

2014 Urban Forest Management Plan

Lime Springs, Iowa

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Community Tree Inventory

Lime Springs, Iowa

Summary

This plan was developed to assist the City of Lime Springs with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows communities to best take advantage of these benefits. Management is especially important considering the serious threats posed by forest pests such as the emerald ash borer (EAB). EAB is an invasive insect imported from Eastern Asia on wood shipping crates that kills all species of ash trees (does not include mountain ash). There is a strong possibility that 23% of Lime Springs's city owned trees (ash) will die once EAB becomes established in the community. With proper planning and management, the costs of removing dead and dying trees can be extended over years, mitigating public safety issues.

Inventory & Results

In 2014, a tree inventory was conducted using Global Positioning System (GPS) data collectors. --The data collector gives Geographic Information Systems (GIS) coordinates with an accuracy of 3 meters, which can be used in Arc GIS as an active GIS data layer. The inventory was a complete inventory of street and park trees. Below are some key findings of the **373 trees inventoried**.

Inventory Overview

- ◆ Lime Springs's trees provide \$63,472 of benefits annually, an average of \$170 a tree
- ◆ There are over 34 species of trees
- ◆ The top three genus are: Maple 46.4%, Ash 23%, Apple 7.5%
- ◆ 32% of trees are in need of some type of management
- ◆ 20 trees are recommended for removal.

General Recommendations

The following are key recommendations from the inventory:

- ◆ Of the 20 trees needing removal, **16 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately.** Of the 20 removals, 12 are ash trees.
**City ownership of the trees recommended for removal should be verified prior to any removal*
- ◆ After the removal of the 20 critical concern trees, ash trees in poor health should be assessed for removal.
- ◆ 12 of the 87 ash trees should be re-evaluated at a later date, because they are displaying signs and symptoms associated with EAB.
- ◆ All trees should be pruned on a routine schedule - one third of the city every other year.
- ◆ Plant a diverse mix of trees that does NOT include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.
- ◆ Check ash trees with a visual survey yearly

The programming used to collect tree information on the data collectors was written to be compatible with a state-of-the-art software suite called i-Tree. i-Tree was developed by the USDA Forest Service to quantify the structure of community trees and the environmental services that trees provide.

To quantify the urban forest structure and benefits, specific data is collected for each tree. This data includes: **location, land use, species, diameter at 4.5 ft, recommended maintenance, priority of that maintenance, leaf health, and wood condition.** Additionally, signs and symptoms of EAB were noted for all ash trees. The signs and symptoms noted were canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and woodpecker damage.

Detailed Inventory Results

The data collected for the 373 city trees was entered into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management (STRATUM), part of the i-Tree suite. The following are results from the i-Tree STRATUM analysis.

Annual Benefits

1. Annual Energy Benefits: Trees conserve energy by shading buildings and blocking winds. Lime Springs's trees reduce energy related costs by approximately \$16,921 annually. These savings are both in Electricity (80 MWh) and in Natural Gas (11,072 Therms).

2. Annual Stormwater Benefits: Lime Springs's trees intercept about 930,356 gallons of rainfall or snowmelt a year. This interception provides \$25,213 of benefits to the city.

3. Annual Air Quality Benefits: Air quality is a persistent public health issue in Iowa. The urban forest improves air quality by removing pollutants, lowering air temperature, and reducing energy consumption, which in turn reduces emissions from power plants, and emitting volatile organic matter (ozone). In Lime Springs, it is estimated that trees remove 1,045 lbs of air pollution (ozone (O₃), particulate matter less than 10 microns (PM₁₀), carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂)) per year with a net value of \$2,946.

4. Annual Carbon Benefits: Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Lime Springs trees sequester about 182,688 lbs of carbon dioxide (CO₂) a year with an associated value of \$1,370. In addition, the trees store 3,613,898 lbs of carbon, with a yearly benefit of \$27,104.

5. Annual Aesthetics Benefits: Social benefits of trees are hard to capture. The analysis does have a calculation for this area that includes: aesthetic value, property values, lowered rates of mental illness and crime, city livability and much more. Lime Springs receives \$16,153 in annual social benefits from trees.

Financial Summary of all Benefits: According to the USDA Forest Service i-Tree STRATUM analysis, Lime Springs's trees provide **\$63,472 of benefits annually**. Benefits of individual trees vary based on size, species, health and location, but **on average each of the 373 trees in Lime Springs provide approximately \$170 annually**.

Table 1: Annual Benefits of Public Trees

Benefits	Per Tree	Cumulative
Energy	\$45.36	\$16,920.84
CO ₂	\$6.00	\$2,239.30
Air Quality	\$7.90	\$2,945.86
Stormwater	\$67.59	\$25,212.65
Aesthetic/Other	\$43.31	\$16,153.38
Total (\$)	\$170.17	\$63,472.02

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Forest Structure

1. Species & Genus Distribution: Lime Springs has over 34 different tree species along city streets and parks. The following figures and tables show the distribution of the 13 most common trees by genus and the ten most common species. It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total urban forest. Presently, the forest is heavily planted with Maple, and it is recommended that they should not be planted until this percentage can be lowered.

