (N/A)		0.1	0.0	0.41
CEM OTHER	192	1	-42	-11	0	217	1	356	1 (N/A)		0.1	0.1	1.17
Balsam fir	15	0	-1	-3	0	31	0	41	0 (N/A)		0.1	0.0	0.13
Apple	100	0	-14	-11	0	196	1	270	1 (N/A)		0.1	0.1	0.89
Hickory	360	1	-225	-21	0	546	2	660	2 (N/A)		0.1	0.2	2.18
Eastern cottonwood	0	0	-77	-25	0	697	2	594	2 (N/A)		0.1	0.2	1.96
Beech	0	0	-77	-25	0	697	2	594	2 (N/A)		0.1	0.2	1.96
Horsechestnut	557	2	0	-21	0	321	1	857	3 (N/A)		0.1	0.2	2.83
Willow oak	1,012	3	-244	-34	0	804	3	1,538	5 (N/A)		0.1	0.4	5.07
PES OTHER	0	0	0	-3	0	55	0	51	0 (N/A)		0.1	0.0	0.17
Plum	36	0	-4	-3	0	46	0	74	0 (N/A)		0.1	0.0	0.24
Willow	0	0	-62	-30	0	566	2	474	2 (N/A)		0.1	0.1	1.57
Catalpa	191	1	-112	-16	0	367	1	429	1 (N/A)		0.1	0.1	1.42
American chestnut	318	1	-77	-25	0	628	2	844	3 (N/A)		0.1	0.2	2.78
<b>Citywide total</b>	<b>169,587</b>	<b>560</b>	<b>-42,639</b>	<b>-9,652</b>	<b>-32</b>	<b>245,844</b>	<b>811</b>	<b>363,140</b>	<b>1,198 (N/A)</b>		<b>100.0</b>	<b>100.0</b>	<b>1.40</b>



## Stored CO2 Benefits of Public Trees

12/17/2013

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	242,408	800	(N/A)	12.4	5.9	7.55
Norway maple	389,526	1,285	(N/A)	8.2	9.6	18.36
Callery pear	62,943	208	(N/A)	8.2	1.5	2.97
Honeylocust	164,447	543	(N/A)	8.1	4.0	7.86
Littleleaf linden	164,151	542	(N/A)	5.3	4.0	12.04
Zelkova	46,744	154	(N/A)	5.0	1.1	3.59
Red oak	467,002	1,541	(N/A)	4.1	11.5	44.03
Black locust	193,650	639	(N/A)	4.1	4.8	18.26
London planetree	209,884	693	(N/A)	3.9	5.2	20.99
Black tupelo	69,609	230	(N/A)	3.3	1.7	8.20
Silver maple	502,506	1,658	(N/A)	2.7	12.3	72.10
Cottonwood	269,562	890	(N/A)	2.6	6.6	40.43
Sugar maple	237,178	783	(N/A)	2.5	5.8	37.27
Ash	48,077	159	(N/A)	2.3	1.2	7.93
Crabapple	29,030	96	(N/A)	2.3	0.7	4.79
Eastern white pine	20,575	68	(N/A)	2.1	0.5	3.77
Green ash	30,120	99	(N/A)	1.6	0.7	7.10
Norway spruce	26,505	87	(N/A)	1.6	0.7	6.25
Maple	64,585	213	(N/A)	1.4	1.6	17.76
Hackberry	23,048	76	(N/A)	1.3	0.6	6.91
Linden	42,029	139	(N/A)	1.2	1.0	13.87
Spruce	8,066	27	(N/A)	0.9	0.2	3.33
Black walnut	27,433	91	(N/A)	0.8	0.7	12.93
Boxelder	15,275	50	(N/A)	0.8	0.4	7.20
Pin oak	170,536	563	(N/A)	0.8	4.2	80.40
European larch	39,986	132	(N/A)	0.8	1.0	18.85
Fir	3,933	13	(N/A)	0.6	0.1	2.60
Black cherry	5,359	18	(N/A)	0.6	0.1	3.54
White oak	113,179	373	(N/A)	0.6	2.8	74.70
Mulberry	18,297	60	(N/A)	0.6	0.4	12.08
Blue spruce	1,132	4	(N/A)	0.5	0.0	0.93
Pine	10,599	35	(N/A)	0.5	0.3	8.74
Japanese 8 tree	2,911	10	(N/A)	0.5	0.1	2.40
Kwanzan cherry	2,328	8	(N/A)	0.5	0.1	1.92
Japanese tree lilac	699	2	(N/A)	0.5	0.0	0.58
Basswood	42,618	141	(N/A)	0.5	1.0	35.16
Tree of heaven	16,159	53	(N/A)	0.5	0.4	13.33
Magnolia	1,452	5	(N/A)	0.4	0.0	1.60
Trident maple	10,872	36	(N/A)	0.4	0.3	11.96
Yellowwood	2,346	8	(N/A)	0.4	0.1	2.58

