

# City of Franklin Inventory Summary Report

The City of Franklin, Indiana is a beautiful community and a splendid place to live, work, play, and study. The city is located in Johnson County and has a population of 23,712, according to the 2010 Census. Founded in 1823, Franklin's downtown is well known for its historical ambiance. The City and its citizens take pride in the preservation of the community's landmark courthouse and theatre, historical churches and brick streets, and unique shops, restaurants, and houses. The City is also home to Franklin College, a private liberal arts college, founded in 1834. The health of Franklin, as with many communities, is closely related to the ability of the City to supply its citizens with efficient services, safe public spaces, and properly maintained infrastructure. Trees are an integral component of the City's infrastructure and urban environment.

When properly maintained, trees return overall benefits and value to the community far in excess of the time and money invested in them for planting, pruning, protection, and removal. They provide shade and act as windbreaks, helping to decrease residential energy consumption. They act as reservoirs, helping to slow and reduce the amount of stormwater that reaches storm drains, rivers, and lakes. They help reduce noise levels, cleanse atmospheric pollutants, produce oxygen and absorb carbon dioxide, stabilize the soil by controlling wind and water erosion, and provide habitat for wildlife. Trees also provide significant economic benefits, including increased real estate values and more attractive settings in which to locate commercial businesses. Their shade and beauty contribute to the community's quality of life and soften the hard appearance of concrete and brick structures and streets. Unlike other components of the City's infrastructure, the tree population, with proper care, will actually continue to increase in value with each passing year.

Managing natural resources in urban areas is challenging. Of great concern is providing adequate maintenance within budget constraints. Franklin's Public Works Department and Tree Board played instrumental roles in advocating the benefits of a public tree inventory to help better manage the City's public tree population. Franklin's public tree inventory was completed January, 2012. All trees within the street rights-of-way, parks, and public spaces were inventoried. The purpose of the inventory is to assess current species, condition, size, and maintenance needs of public trees, providing the City a way in which to manage the entire population over time. Ultimately, this inventory will establish a means of which Franklin can efficiently and effectively plan and manage the City's green infrastructure.

*A combination of organized leadership coupled with comprehensive information about the City's public tree population, dedicated personnel, and effective public relations will lead to a successful urban forestry program.*

## City of Franklin Inventory Summary Report (Continued)

### Franklin's Public Tree Inventory

Davey Resource Group recorded 9,728 trees, planting sites, and stumps within public street rights-of-way, parks, and public spaces. Tree data were collected and analyzed, providing information on species composition, relative size, overall health, and maintenance needs of the urban forest. The park and public space properties include Province Park, Blue Herron Park and Wetland, Greenlawn Cemetery, Community Park, Depot Park, Franklin Senior Center, Morgan Park, Palmer Park, Payne Park, Robert C Schmidt Memorial Park, Scott Park, and Temple Park.

Major inventory trends in Franklin's tree population include the following:

- 🌳 There are 9,728 sites located within street rights-of-way (7,718 sites) and park and public space grounds (2,010 sites). Of the street trees, there are 4 recorded borderline.
- 🌳 Sites include 6,288 (64%) trees, 71 (1%) stumps, and 3,369 (35%) vacant planting sites. All inventoried vacant sites were located within the street right-of-way.
- 🌳 The per capita ratio of trees to people is 0.3 trees for every 1 person. Only considering the street tree population, the inventory captures a 56% stocking level. Stocking level is the percentage of potential sites (7,718) filled with trees (4,298).
- 🌳 In the entire inventoried population, there are 78 species representing 48 genera. The genus *Acer* (maple) comprises 36% of the tree population, followed by *Pyrus* (pear) 12%, *Fraxinus* (ash) 11%, *Tilia* (linden) 7%, and *Malus* (apple) 5%. The species *Acer rubrum* (red maple) and *Pyrus calleryana* (Callery pear) encompasses 15% and 12% of the entire population, respectively.
- 🌳 The inventoried tree population has an ideal distribution of tree size. There is high percentage of young trees (40%) with a skewed size distribution of 40:30:19:11 (percentages of young: established: maturing: mature trees). Young trees are 6-inch and less in diameter at breast height (DBH), established trees are 7- to 12-inch DBH; maturing trees are 13- to 24-inch DBH; and mature trees are 25-inch and greater DBH.
- 🌳 Of the 6,288 inventoried trees, the majority of the public tree population is in Fair condition (3,489 trees or 55% of the population). There are 34 (less than 1%) trees in Very Good condition, 1,329 (21%) trees in Good condition, 1,181 (19%) trees in Poor condition, 226 (4%) trees in Critical condition, and there are 29 (less than 1%) Dead trees.