Figure 1: Common Tree Genus by Percentage

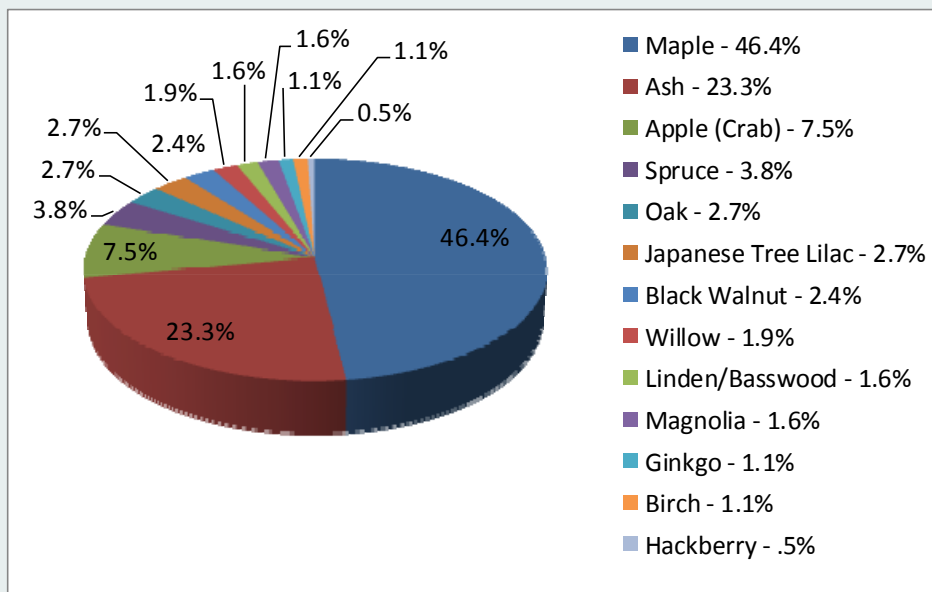
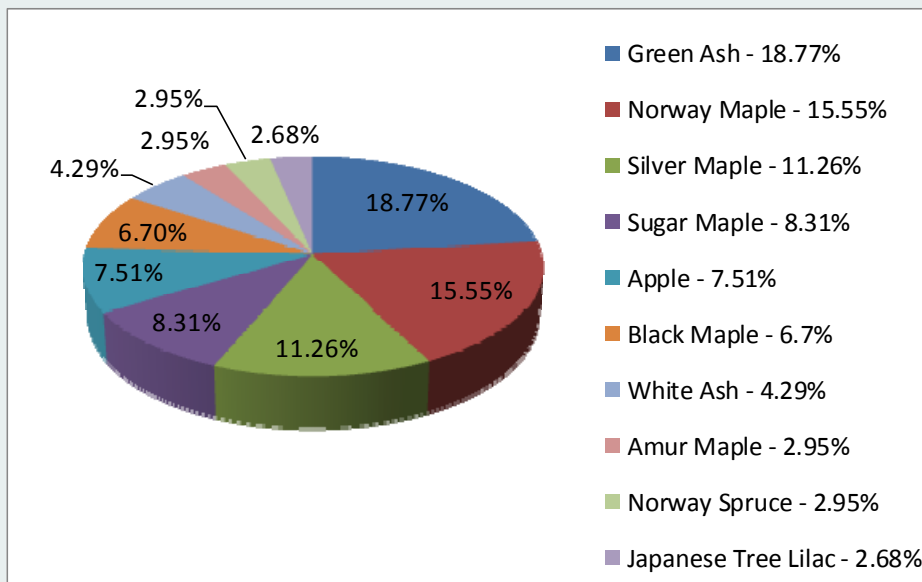


Table 2: Tree Genus

Genus	No. of Trees
Maple	173
Ash	87
Apple (Crab)	28
Spruce	14
Oak	10
Japanese Tree Lilac	10
Black Walnut	9
Willow	7
Linden/Basswood	6
Magnolia	6
Ginkgo	4
Birch	4
Hackberry	2

Figure 2: Common Tree Species by Percentage



2. Age Class: Lime Springs has a good balance of age classes. For age, it is preferred that the highest amounts of trees are in the smallest size category (a downward slope) to prepare for natural mortality and to maintain canopy cover. Lime Springs's size curve is on the smaller side, indicating a younger than average stand.

Figure 3: Age Distribution of Top 10 Public Tree Species (by Percentage)