## Stored CO2 Benefits of Public Trees

12/17/2013

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Elm	41,386	137	(N/A)	0.4	1.0	45.52
American elm	55,460	183	(N/A)	0.4	1.4	61.01
American sycamore	11,196	37	(N/A)	0.4	0.3	12.32
Dogwood	2,318	8	(N/A)	0.4	0.1	2.55
Crimson king maple	1,319	4	(N/A)	0.2	0.0	2.18
American hornbeam	2,569	8	(N/A)	0.2	0.1	4.24
Tulip tree	634	2	(N/A)	0.2	0.0	1.05
Redbud	349	1	(N/A)	0.2	0.0	0.58
Ginkgo	1,898	6	(N/A)	0.2	0.0	3.13
Kousa dogwood	349	1	(N/A)	0.2	0.0	0.58
Sassafras	13,689	45	(N/A)	0.2	0.3	22.59
Serviceberry	8,162	27	(N/A)	0.2	0.2	13.47
Cherry plum	175	1	(N/A)	0.1	0.0	0.58
Scotch pine	360	1	(N/A)	0.1	0.0	1.19
CEM OTHER	1,862	6	(N/A)	0.1	0.0	6.15
Balsam fir	53	0	(N/A)	0.1	0.0	0.18
Apple	3,037	10	(N/A)	0.1	0.1	10.02
Hickory	10,044	33	(N/A)	0.1	0.2	33.14
Eastern cottonwood	16,940	56	(N/A)	0.1	0.4	55.90
Beech	16,940	56	(N/A)	0.1	0.4	55.90
Horsechestnut	0	0	(N/A)	0.1	0.0	0.00
Willow oak	53,466	176	(N/A)	0.1	1.3	176.44
PES OTHER	104	0	(N/A)	0.1	0.0	0.34
Plum	175	1	(N/A)	0.1	0.0	0.58
Willow	13,518	45	(N/A)	0.1	0.3	44.61
Catalpa	5,016	17	(N/A)	0.1	0.1	16.55
American chestnut	16,940	56	(N/A)	0.1	0.4	55.90
Citywide total	4,074,716	13,447	(N/A)	100.0	100.0	15.73

## Annual Aesthetic/Other Benefits of Public Trees

12/17/2013

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Red maple	3,301	(N/A)	12.4	9.9	31.15
Norway maple	2,845	(N/A)	8.2	8.6	40.65
Callery pear	3,603	(N/A)	8.2	10.9	51.48
Honeylocust	2,989	(N/A)	8.1	9.0	43.32
Littleleaf linden	886	(N/A)	5.3	2.7	19.70
Zelkova	2,318	(N/A)	5.0	7.0	53.91
Red oak	1,755	(N/A)	4.1	5.3	50.15
Black locust	2,209	(N/A)	4.1	6.7	63.11
London planetree	1,473	(N/A)	3.9	4.4	44.62
Black tupelo	881	(N/A)	3.3	2.7	31.48
Silver maple	733	(N/A)	2.7	2.2	31.87
Cottonwood	983	(N/A)	2.6	3.0	44.69
Sugar maple	981	(N/A)	2.5	3.0	46.72
Ash	701	(N/A)	2.3	2.1	35.06
Crabapple	190	(N/A)	2.3	0.6	9.50
Eastern white pine	256	(N/A)	2.1	0.8	14.24
Green ash	461	(N/A)	1.6	1.4	32.90
Norway spruce	177	(N/A)	1.6	0.5	12.63
Maple	503	(N/A)	1.4	1.5	41.92
Hackberry	675	(N/A)	1.3	2.0	61.36
Linden	466	(N/A)	1.2	1.4	46.64
Spruce	128	(N/A)	0.9	0.4	16.05
Black walnut	485	(N/A)	0.8	1.5	69.29
Boxelder	183	(N/A)	0.8	0.6	26.15
Pin oak	471	(N/A)	0.8	1.4	67.35
European larch	512	(N/A)	0.8	1.5	73.09
Fir	80	(N/A)	0.6	0.2	16.08
Black cherry	44	(N/A)	0.6	0.1	8.70
White oak	331	(N/A)	0.6	1.0	66.24
Mulberry	153	(N/A)	0.6	0.5	30.66
Blue spruce	69	(N/A)	0.5	0.2	17.13
Pine	31	(N/A)	0.5	0.1	7.66
Japanese S tree	130	(N/A)	0.5	0.4	32.60
Kwanzan cherry	30	(N/A)	0.5	0.1	7.43
Japanese tree lilac	27	(N/A)	0.5	0.1	6.82