**Province Park has 823 inventoried sites and *Acer saccharinum* (silver maple) makes up the majority (22%) of that population.**

## City of Franklin Inventory Summary Report (Continued)

- ✿ The total maintenance requirements indicate that 3,407 (35%) trees are recommended for Large Tree Clean, 3,369 (35%) vacant sites are located to Plant Trees, 1,920 (20%) trees are recommended for Young Tree Train, 617 (6%) trees are recommended for Removal, 344 (4%) trees are recommended for Small Tree Clean, 71 (less than 1%) stumps require Stump Removal.
- ✿ Of the 6,288 inventoried trees, 3,227 (52%) trees have a Low level of risk (Risk Rating of 3 or 4), 2,228 (35%) have a Moderate level of risk (Risk Rating of 5 or 6), 733 (12%) have a High level of risk (Risk Rating of 7 or 8), and 100 (1%) have a Severe level of risk (Risk Rating of 9 or 10).
- ✿ Of the 3,369 vacant planting sites, 937 (28%) are Vacant Large Sites, 816 (24%) are Vacant Medium Sites, and 1,616 (48%) are Vacant Small Sites.

## Franklin's i-Tree Streets Analysis

Trees provide abundant environmental and economic benefits. In order to identify how much benefit is provided and returned to the community, a benefit-cost analysis of Franklin's inventoried tree population was performed. Davey Resource Group formatted the City's tree inventory for use in the i-Tree Streets (Version 4.1.7) benefit-cost assessment tool. i-Tree Streets is a free software application released by the United States Forest Service and is used to analyze the inventoried tree population's structure and its environmental and economic functional benefits and values. Quantified functional benefits include energy conservation, air quality improvement, stormwater interception, carbon dioxide removal, and property value increases. i-Tree Streets quantified these benefits and determined the environmental and economic value of Franklin's inventoried trees to produce accurate gross benefit values and average benefits per tree. i-Tree Streets also determined how much these public trees pay the community back in regards to the City's tree-related costs. This i-Tree Street's analysis is a statistically valid, financially sound, and defensible benefit-cost assessment tool. With this tool, the City's urban forest managers have accurately quantified the benefits of their inventoried resource.

Franklin's trees are providing the community substantial annual benefits such as:

- ✿ The interception of 15,243,994 million gallons of stormwater valued at \$94,519 per year, for an average benefit of \$15.03 per tree.
- ✿ Reduction of energy and natural gas use from shading and climate effects equal to 313.8 Megawatt-hours, and 8,266 therms are valued at \$31,341 per year, for an average of \$4.98 per tree.
- ✿ Net air quality improvements from the removal and avoidance of 4.1 tons of air pollutants are valued at \$10,285 per year, for an average of \$1.64 per tree.
- ✿ Reduction of atmospheric carbon dioxide (CO<sub>2</sub>) by a net of 667.9 tons per year is valued at \$4,408 for an average of \$0.70 per tree.

## City of Franklin Inventory Summary Report (Continued)

- ✿ Increased property values, aesthetics, and other less tangible improvements are valued at \$157,312 per year, for an average of \$25.02 per tree.
- ✿ The gross annual benefit received from the City's public trees is \$297,865. When the City's annual tree-related expenditures of \$264,084 are considered, the net annual benefit (benefits minus costs) returned to the City is \$33,781. The net benefit per tree is \$5.37 and the net benefit per capita is \$12.56.
- ✿ The City of Franklin receives \$1.13 in benefits for every \$1 spent on its municipal forestry program.

The public tree inventory has provided comprehensive information about Franklin's urban forest resource. The above overview refers to the complete data set which is provided digitally on a CD-ROM along with this summary. The following frequency reports, created in Davey's Tree Collector Interface and i-Tree Streets, further illustrate species distribution, relative size, overall tree condition, maintenance needs, and resource benefits. With Franklin's public tree inventory and i-Tree Streets benefit-cost analysis, Franklin has shown a strong commitment to building an efficient, effective, and successful urban forestry program.