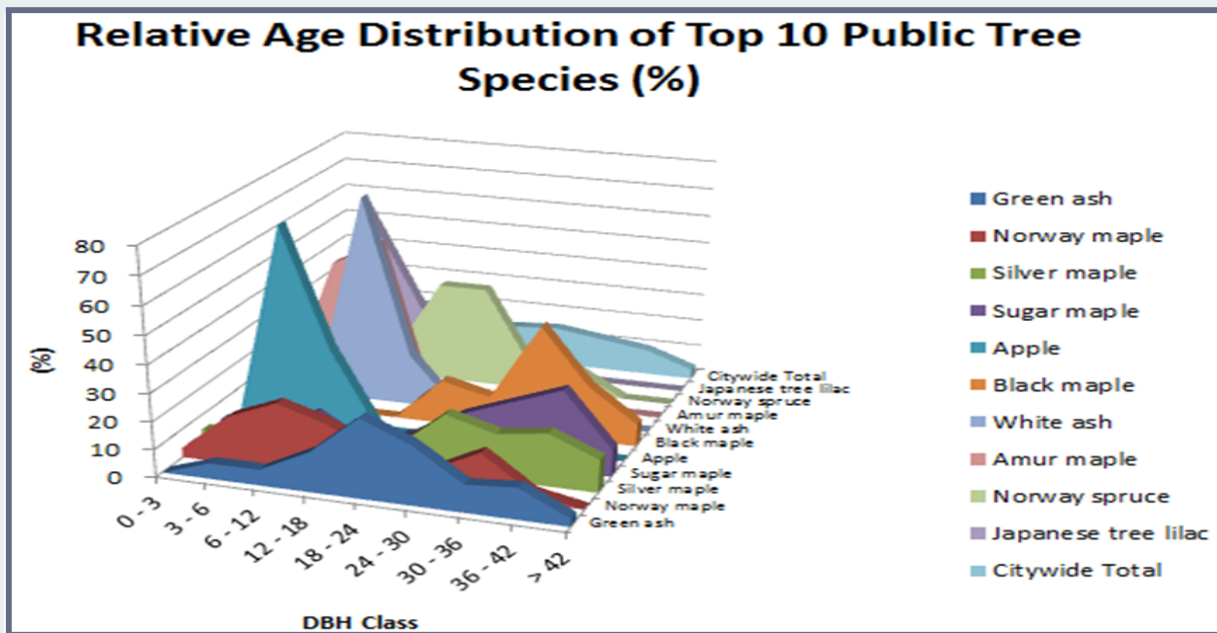


Table 3: Relative Age Distribution

Species	DBH class (in)								
	0 - 3	3 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	> 42
Green ash	0.00	5.71	5.71	14.29	28.57	21.43	10.00	11.43	2.86
Norway maple	3.45	17.24	24.14	18.97	10.34	6.90	15.52	3.45	0.00
Silver maple	4.76	4.76	7.14	7.14	7.14	21.43	16.67	19.05	11.90
Sugar maple	3.23	3.23	9.68	0.00	6.45	16.13	22.58	29.03	9.68
Apple	0.00	71.43	28.57	0.00	0.00	0.00	0.00	0.00	0.00
Black maple	0.00	4.00	0.00	0.00	16.00	12.00	40.00	20.00	8.00
White ash	0.00	6.25	75.00	18.75	0.00	0.00	0.00	0.00	0.00
Amur maple	0.00	45.45	54.55	0.00	0.00	0.00	0.00	0.00	0.00
Norway spruce	0.00	0.00	9.09	36.36	36.36	9.09	9.09	0.00	0.00
Japanese tree lilac	0.00	60.00	30.00	0.00	10.00	0.00	0.00	0.00	0.00
Citywide Total	2.95	16.35	18.23	10.46	13.14	14.21	11.80	9.38	3.49

3. Condition:- Wood and Foliage: Both wood condition and leaf condition are good indicators of the overall health of the urban forest. The foliage condition results for Lime Springs indicate that 98.66% of the trees are in fair-good health, with only 1.34% of the foliage in poor health, dead or dying. Similarly, 89% of Lime Springs's trees are in fair-good health for wood condition. Wood condition that is in poor health, dead or dying is about 11% of the population. This 11% is an estimate of trees that need management follow up soon.

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4. Management Needs: The following management needs for Lime Springs's urban trees are outlined in Table 4. The table outlines the specific management needs of the street and park trees by number of trees and percent of the canopy.

- ◆ Crown cleaning removes dead, diseased, and damaged limbs.
- ◆ Crown raising is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles.
- ◆ Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years.
- ◆ Tree staking includes staking, training, mulching, etc.

Table 4: Management Needs

Technique	No of Trees	Percentage
Crown Cleaning	54	14.5%
Crown Raising	22	5.9%
Tree Staking	0	0%
Tree Removal	20	5.4%
Crown Reduction	23	6.2%

Table 5: Land Use

Single Family Residential	75.6%
Park/Vacant/Other	17.2%
Industrial/Large Commercial	0%
Small Commercial	5.63%
Multifamily Residential	1.61%

Table 6: Location Type

Planting Strip	48.3%
Other Maintained Location (Park)	15.3%
Front Yard	36.7%
Cutout (Surrounded by Pavement)	0%

5. Canopy Cover: Lime Springs occupies 652 acres. The tree canopy cover of Lime Springs is approximately 9.32 acres, about 1.4%.

6. Land Use and Location: The majority of Lime Springs's city and park trees are in planting strips in single family residential neighborhoods. Table 5 & Table 6 describe the land use and locations for the street and park trees.

Recommendations

1. Risk Management: Hazardous trees can be a significant threat to both people and property. Trees that are dead or dying, or that have large issues such as trunk cracks longer than 18 inches should be removed. Broken branches and branches that interfere with motorist's vision of pedestrians, vehicles, traffic signs and signals, etc. should be removed.

2. Hazardous Trees: Lime Springs has 20 critical concern trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Image 4 & Image 5). It is recommended to start with the large diameter critical concern trees first. There are 16 trees over 24 inches in diameter at 4.5 ft that should be addressed immediately. Please refer to the *Six Year Maintenance Plan* at the end of this section. After all of the critical concern trees are addressed, there should be follow up on the trees marked as needing maintenance that do not include trimming. There are a total of 4 trees with these needs.

3. Poor Tree Species: After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Image 3 & Appendix B, Image 4). Of the 20 removals, 8 are ash trees. There are a total of 87 ash trees, and 12 of those have signs and symptoms that have

been associated with EAB. In addition, there are 13 trees that are in poor health. *City ownership of the trees recommended for removal should be verified prior to any removal.

4. Pruning Cycle: Proper pruning can extend the life and good health of trees, as well as reduce public safety issues. In the Management Needs section of the Findings there are four main maintenance issues to be addressed: routine pruning, crown cleaning, crown raising, and crown reduction. Crown cleaning removes dead, diseased, and damaged limbs. Crown raising is the removal of lower branches that are 2 inches in diameter or larger in the case of providing clearance for pedestrians or vehicles. Crown reduction is removing individual limbs from structures or utility wires. It is recommended that all trees be pruned on a routine schedule every five to seven years. Please refer to the *Six-Year Maintenance Plan* for further information.