## BENEFIT SUMMARY

	Energy	CO <sub>2</sub>	Air Quality	Stormwater	Aesthetic/Other	Total (\$)
	52,455	1,198	9,529	12,919	33,203	109,304
Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree	
Basswood	173	(N/A)	0.5	0.5	43.17	
Tree of heaven	282	(N/A)	0.5	0.8	70.47	
Magnolia	113	(N/A)	0.4	0.3	37.57	
Trident maple	106	(N/A)	0.4	0.3	35.20	
Yellowwood	98	(N/A)	0.4	0.3	32.58	
Elm	248	(N/A)	0.4	0.7	82.62	
American elm	258	(N/A)	0.4	0.8	86.08	
American sycamore	122	(N/A)	0.4	0.4	40.74	
Dogwood	24	(N/A)	0.4	0.1	8.07	
Crimson king maple	29	(N/A)	0.2	0.1	14.56	
American hornbeam	65	(N/A)	0.2	0.2	32.25	
Tulip tree	95	(N/A)	0.2	0.3	47.69	
Redbud	14	(N/A)	0.2	0.0	6.82	
Ginkgo	39	(N/A)	0.2	0.1	19.27	
Kousa dogwood	14	(N/A)	0.2	0.0	6.82	
Sassafras	56	(N/A)	0.2	0.2	28.04	
Serviceberry	23	(N/A)	0.2	0.1	11.32	
Cherry plum	7	(N/A)	0.1	0.0	6.82	
Scotch pine	17	(N/A)	0.1	0.1	17.31	
CEM OTHER	19	(N/A)	0.1	0.1	19.41	
Balsam fir	17	(N/A)	0.1	0.0	16.60	
Apple	14	(N/A)	0.1	0.0	14.31	
Hickory	74	(N/A)	0.1	0.2	73.91	
Eastern cottonwood	0	(N/A)	0.1	0.0	0.00	
Beech	0	(N/A)	0.1	0.0	0.00	
Horsechestnut	58	(N/A)	0.1	0.2	57.78	
Willow oak	85	(N/A)	0.1	0.3	84.76	
PES OTHER	0	(N/A)	0.1	0.0	0.00	
Plum	7	(N/A)	0.1	0.0	6.82	
Willow	0	(N/A)	0.1	0.0	0.00	
Catalpa	30	(N/A)	0.1	0.1	29.78	
American chestnut	56	(N/A)	0.1	0.2	56.14	
Citywide total	33,203	(N/A)	100.0	100.0	38.83	

# RECOMMENDATIONS and CONCLUSIONS

- It is important to maintain an ***up-to-date inventory*** in order to direct future maintenance and planting. Record any pruning, removal, or planting activities. Try to designate this responsibility to someone early in the tree management process. Some communities decide to re-inventory 20% of their street trees every year so that every five years a total reassessment has been performed.
- A ***community forestry management plan*** is an essential component to a public tree management program. The City of Beacon can use this inventory to set maintenance and planting priorities. The Northeast Center for Urban and Community Forestry and the Arbor Day Foundation have information on the development and importance of creating a management plan. (See resource page.)
- The ***stocking level*** is about 80%. It is up to the community to set stocking level goals. The national average is about 60%.
- In the City of Beacon, maple trees make up almost 30% of total tree population inventoried, so greater ***diversity*** is one recommended goal for a management plan. A diverse tree population helps prevent the loss of large numbers of trees when pest or disease outbreaks occur. It is recommended that one species comprise no more than 5% of the tree population and one genus make up no more than 10%.
- When selecting tree species for new plantings, using the ***“right tree in the right place”*** promotes a healthier, more sustainable forest. Choose species that are disease and pest resistant and suitable for street plantings. Consider available planting space. Many tree failures occur because of restricted or compacted soil. Choosing the proper size tree for the site also helps prevent damage by roots to impervious surfaces. According to the National Arbor Day Foundation, tree lawns less than 4-feet wide are generally too narrow for tree planting. The Urban Horticulture Institute at Cornell University offers information on many aspects of street tree planning. (See resource page.)
- Looking at the ***condition*** of the trees and the ***maintenance*** recommendations, a community can set priorities for maintenance needs. Public safety should be a top priority. There are 134 trees that are recommended for further examination by a certified arborist. Pruning priorities should be established which take into consideration the 61 “high priority prune” trees.
- The City of Beacon’s street trees provide ***significant benefits*** to residents. With a public tree replacement value of almost \$5 million and a total annual environmental benefits value of over \$109,000, the importance of proper management of this valuable resource is clear. The Northeast Community Tree Guide gives placement guidelines to maximize the benefits provided by public trees. (See resource page.) According to the Tree Guide and as evidenced in the inventory, larger public trees produce greater average annual net benefits.