**Trees provide abundant environmental and economic benefits such as the aesthetic pleasure Province Park gains by the population of trees there.**

# Summary Appendices



**Franklin, IN**  
**Quantity Report: Common**

<i>Common</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
maple, red ( <i>Acer rubrum</i> )	965	15.35%
pear, Callery ( <i>Pyrus calleryana</i> )	738	11.74%
maple, silver ( <i>Acer saccharinum</i> )	599	9.53%
maple, sugar ( <i>Acer saccharum</i> )	515	8.19%
ash, green ( <i>Fraxinus pennsylvanica</i> )	445	7.08%
linden, littleleaf ( <i>Tilia cordata</i> )	373	5.93%
crabapple, flowering ( <i>Malus</i> spp.)	329	5.23%
ash, white ( <i>Fraxinus americana</i> )	247	3.93%
pine, eastern white ( <i>Pinus strobus</i> )	189	3.01%
oak, northern red ( <i>Quercus rubra</i> )	186	2.96%
honeylocust, thornless ( <i>Gleditsia triacanthos inermis</i> )	113	1.80%
maple, Norway ( <i>Acer platanoides</i> )	108	1.72%
redbud, eastern ( <i>Cercis canadensis</i> )	105	1.67%
mulberry, white ( <i>Morus alba</i> )	99	1.57%
elm, Siberian ( <i>Ulmus pumila</i> )	89	1.42%
tuliptree ( <i>Liriodendron tulipifera</i> )	83	1.32%
cherry/plum, spp. ( <i>Prunus</i> spp.)	80	1.27%
arborvitae spp. ( <i>Thuja</i> spp.)	78	1.24%
hackberry, common ( <i>Celtis occidentalis</i> )	73	1.16%
spruce, Colorado ( <i>Picea pungens</i> )	64	1.02%
walnut, black ( <i>Juglans nigra</i> )	56	0.89%
oak, pin ( <i>Quercus palustris</i> )	41	0.65%
linden, American ( <i>Tilia americana</i> )	39	0.62%
serviceberry, spp. ( <i>Amelanchier</i> spp.)	38	0.60%
spruce, Norway ( <i>Picea abies</i> )	37	0.59%
dogwood, flowering ( <i>Cornus florida</i> )	35	0.56%
cottonwood, eastern ( <i>Populus deltoides</i> )	35	0.56%
sycamore, American ( <i>Platanus occidentalis</i> )	31	0.49%
birch, river ( <i>Betula nigra</i> )	31	0.49%
sweetgum, American ( <i>Liquidambar styraciflua</i> )	29	0.46%
baldcypress, common ( <i>Taxodium distichum</i> )	28	0.45%
locust, black ( <i>Robinia pseudoacacia</i> )	23	0.37%
boxelder ( <i>Acer negundo</i> )	23	0.37%
oak, willow ( <i>Quercus phellos</i> )	22	0.35%
oak, bur ( <i>Quercus macrocarpa</i> )	21	0.33%