5. Planting: Most of the planting over the next 5 years will replace the trees that are removed. It is recommended to plant 1.2 trees for every tree removed, since survival rates will not be 100%. It is not essential that the new trees be planted in the same location of the trees being removed. However, maintaining the same number of trees helps ensure continuation of the benefits of the existing forest in Lime Springs.

It is important to plant a diverse mix of species in the urban forest to maintain canopy health, since most insects and diseases target a genus (ash) or species (green ash) of trees. Current diversity recommendations advise that a genus (i.e. maple, oak) not make up more than 20% of the urban forest and a single species (i.e. silver maple, sugar maple, white oak, bur oak) not make up more than 10% of the total urban forest. Presently, the forest is heavily planted with Maple (46.4%). Maple should not be planted until this percentage can be lowered. Also, ash trees have not been recommended since 2002, due to the threat of EAB. Other species to avoid because they are public nuisances include: cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut. All trees planted must meet the restrictions in the city tree ordinance.

The importance of species diversity was brought to the forefront with the loss of the American elm from Dutch elm disease. When one genus (Maple) makes up a majority of the species (Norway Maple, Silver Maple, Sugar Maple) in a planting it is an unbalanced population. These unbalanced populations leave the population open to destruction from diseases and pests. Unfortunately, the lessons of the American elm are only recently being heeded. Communities typically replaced lost elms with a small but reliable selection of ash and Norway and silver maple. This left cities in the predicament they are finding themselves in now as they stand to lose a large percentage of their ash trees to the emerald ash borer.

6. Continual Monitoring: It is important to continuously check the health of all trees. Due to the imminent threat of Emerald Ash Borer to ash trees, it is recommended that trees be checked with a visual survey every year for tree death and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage. For a list of forest health threats, please visit the Iowa DNR's website at <http://www.iowadnr.gov/Environment/Forestry/ForestHealth>

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Six Year Maintenance Plan with No Additional Funding

Year 1: Removal: 5 largest critical concern trees (includes 4 ash) or saving for ash tree treatment

Planting and Replacement: 6 trees to be planted in open locations

Visual Survey for signs and symptoms of EAB

Year 2: Removal: 5 critical concern trees of all species and 1 ash in poor health or saving for ash tree treatment

Planting and Replacement: 6 trees in open locations from year one removals

Routine pruning: Delayed except critical concern branches

Visual Survey for signs and symptoms of EAB

Year 3: Removal: 5 critical concern trees (includes 4 ash trees of critical concern) or saving for ash tree treatment

Planting and Replacement: 6 trees to be planted in open locations and locations from previous removals

Visual Survey for signs and symptoms of EAB

Year 4: Removal: 5 critical concern trees and/or 4 ash in poor health or saving for ash tree treatment

Planting and Replacement: 6 trees in open locations from previous removals

Routine pruning: Delayed except critical concern branches

Visual Survey for signs and symptoms of EAB

Year 5: Removal: New critical concern trees and/or 5 ash in poor health or saving for ash tree treatment

Planting and Replacement: 6 trees to be planted in open locations and locations from previous removals

Visual Survey for signs and symptoms of EAB

Year 6: Removal: New critical concern trees and/or 4 ash in poor health or saving for ash tree treatment

Planting and Replacement: 6 trees in open locations from previous removals

Routine pruning: Delayed except critical concern branches

Visual Survey for signs and symptoms of EAB

Reduction of ash over 6 years: Approximately 25 ash trees removed (29% of ash). It will take nearly 17 years to remove all the ash with the current budget. EAB could potentially kill all ash within 4 years of its arrival. ** To remove all ash trees within 6 years, and do nothing else, the budget would need to be increased to \$11,600 a year.

Emerald Ash Borer Plan

1. Ash Tree Removal

Tree removal will be prioritized with dead, dying, hazardous trees to be removed first. Next will be all ash in poor condition and displaying signs and symptoms of EAB. ***City ownership of the tree recommended for removal should be verified prior to any removal.**

2. Treatment of Ash Trees

Chemical treatment can be effective, spreading removal costs out over several years while allowing trees to continue to provide benefits. However, treatment is not recommended if EAB is more than 15 miles away from the community. For more information on the cost of treatment strategies visit <http://extension.entm.purdue.edu/treecomputer/>



Emerald Ash Borer Beetle next to D-shaped exit holes.

3. EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of over 25 million ash trees. Ash in both forested and urban settings constitute a significant portion of the canopy cover in the United States. Current tools to detect, control, suppress and eradicate this pest are not as robust as the USDA would desire. In order to stay ahead of this hard to detect beetle, the USDA is attempting to contain the beetle before it spreads beyond its known positions by regulating articles.

A regulated article under the USDA's quarantine includes any of the following items:

- emerald ash borer
- firewood of all hardwood species (for example ash, oak, maple and hickory)
- ◆ nursery stock and green lumber of ash
- ◆ any other ash material, whether living, dead, cut or fallen, including logs, stumps, roots, branches, as well as composted and not composted chips of the genus ash (Mountain ash is not included)

In addition, any other article, product or means of conveyance not listed above may be designated as a regulated article if a USDA inspector determines that it presents a risk of spreading EAB once a quarantine is in effect for your county.