## RECOMMENDATIONS and CONCLUSIONS (cont'd)

- Becoming a ***Tree City USA*** can provide many benefits to a community – the Tree City designation increases public awareness about the value of trees, provides leverage when applying for grants, and indicates local commitment to a healthy community forest. The four requirements are: a tree ordinance, a tree board, a forestry program with an expenditure of at least \$2 per capita, and an Arbor Day observance and proclamation. The City is to be congratulated on its 16 years as a Tree City. (See resource page.)
- Be aware of current threats to the trees in your area. For example, the ***emerald ash borer*** was first found in Michigan in 2002 and has destroyed more than 70 million ash trees since that time. It has now been discovered in Dutchess County and the county has been added to the quarantine area. 34 ash trees were identified in the inventory; they are not currently recommended for planting. The NY Department of Environmental Conservation, U.S. Forest Service, USDA APHIS, and Cornell Cooperative Extension are good sources of information on invasive species.
- ***Planting on private property*** has become a new way of thinking for many communities. Some towns are considering changes to their ordinances to allow planting on homeowners' lawns especially since the loss of hundreds of thousands of trees in the wake of Superstorm Sandy. Although a shady canopy makes for a charming street, planting on the right of way is an idea that has been phased out in some towns. And by planting on the homeowner's lawn rather than on the narrow right of way, the roots have more soil volume in which to grow and thrive. The New York Urban Forestry Council is studying ways in which a municipality can use public monies for planting on private property.

# WEB RESOURCES

- ARBOR DAY FOUNDATION  
<http://www.arborday.org/>
- CORNELL COOPERATIVE EXTENSION  
<http://www.cce.cornell.edu/dutchess/>
- CORNELL ENTOMOLOGY – pest updates  
<http://www.entomology.cornell.edu/Extension/Woodys/>
- INTERNATIONAL SOCIETY OF ARBORICULTURE  
<http://www.isa-arbor.com/>
- i-TREE – software suite for assessing and managing community forests  
<http://www.itreetools.org/>
- NEW YORK DEC URBAN AND COMMUNITY FORESTRY  
<http://www.dec.ny.gov/lands/4957.html>
- NEW YORK INVASIVE SPECIES INFORMATION WEBSITE  
<http://www.nyis.info/>
- NEW YORK RELEAF  
<http://www.dec.ny.gov/lands/5307.html>
- NEW YORK STATE ARBORISTS – locate certified arborists  
<http://www.newyorkstatearborists.com/>
- NEW YORK STATE URBAN AND COMMUNITY FORESTRY COUNCIL  
<http://www.nysurbanforestrycouncil.com/>
- NORTHEAST CENTER FOR URBAN & COMMUNITY FORESTRY – management plan guide  
<http://www.umass.edu/urbantree/mgtplanguide.pdf>
- SOCIETY OF MUNICIPAL ARBORISTS  
<http://www.urban-forestry.com/>
- TREE CITY – learn how to become a Tree City USA  
<http://www.arborday.org/programs/treeCityUSA.cfm>
- TREELINK  
<http://www.treelink.org/>
- URBAN HORTICULTURE INSTITUTE – free downloadable resources  
<http://www.hort.cornell.edu/UHI/>
- US FOREST SERVICE NORTHEASTERN AREA  
<http://www.na.fs.fed.us/>
- US FOREST SERVICE PACIFIC SOUTHWEST RESEARCH STATION  
<http://treesearch.fs.fed.us/pubs/28759> Northeast Community Tree Guide
- URBAN NATURAL RESOURCES INSTITUTE  
<http://www.unri.org/>