<i>Common</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
spruce, white ( <i>Picea glauca</i> )	20	0.32%
maple, hedge ( <i>Acer campestre</i> )	20	0.32%
oak, swamp white ( <i>Quercus bicolor</i> )	18	0.29%
cherry, black ( <i>Prunus serotina</i> )	17	0.27%
maple, Amur ( <i>Acer tataricum ginnala</i> )	15	0.24%
catalpa, northern ( <i>Catalpa speciosa</i> )	13	0.21%
elm, hybrid ( <i>Ulmus x</i> )	12	0.19%
cherry, Japanese flowering ( <i>Prunus serrulata</i> )	12	0.19%
tree of heaven ( <i>Ailanthus altissima</i> )	11	0.17%
redcedar, eastern ( <i>Juniperus virginiana</i> )	10	0.16%
ginkgo ( <i>Ginkgo biloba</i> )	10	0.16%
oak, English ( <i>Quercus robur</i> )	9	0.14%
elm, American ( <i>Ulmus americana</i> )	9	0.14%
willow, spp. ( <i>Salix spp.</i> )	8	0.13%
osage-orange ( <i>Maclura pomifera</i> )	8	0.13%
maple, Japanese ( <i>Acer palmatum</i> )	8	0.13%
hemlock, eastern ( <i>Tsuga canadensis</i> )	8	0.13%
hawthorn, spp. ( <i>Crataegus spp.</i> )	8	0.13%
juniper, spp. ( <i>Juniperus spp.</i> )	7	0.11%
oak, shingle ( <i>Quercus imbricaria</i> )	6	0.10%
magnolia, saucer ( <i>Magnolia x soulangiana</i> )	6	0.10%
dogwood, Kousa ( <i>Cornus kousa</i> )	6	0.10%
pecan ( <i>Carya illinoensis</i> )	5	0.08%
horsechestnut ( <i>Aesculus hippocastanum</i> )	5	0.08%
willow, weeping ( <i>Salix babylonica</i> )	4	0.06%
planetree, London ( <i>Platanus x acerifolia</i> )	4	0.06%
pine, mugo ( <i>Pinus mugo</i> )	4	0.06%
buckeye, Ohio ( <i>Aesculus glabra</i> )	4	0.06%
arborvitae, eastern ( <i>Thuja occidentalis</i> )	4	0.06%
willow, corkscrew ( <i>Salix matsudana</i> )	3	0.05%
spruce, spp. ( <i>Picea spp.</i> )	3	0.05%
persimmon, common ( <i>Diospyros virginiana</i> )	3	0.05%
pear, common ( <i>Pyrus communis</i> )	3	0.05%
oak, white ( <i>Quercus alba</i> )	3	0.05%
oak, spp. ( <i>Quercus spp.</i> )	3	0.05%
oak, scarlet ( <i>Quercus coccinea</i> )	3	0.05%
hornbeam, European ( <i>Carpinus betulus</i> )	3	0.05%
crapemyrtle, common ( <i>Lagerstroemia indica</i> )	3	0.05%

<i>Common</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
beech, American ( <i>Fagus grandifolia</i> )	3	0.05%
zelkova, Japanese ( <i>Zelkova serrata</i> )	2	0.03%
willow, pussy ( <i>Salix discolor</i> )	2	0.03%
plum, Japanese ( <i>Prunus salicina</i> )	2	0.03%
mimosa ( <i>Albizia julibrissin</i> )	2	0.03%
dawn redwood ( <i>Metasequoia glyptostroboides</i> )	2	0.03%
butternut ( <i>Juglans cinerea</i> )	2	0.03%
yellowwood ( <i>Cladrastis kentukea</i> )	1	0.02%
seven-son flower ( <i>Heptacodium miconioides</i> )	1	0.02%
sassafras ( <i>Sassafras albidum</i> )	1	0.02%
oak, chinkapin ( <i>Quercus muehlenbergii</i> )	1	0.02%
maple, spp. ( <i>Acer</i> spp.)	1	0.02%
Kentucky coffeetree ( <i>Gymnocladus dioica</i> )	1	0.02%
apple, common ( <i>Malus pumila</i> )	1	0.02%
alder, common ( <i>Alnus glutinosa</i> )	1	0.02%
<b>Grand Total</b>	6288	100%





**Franklin, IN**  
**Quantity Report: Genus**

<i>Genus</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
Acer	2254	35.85%
Pyrus	741	11.78%
Fraxinus	692	11.01%
Tilia	412	6.55%
Malus	330	5.25%
Quercus	313	4.98%
Pinus	193	3.07%
Picea	124	1.97%
Gleditsia	113	1.80%
Prunus	111	1.77%
Ulmus	110	1.75%
Cercis	105	1.67%
Morus	99	1.57%
Liriodendron	83	1.32%
Thuja	82	1.30%
Celtis	73	1.16%
Juglans	58	0.92%
Cornus	41	0.65%
Amelanchier	38	0.60%
Populus	35	0.56%
Platanus	35	0.56%
Betula	31	0.49%
Liquidambar	29	0.46%
Taxodium	28	0.45%
Robinia	23	0.37%
Salix	17	0.27%
Juniperus	17	0.27%
Catalpa	13	0.21%
Ailanthus	11	0.17%
Ginkgo	10	0.16%
Aesculus	9	0.14%
Tsuga	8	0.13%
Maclura	8	0.13%
Crataegus	8	0.13%
Magnolia	6	0.10%