4. Wood Disposal

A very important aspect of planning is determining how wood infested with EAB will be handled, keeping in mind that quarantines will restrict its movement. Consider who will cut and haul the dead and dying trees. Is there an accessible, secured site big enough to store and sort the hundreds of trees and the associated brush and chips? How will wood be disposed of or utilized? Do you have equipment capable of handling the amount and size of ash trees your tree inventory has identified? Once your county is under quarantine for EAB, contact USDA-APHIS-PPQ at 515-251-4083 or visit the website http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/regulatory.shtml.

5. Canopy Replacement

As budget permits, all removed ash trees will be replaced. All trees will meet the restrictions in the city ordinance. The new plantings will be a diverse mix and will not include ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

6. Postponed Work

While finances, staffing and equipment are focused on the management of ash, usual services may be delayed. Tree removal requests on genus other than ash will be prioritized by hazardous or emergency situations only.

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7. Monitoring (repeated)

It is recommended that ash trees be checked with a visual survey every year for tree death and for the following signs and symptoms: canopy die-back, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

8. Private Ash Trees

It is strongly recommended that private property owners start removing ash trees or treating healthy trees they desire to preserve on their property upon arrival of EAB or confirmed within 15 miles. Refer to City Ordinance, Title VI: Environment—Chapter 15 Trees.

Proposed Budget

Total \$29,100 over 6 years (\$4,850/year)

FY 2015 Budget

Removal @ \$700/tree: \$3,500 *Or saving for ash tree treatment

Planting @ \$100/tree: \$600

Watering & Maintenance @ \$50/tree: \$500

FY 2016 Budget

Removal: \$3,500 *Or saving for ash tree treatment

Planting: \$600

Critical Concern Trimming: \$500

Watering & Maintenance: \$500

FY 2017 Budget

Removal: \$3,500 *Or saving for ash tree treatment

Planting: \$600

Watering & Maintenance: \$600

FY 2018 Budget

Removal: \$3,500 *Or saving for ash tree treatment

Planting: \$600

Critical Concern Trimming: \$500

Watering & Maintenance: \$500

FY 2019 Budget

Removal: \$3,500 *Or saving for ash tree treatment

Planting: \$600

Watering & Maintenance: \$500

FY 2020 Budget

Removal: \$2,800 *Or saving for ash tree treatment

Planting: \$600

Watering & Maintenance: \$500

Routine Pruning: \$500

*Reduction of ash over 6 years: 25 ash trees removed (29% of ash). It will take 17 years to remove all the ash with the current budget

Proposed Budget Increase

EAB could potentially kill all ash trees in Lime Springs within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$11,600 a year. Additionally, it is recommended that Lime Springs apply for grants to fund replacement trees. Utility Company grants are usually between \$500 and \$10,000 for community-based, tree-planting projects that include parks, gateways, cemeteries, nature trails, libraries, nursing homes, and schools.

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Appendix A: i-Tree Data

Table 1: Annual Energy Benefits

Annual Energy Benefits of Public Trees by Species									
Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Stand. Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	20.22	1,534.88	2,778.46	2,722.89	4,257.77	(N/A)	18.77	25.16	60.83
Norway maple	10.84	822.89	1,572.47	1,541.02	2,363.91	(N/A)	15.55	13.97	40.76
Silver maple	13.19	1,000.97	1,735.80	1,701.08	2,702.05	(N/A)	11.26	15.97	64.33
Sugar maple	10.17	771.80	1,358.74	1,331.56	2,103.36	(N/A)	8.31	12.43	67.85
Apple	1.04	78.60	178.57	175.00	253.60	(N/A)	7.51	1.50	9.06
Black maple	6.86	520.71	962.81	943.56	1,464.26	(N/A)	6.70	8.65	58.57
White ash	1.95	147.87	249.36	244.37	392.25	(N/A)	4.29	2.32	24.52
Amur maple	0.55	42.12	95.97	94.05	136.17	(N/A)	2.95	0.80	12.38
Norway spruce	1.53	116.19	196.08	192.16	308.35	(N/A)	2.95	1.82	28.03
Japanese tree lilac	0.55	42.10	92.89	91.04	133.14	(N/A)	2.68	0.79	13.31
Black walnut	2.89	219.29	411.05	402.83	622.13	(N/A)	2.41	3.68	69.13
Willow	2.13	161.68	316.21	309.89	471.57	(N/A)	1.88	2.79	67.37
Northern red oak	0.31	23.76	45.79	44.87	68.63	(N/A)	1.61	0.41	11.44
Southern magnolia	1.26	96.01	150.89	147.88	243.88	(N/A)	1.61	1.44	40.65
Red maple	0.94	71.70	121.74	119.31	191.01	(N/A)	1.34	1.13	38.20
Ginkgo	0.05	3.53	6.75	6.61	10.14	(N/A)	1.07	0.06	2.54
Littleleaf linden	0.36	27.33	48.85	47.88	75.21	(N/A)	0.80	0.44	25.07
Broadleaf Deciduous Sma	0.42	31.98	67.04	65.70	97.68	(N/A)	0.80	0.58	32.56
Swamp white oak	0.21	16.24	34.50	33.81	50.05	(N/A)	0.80	0.30	16.68
Blue spruce	0.19	14.42	30.59	29.98	44.40	(N/A)	0.80	0.26	14.80
Other City Trees	13.36	1,014.22	1,867.73	1,830.38	2,844.60		26.01	16.81	28.33
Total	79.98	6,070.42	11,071.85	10,850.42	16,920.84	(N/A)	100.00	100.00	45.36

Table 2: Annual Stormwater Benefits

Annual Stormwater Benefits of Public Trees by Species							
Species	Total Rainfall Interception (Gal)	Total (\$)	Stand. Error	% of Total Tree Numbers	% of Total \$	Avg. \$/tree	
Green ash	239,554.28	6,491.92	(N/A)	18.77	25.75	92.74	
Norway maple	96,695.79	2,620.46	(N/A)	15.55	10.39	45.18	
Silver maple	198,911.99	5,390.51	(N/A)	11.26	21.38	128.35	
Sugar maple	148,005.10	4,010.94	(N/A)	8.31	15.91	129.39	
Apple	3,489.08	94.55	(N/A)	7.51	0.38	3.38	
Black maple	68,944.78	1,868.40	(N/A)	6.70	7.41	74.74	
White ash	12,514.94	339.15	(N/A)	4.29	1.35	21.20	
Amur maple	1,930.23	52.31	(N/A)	2.95	0.21	4.76	
Norway spruce	27,836.04	754.36	(N/A)	2.95	2.99	68.58	
Japanese tree lilac	2,379.45	64.48	(N/A)	2.68	0.26	6.45	
Black walnut	34,329.62	930.33	(N/A)	2.41	3.69	103.37	
Willow	23,780.29	644.45	(N/A)	1.88	2.56	92.06	
Northern red oak	1,578.85	42.79	(N/A)	1.61	0.17	7.13	
Southern magnolia	13,287.64	360.10	(N/A)	1.61	1.43	60.02	
Red maple	6,837.27	185.29	(N/A)	1.34	0.73	37.06	
Ginkgo	177.68	4.82	(N/A)	1.07	0.02	1.20	
Littleleaf linden	2,180.82	59.10	(N/A)	0.80	0.23	19.70	
Broadleaf Deciduous Sma	2,416.73	65.49	(N/A)	0.80	0.26	21.83	
Swamp white oak	1,184.12	32.09	(N/A)	0.80	0.13	10.70	
Blue spruce	2,266.28	61.42	(N/A)	0.80	0.24	20.47	
Other City Trees	132,699.97	3,596.17	(N/A)	26.01	14.26	33.89	
Citywide total	930,355.94	25,212.65	(N/A)	100.00	100.00	67.59	

Table 3: Annual Air Quality Benefits & Table 4: Annual Carbon Sequestered

Annual Air Quality Benefits of Public Trees by Species																	
Species	Deposition O3 (lb)	Deposition NO2 (lb)	Deposition PM10 (lb)	Deposition SO2 (lb)	Total Deposition (\$)	Avoided NO2 (lb)	Avoided PM10 (lb)	Avoided VOC (lb)	Avoided SO2 (lb)	Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total (\$)	Standard Error	% of Total Trees	Avg. \$/tree
Green ash	31.93	5.11	14.98	1.43	169.16	96.65	14.06	13.41	91.65	601.82	0.00	0.00	269.20	770.98	(N/A)	18.77	11.01
Norway maple	19.16	3.31	9.53	0.85	103.85	52.65	7.61	7.24	49.20	325.92	- 4.55	- 17.08	144.98	412.70	(N/A)	15.55	7.12
Silver maple	35.58	6.03	17.33	1.58	191.43	62.17	9.10	8.69	59.65	388.94	- 18.52	- 69.45	181.60	510.93	(N/A)	11.26	12.16
Sugar maple	23.20	3.95	10.95	1.02	123.91	48.19	7.04	6.72	46.05	301.00	- 17.85	- 66.95	129.27	357.96	(N/A)	8.31	11.55
Apple	0.45	0.07	0.30	0.02	2.61	5.26	0.74	0.70	4.69	31.97	0.00	- 0.01	12.23	34.57	(N/A)	7.51	1.23
Black maple	17.99	3.07	8.24	0.80	95.35	32.92	4.78	4.55	31.07	204.59	- 5.83	- 21.85	97.58	278.08	(N/A)	6.70	11.12
White ash	0.57	0.09	0.44	0.03	3.51	9.13	1.34	1.28	8.83	57.30	0.00	0.00	21.71	60.81	(N/A)	4.29	3.80
Amur maple	0.29	0.05	0.18	0.01	1.68	2.82	0.40	0.38	2.51	17.16	0.00	- 0.01	6.65	18.83	(N/A)	2.95	1.71
Norway spruce	3.24	0.64	2.65	0.40	21.34	7.17	1.05	1.01	6.93	45.00	- 13.59	- 50.95	9.52	15.39	(N/A)	2.95	1.40
Japanese tree lilac	0.59	0.10	0.30	0.03	3.22	2.79	0.40	0.38	2.51	17.04	0.00	- 0.01	7.09	20.25	(N/A)	2.68	2.02
Black walnut	4.29	0.69	2.03	0.19	22.79	13.93	2.02	1.92	13.09	86.45	0.00	0.00	38.17	109.25	(N/A)	2.41	12.14
Willow	5.30	0.91	2.55	0.23	28.48	10.41	1.50	1.42	9.66	64.26	- 1.20	- 4.52	30.79	88.22	(N/A)	1.88	12.60
Northern red oak	0.17	0.03	0.12	0.01	1.00	1.51	0.22	0.21	1.42	9.38	- 0.25	- 0.95	3.43	9.43	(N/A)	1.61	1.57
Southern magnolia	2.03	0.40	1.84	0.25	13.90	5.80	0.86	0.82	5.68	36.59	- 3.62	- 13.59	14.07	36.90	(N/A)	1.61	6.15
Red maple	1.48	0.25	0.71	0.07	7.93	4.44	0.65	0.62	4.28	27.82	- 0.52	- 1.94	11.98	33.81	(N/A)	1.34	6.76
Ginkgo	0.01	0.00	0.01	0.00	0.05	0.22	0.03	0.03	0.21	1.39	0.00	- 0.02	0.51	1.42	(N/A)	1.07	0.36
Littleleaf linden	0.23	0.04	0.14	0.01	1.32	1.72	0.25	0.24	1.64	10.72	- 0.14	- 0.52	4.12	11.52	(N/A)	0.80	3.84
Broadleaf Deciduous Sma	0.87	0.14	0.39	0.04	4.59	2.09	0.30	0.28	1.91	12.83	0.00	- 0.02	6.03	17.40	(N/A)	0.80	5.80
Swamp white oak	0.11	0.02	0.08	0.00	0.67	1.07	0.15	0.14	0.97	6.55	- 0.04	- 0.14	2.51	7.07	(N/A)	0.80	2.36
Blue spruce	0.21	0.04	0.21	0.03	1.47	0.94	0.13	0.13	0.86	5.79	- 0.71	- 2.65	1.84	4.60	(N/A)	0.80	1.53
Other city Trees	19.41	3.41	11.64	1.30	111.94	64.07	9.30	8.86	60.50	398.28	- 20.08	- 75.31	158.41	434.91	(N/A)	26.01	4.43
Citywide Total	154.17	26.06	76.35	7.33	833.89	382.69	55.65	53.04	362.30	2,381.44	- 71.86	- 269.47	1,045.72	2,945.86	(N/A)	100.00	7.90