<i>Genus</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
Carya	5	0.08%
Lagerstroemia	3	0.05%
Fagus	3	0.05%
Diospyros	3	0.05%
Carpinus	3	0.05%
Zelkova	2	0.03%
Metasequoia	2	0.03%
Albizia	2	0.03%
Sassafras	1	0.02%
Heptacodium	1	0.02%
Gymnocladus	1	0.02%
Cladrastis	1	0.02%
Alnus	1	0.02%
<b>Grand Total</b>	6288	100%



<i>Diameter Class</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
1 - 3	1459	15.00%
4 - 6	1084	11.14%
7 - 12	1881	19.34%
13 - 18	687	7.06%
19 - 24	488	5.02%
25 - 30	392	4.03%
31 - 36	216	2.22%
37 - 42	92	0.95%
43 +	60	0.62%
N/A	3369	34.63%
<b>Grand Total</b>	<b>9728</b>	<b>100%</b>



**Franklin, IN**  
**Quantity Report: Condition**

<i>Condition</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
Fair	3489	55.49%
Good	1329	21.14%
Poor	1181	18.78%
Critical	226	3.59%
Very Good	34	0.54%
Dead	29	0.46%
<b>Grand Total</b>	<b>6288</b>	<b>100%</b>



<i>Primary Maintenance</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
Large Tree Clean	3407	35.02%
Plant Tree	3369	34.63%
Young Tree Train	1920	19.74%
Removal	617	6.34%
Small Tree Clean	344	3.54%
Stump Removal	71	0.73%
<b>Grand Total</b>	<b>9728</b>	<b>100%</b>



**Franklin, IN**  
**Quantity Report: Rating**

<i>Rating</i>	<i>Total</i>	<i>Percentage of Entire Population</i>
4	3130	49.78%
5	1476	23.47%
6	752	11.96%
7	498	7.92%
8	235	3.74%
3	97	1.54%
9	86	1.37%
10	14	0.22%
<b>Grand Total</b>	<b>6288</b>	<b>100%</b>

# Franklin

## Annual Stormwater Benefits of All Trees by Species

2/16/2012

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
maple, red	1,356,801	8,413	(N/A)	15.4	8.9	8.72
pear, callery	604,273	3,747	(N/A)	11.7	4.0	5.08
maple, silver	3,432,864	21,285	(N/A)	9.5	22.5	35.53
maple, sugar	2,410,559	14,947	(N/A)	8.2	15.8	29.02
ash, green	1,367,916	8,482	(N/A)	7.1	9.0	19.06
linden, littleleaf	513,122	3,182	(N/A)	5.9	3.4	8.53
apple	240,775	1,493	(N/A)	5.2	1.6	4.54
ash, white	725,450	4,498	(N/A)	3.9	4.8	18.21
pine, eastern white	417,768	2,590	(N/A)	3.0	2.7	13.71
oak, northern red	304,882	1,890	(N/A)	3.0	2.0	10.16
honeylocust	271,585	1,684	(N/A)	1.8	1.8	14.90
maple, Norway	258,951	1,606	(N/A)	1.7	1.7	14.87
redbud, eastern	97,179	603	(N/A)	1.7	0.6	5.74
mulberry, white	290,621	1,802	(N/A)	1.6	1.9	18.20
elm, Siberian	529,164	3,281	(N/A)	1.4	3.5	36.87
tulip tree	235,810	1,462	(N/A)	1.3	1.6	17.62
plum	45,220	280	(N/A)	1.3	0.3	3.50
arborvitae spp.	26,027	161	(N/A)	1.2	0.2	2.07
hackberry, northern	252,141	1,563	(N/A)	1.2	1.7	21.42
spruce, blue	76,536	475	(N/A)	1.0	0.5	7.41
OTHER STREET TREES	1,786,351	11,076	(N/A)	12.9	11.7	13.67
Citywide total	15,243,994	94,519	(N/A)	100.0	100.0	15.03