Annual CO2 Benefits of Public Trees by Species													
Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release(lb)	Maintenance Release (lb)	Total Release (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	46,604.01	349.53	- 5,063.89	- 216.06	- 1.62	33,920.53	254.40	75,244.59	564.33	(N/A)	18.77	25.20	8.06
Norway maple	12,647.35	94.86	- 1,540.06	- 121.68	- 0.91	18,185.63	136.39	29,171.23	218.78	(N/A)	15.55	9.77	3.77
Silver maple	58,317.09	437.38	- 3,990.97	- 150.54	- 1.13	22,121.11	165.91	76,296.69	572.23	(N/A)	11.26	25.55	13.62
Sugar maple	28,574.82	214.31	- 3,334.83	- 120.51	- 0.90	17,056.62	127.92	42,176.11	316.32	(N/A)	8.31	14.13	10.20
Apple	1,669.78	12.52	- 51.93	- 21.06	- 0.16	1,737.04	13.03	3,333.83	25.00	(N/A)	7.51	1.12	0.89
Black maple	3,732.12	27.99	- 916.35	- 66.11	- 0.50	11,507.50	86.31	14,257.17	106.93	(N/A)	6.70	4.78	4.28
White ash	3,731.50	27.99	- 113.95	- 20.48	- 0.15	3,267.99	24.51	6,865.07	51.49	(N/A)	4.29	2.30	3.22
Amur maple	872.94	6.55	- 30.41	- 9.95	- 0.07	930.87	6.98	1,763.45	13.23	(N/A)	2.95	0.59	1.20
Norway spruce	1,520.37	11.40	- 159.79	- 27.69	- 0.21	2,567.83	19.26	3,900.72	29.26	(N/A)	2.95	1.31	2.66
Japanese tree lilac	1,047.71	7.86	- 50.56	- 9.75	- 0.07	930.38	6.98	1,917.78	14.38	(N/A)	2.68	0.64	1.44
Black walnut	7,420.22	55.65	- 659.98	- 30.81	- 0.23	4,846.35	36.35	11,575.78	86.82	(N/A)	2.41	3.88	9.65
Willow	2,790.06	20.93	- 419.00	- 23.01	- 0.17	3,572.99	26.80	5,921.03	44.41	(N/A)	1.88	1.98	6.34
Northern red oak	465.02	3.49	- 12.62	- 4.29	- 0.03	525.04	3.94	973.15	7.30	(N/A)	1.61	0.33	1.22
Southern magnolia	1,180.56	8.85	- 105.79	- 12.09	- 0.09	2,121.69	15.91	3,184.37	23.88	(N/A)	1.61	1.07	3.98
Red maple	2,093.75	15.70	- 79.26	- 8.39	- 0.06	1,584.60	11.88	3,590.70	26.93	(N/A)	1.34	1.20	5.39
Ginkgo	36.87	0.28	- 0.82	- 1.56	- 0.01	77.97	0.58	112.47	0.84	(N/A)	1.07	0.04	0.21
Littleleaf linden	960.80	7.21	- 27.09	- 4.29	- 0.03	604.08	4.53	1,533.50	11.50	(N/A)	0.80	0.51	3.83
Broadleaf Deciduous Sma	37.94	0.28	- 65.58	- 7.61	- 0.06	706.74	5.30	671.49	5.04	(N/A)	0.80	0.22	1.68
Swamp white oak	453.31	3.40	- 10.70	- 2.54	- 0.02	358.90	2.69	798.98	5.99	(N/A)	0.80	0.27	2.00
Blue spruce	115.84	0.87	- 4.09	- 3.51	- 0.03	318.62	2.39	426.85	3.20	(N/A)	0.80	0.14	1.07
Other City Trees	22,726.88	170.45	- 1,739.64	- 165.95	- 1.24	22,414.06	168.11	43,235.36	324.27	(N/A)	26.01	14.48	3.13
Citywide Total	182,688.17	1,370.16	- 17,357.43	- 911.83	- 6.84	134,154.63	1,006.16	298,573.54	2,239.30	(N/A)	100.00	100.00	6.00