# Franklin

## Annual Energy Benefits of All Trees By Species

2/16/2012

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
maple, red	30.3	2,815	1,044.0	276	3,091	(N/A)	15.4	9.9	3.20
pear, callery	15.4	1,427	318.6	84	1,511	(N/A)	11.7	4.8	2.05
maple, silver	61.5	5,710	1,900.8	503	6,212	(N/A)	9.5	19.8	10.37
maple, sugar	43.6	4,049	1,601.3	423	4,472	(N/A)	8.2	14.3	8.68
ash, green	33.5	3,109	984.9	260	3,370	(N/A)	7.1	10.8	7.57
linden, littleleaf	12.9	1,202	264.2	70	1,272	(N/A)	5.9	4.1	3.41
apple	7.3	681	248.1	66	747	(N/A)	5.2	2.4	2.27
ash, white	15.2	1,408	461.6	122	1,530	(N/A)	3.9	4.9	6.19
pine, eastern white	6.6	610	-206.2	-55	555	(N/A)	3.0	1.8	2.94
oak, northern red	7.0	646	205.5	54	701	(N/A)	3.0	2.2	3.77
honeylocust	6.7	620	-33.1	-9	611	(N/A)	1.8	2.0	5.41
maple, Norway	5.3	492	150.8	40	532	(N/A)	1.7	1.7	4.93
redbud, eastern	2.3	212	-16.8	-4	208	(N/A)	1.7	0.7	1.98
mulberry, white	5.1	478	144.7	38	516	(N/A)	1.6	1.7	5.22
elm, Siberian	9.6	896	154.0	41	937	(N/A)	1.4	3.0	10.53
tulip tree	5.6	524	165.7	44	568	(N/A)	1.3	1.8	6.84
plum	1.4	128	42.3	11	139	(N/A)	1.3	0.4	1.74
arborvitae spp.	0.5	45	2.9	1	46	(N/A)	1.2	0.2	0.58
hackberry, northern	4.8	442	99.7	26	469	(N/A)	1.2	1.5	6.42
spruce, blue	1.0	91	-26.2	-7	84	(N/A)	1.0	0.3	1.31
OTHER STREET TREES	38.4	3,570	759.2	201	3,771	(N/A)	12.9	12.0	4.66
Citywide total	313.8	29,156	8,266.0	2,186	31,341	(N/A)	100.0	100.0	4.98



# Franklin

## Annual Air Quality Benefits of All Trees by Species

2/16/2012

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>								
maple, red	214.8	44.1	91.6	34.1	354	100.6	31.1	30.8	362.7	667	-94.3	-28	815.5	992 (N/A)	15.3	1.03	
pear, callery	108.1	22.2	46.1	17.2	178	48.9	15.6	15.5	183.9	336	0.0	0	457.4	514 (N/A)	11.7	0.70	
maple, silver	469.9	96.5	200.3	74.5	775	201.8	62.8	62.4	735.6	1,350	-210.2	-63	1,693.7	2,061 (N/A)	9.5	3.44	
maple, sugar	326.1	67.0	139.0	51.7	538	145.7	44.8	44.4	521.6	959	-374.0	-112	966.3	1,385 (N/A)	8.2	2.69	
ash, green	238.1	44.1	91.7	32.9	372	109.4	34.2	34.0	400.6	735	0.0	0	984.9	1,106 (N/A)	7.1	2.49	
linden, littleleaf	89.0	18.3	38.0	14.1	147	41.1	13.1	13.1	154.8	283	-35.2	-11	346.4	419 (N/A)	5.9	1.12	
apple	52.4	10.8	22.3	8.3	86	24.3	7.5	7.5	87.8	161	-0.5	0	220.4	247 (N/A)	5.2	0.75	
ash, white	106.1	21.8	45.2	16.8	175	49.7	15.5	15.4	181.3	333	0.0	0	451.9	508 (N/A)	3.9	2.06	
pine, eastern white	50.7	12.8	28.0	10.9	96	17.4	6.4	6.4	78.5	140	-67.3	-20	143.8	216 (N/A)	3.0	1.14	
oak, northern red	51.0	10.5	21.8	8.1	84	22.7	7.1	7.1	83.2	153	-63.7	-19	147.8	218 (N/A)	3.0	1.17	
honeylocust	51.0	10.5	21.7	8.1	84	19.5	6.6	6.6	79.8	144	-22.9	-7	181.0	221 (N/A)	1.8	1.96	
maple, Norway	38.5	7.9	16.4	6.1	63	17.3	5.4	5.4	63.4	116	-16.4	-5	144.0	175 (N/A)	1.7	1.62	
redbud, eastern	17.2	3.5	7.3	2.7	28	6.6	2.3	2.3	27.3	49	0.0	0	69.3	78 (N/A)	1.7	0.74	
mulberry, white	37.3	7.7	15.9	5.9	62	16.8	5.3	5.2	61.6	113	-12.4	-4	143.2	171 (N/A)	1.6	1.72	
elm, Siberian	78.4	16.1	33.4	12.4	129	30.2	9.8	9.7	115.4	211	0.0	0	305.5	340 (N/A)	1.4	3.82	
tulip tree	40.8	7.5	15.7	5.6	64	18.4	5.8	5.7	67.5	124	0.0	0	167.1	187 (N/A)	1.3	2.26	
plum	9.9	2.0	4.2	1.6	16	4.5	1.4	1.4	16.5	30	-0.1	0	41.5	47 (N/A)	1.3	0.58	
arborvitae spp.	4.4	1.1	2.4	0.9	8	1.5	0.5	0.5	5.8	10	-3.4	-1	13.6	18 (N/A)	1.2	0.23	
hackberry, northern	35.4	7.3	15.1	5.6	58	15.1	4.8	4.8	57.0	104	0.0	0	145.2	162 (N/A)	1.2	2.23	
spruce, blue	7.8	2.0	4.3	1.7	15	2.6	1.0	1.0	11.7	21	-15.4	-5	16.6	31 (N/A)	1.0	0.49	
OTHER STREET TREES	275.1	53.2	112.5	41.1	442	121.8	39.0	38.8	459.9	840	-313.9	-94	827.6	1,188 (N/A)	12.9	1.47	
Citywide total	2,302.1	466.7	972.9	360.5	3,774	1,015.9	319.8	318.1	3,755.9	6,879	-1,229.5	-369	8,282.5	10,285 (N/A)	100.0	1.64	

# Franklin

## Annual CO<sub>2</sub> Benefits of All Trees by Species

2/16/2012

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
maple, red	52,667	174	-8,413	-3,540	-39	66,330	219	107,045	353(N/A)		15.4	8.0	0.37
pear, callery	40,702	134	-3,497	-556	-13	33,627	111	70,276	232(N/A)		11.7	5.3	0.31
maple, silver	239,043	789	-56,624	-7,504	-212	134,524	444	309,439	1,021(N/A)		9.5	23.2	1.70
maple, sugar	72,148	238	-31,384	-4,867	-120	95,387	315	131,285	433(N/A)		8.2	9.8	0.84
ash, green	100,653	332	-21,178	-3,349	-81	73,257	242	149,383	493(N/A)		7.1	11.2	1.11
linden, littleleaf	22,800	75	-2,503	-1,800	-14	28,317	93	46,814	154(N/A)		5.9	3.5	0.41
apple	24,566	81	-1,882	-1,132	-10	16,050	53	37,602	124(N/A)		5.2	2.8	0.38
ash, white	56,665	187	-8,106	-1,598	-32	33,167	109	80,127	264(N/A)		3.9	6.0	1.07
pine, eastern white	4,566	15	-565	-898	-5	14,361	47	17,464	58(N/A)		3.0	1.3	0.30
oak, northern red	36,567	121	-4,873	-681	-18	15,224	50	46,237	153(N/A)		3.0	3.5	0.82
honeylocust	18,362	61	-2,635	-524	-10	14,603	48	29,807	98(N/A)		1.8	2.2	0.87
maple, Norway	8,865	29	-1,776	-612	-8	11,595	38	18,072	60(N/A)		1.7	1.4	0.55
redbud, eastern	2,753	9	-373	-79	-1	5,001	17	7,302	24(N/A)		1.7	0.6	0.23
mulberry, white	7,341	24	-1,133	-518	-5	11,265	37	16,955	56(N/A)		1.6	1.3	0.57
elm, Siberian	22,390	74	-6,120	-952	-23	21,115	70	36,433	120(N/A)		1.4	2.7	1.35
tulip tree	17,362	57	-3,807	-573	-14	12,351	41	25,333	84(N/A)		1.3	1.9	1.01
plum	4,679	15	-311	-225	-2	3,020	10	7,163	24(N/A)		1.3	0.5	0.30
arborvitae spp.	691	2	-27	-129	-1	1,057	3	1,592	5(N/A)		1.2	0.1	0.07
hackberry, northern	16,499	54	-2,277	-492	-9	10,417	34	24,147	80(N/A)		1.2	1.8	1.09
spruce, blue	1,712	6	-196	-295	-2	2,140	7	3,361	11(N/A)		1.0	0.3	0.17
OTHER STREET TREI	113,395	374	-22,985	-4,510	-91	84,123	278	170,024	561(N/A)		12.9	12.7	0.69
Citywide total	864,425	2,853	-180,666	-34,833	-711	686,934	2,267	1,335,861	4,408(N/A)		100.0	100.0	0.70

# Franklin

## Annual Aesthetic/Other Benefits of All Trees by Species

2/16/2012

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
maple, red	26,238	(N/A)	15.4	16.7	27.19
pear, callery	12,341	(N/A)	11.7	7.9	16.72
maple, silver	17,093	(N/A)	9.5	10.9	28.54
maple, sugar	12,836	(N/A)	8.2	8.2	24.92
ash, green	13,607	(N/A)	7.1	8.7	30.58
linden, littleleaf	6,998	(N/A)	5.9	4.5	18.76
apple	4,342	(N/A)	5.2	2.8	13.20
ash, white	7,674	(N/A)	3.9	4.9	31.07
pine, eastern white	3,695	(N/A)	3.0	2.4	19.55
oak, northern red	6,525	(N/A)	3.0	4.2	35.08
honeylocust	3,501	(N/A)	1.8	2.2	30.98
maple, Norway	2,725	(N/A)	1.7	1.7	25.23
redbud, eastern	1,248	(N/A)	1.7	0.8	11.88
mulberry, white	3,998	(N/A)	1.6	2.5	40.38
elm, Siberian	3,681	(N/A)	1.4	2.3	41.36
tulip tree	2,277	(N/A)	1.3	1.5	27.44
plum	1,083	(N/A)	1.3	0.7	13.54
arborvitae spp.	768	(N/A)	1.2	0.5	9.85
hackberry, northern	3,831	(N/A)	1.2	2.4	52.48
spruce, blue	987	(N/A)	1.0	0.6	15.42
OTHER STREET TREES	21,865	(N/A)	12.9	13.9	26.99
Citywide total	157,312	(N/A)	100.0	100.0	25.02

# Franklin

## Total Annual Benefits, Net Benefits, and Costs for All Trees

2/16/2012

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	31,341 (N/A)	4.98 (N/A)	1.32(N/A)
CO2	4,408 (N/A)	0.70 (N/A)	0.19(N/A)
Air Quality	10,285 (N/A)	1.64 (N/A)	0.43(N/A)
Stormwater	94,519 (N/A)	15.03 (N/A)	3.99(N/A)
Aesthetic/Other	157,312 (N/A)	25.02 (N/A)	6.63(N/A)
<b>Total Benefits</b>	<b>297,865 (N/A)</b>	<b>47.37 (N/A)</b>	<b>12.56(N/A)</b>
<b>Costs</b>			
Planting	12,500	1.99	0.53
Contract Pruning	46,270	7.36	1.95
Pest Management	0	0.00	0.00
Irrigation	14,125	2.25	0.60
Removal	49,995	7.95	2.11
Administration	22,189	3.53	0.94
Inspection/Service	10,000	1.59	0.42
Infrastructure Repairs	5,000	0.80	0.21
Litter Clean-up	20,000	3.18	0.84
Liability/Claims	0	0.00	0.00
Other Costs	84,005	13.36	3.54
<b>Total Costs</b>	<b>264,084</b>	<b>42.00</b>	<b>11.14</b>
<b>Net Benefits</b>	<b>33,781 (N/A)</b>	<b>5.37 (N/A)</b>	<b>1.42(N/A)</b>
Benefit-cost ratio	1.13 (N/A)		