Table 5: Annual Carbon Stored

Species	Total stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	1,054,977.54	7,912.33	(N/A)	18.77	29.19	113.03
Norway maple	319,367.38	2,395.26	(N/A)	15.55	8.84	41.30
Silver maple	831,137.94	6,233.53	(N/A)	11.26	23.00	148.42
Sugar maple	694,598.38	5,209.49	(N/A)	8.31	19.22	168.05
Apple	10,819.08	81.14	(N/A)	7.51	0.30	2.90
Black maple	190,905.33	1,431.79	(N/A)	6.70	5.28	57.27
White ash	23,615.30	177.11	(N/A)	4.29	0.65	11.07
Amur maple	6,336.40	47.52	(N/A)	2.95	0.18	4.32
Norway spruce	33,289.20	249.67	(N/A)	2.95	0.92	22.70
Japanese tree lilac	10,533.18	79.00	(N/A)	2.68	0.29	7.90
Black walnut	137,495.09	1,031.21	(N/A)	2.41	3.80	114.58
Willow	87,291.31	654.68	(N/A)	1.88	2.42	93.53
Northern red oak	2,621.59	19.66	(N/A)	1.61	0.07	3.28
Southern magnolia	22,039.23	165.29	(N/A)	1.61	0.61	27.55
Red maple	16,512.74	123.85	(N/A)	1.34	0.46	24.77
Ginkgo	163.73	1.23	(N/A)	1.07	0.00	0.31
Littleleaf linden	5,644.29	42.33	(N/A)	0.80	0.16	14.11
Broadleaf Deciduous Small	13,663.22	102.47	(N/A)	0.80	0.38	34.16
Swamp white oak	2,218.18	16.64	(N/A)	0.80	0.06	5.55
Blue spruce	852.53	6.39	(N/A)	0.80	0.02	2.13
Other City Trees	362,275.99	2,717.07	(N/A)	26.01	10.02	26.14
Citywide total	3,613,897.90	27,104.23	(N/A)	100.00	100.00	72.67

Table 6: Annual Social and Aesthetic Benefits

Annual Aesthetic/Other Benefit of Public Trees by Species					
Species	Total (\$)	Stand. Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	3,759.38	(N/A)	18.77	23.27	53.71
Norway maple	1,316.37	(N/A)	15.55	8.15	22.70
Silver maple	4,449.82	(N/A)	11.26	27.55	105.95
Sugar maple	2,705.94	(N/A)	8.31	16.75	87.29
Apple	92.38	(N/A)	7.51	0.57	3.30
Black maple	443.63	(N/A)	6.70	2.75	17.75
White ash	605.04	(N/A)	4.29	3.75	37.82
Amur maple	48.70	(N/A)	2.95	0.30	4.43
Norway spruce	359.27	(N/A)	2.95	2.22	32.66
Japanese tree lilac	60.36	(N/A)	2.68	0.37	6.04
Black walnut	575.52	(N/A)	2.41	3.56	63.95
Willow	243.40	(N/A)	1.88	1.51	34.77
Northern red oak	55.65	(N/A)	1.61	0.34	9.27
Southern magnolia	155.02	(N/A)	1.61	0.96	25.84
Red maple	277.97	(N/A)	1.34	1.72	55.59
Ginkgo	6.26	(N/A)	1.07	0.04	1.56
Littleleaf linden	117.49	(N/A)	0.80	0.73	39.16
Broadleaf Deciduous Sma	2.06	(N/A)	0.80	0.01	0.69
Swamp white oak	55.18	(N/A)	0.80	0.34	18.39
Blue spruce	63.25	(N/A)	0.80	0.39	21.08
Other City Trees	2,625.18		26.01	16.25	25.09
Citywide Total	16,153.38	(N/A)	100.00	100.00	43.31

Table 7: Summary of Benefits in Dollars

Average Annual Benefits of Public Trees by Species								
Species	Energy	CO2	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Stand. Error	% of Total \$
Green ash	4,257.77	564.33	770.98	6,491.92	3,759.38	15,844.39	(N/A)	24.96
Norway maple	2,363.91	218.78	412.70	2,620.46	1,316.37	6,932.22	(N/A)	10.92
Silver maple	2,702.05	572.23	510.93	5,390.51	4,449.82	13,625.54	(N/A)	21.47
Sugar maple	2,103.36	316.32	357.96	4,010.94	2,705.94	9,494.52	(N/A)	14.96
Apple	253.60	25.00	34.57	94.55	92.38	500.11	(N/A)	0.79
Black maple	1,464.26	106.93	278.08	1,868.40	443.63	4,161.31	(N/A)	6.56
White ash	392.25	51.49	60.81	339.15	605.04	1,448.75	(N/A)	2.28
Amur maple	136.17	13.23	18.83	52.31	48.70	269.24	(N/A)	0.42
Norway spruce	308.35	29.26	15.39	754.36	359.27	1,466.62	(N/A)	2.31
Japanese tree lilac	133.14	14.38	20.25	64.48	60.36	292.60	(N/A)	0.46
Black walnut	622.13	86.82	109.25	930.33	575.52	2,324.05	(N/A)	3.66
Willow	471.57	44.41	88.22	644.45	243.40	1,492.04	(N/A)	2.35
Northern red oak	68.63	7.30	9.43	42.79	55.65	183.80	(N/A)	0.29
Southern magnolia	243.88	23.88	36.90	360.10	155.02	819.79	(N/A)	1.29
Red maple	191.01	26.93	33.81	185.29	277.97	715.01	(N/A)	1.13
Ginkgo	10.14	0.84	1.42	4.82	6.26	23.48	(N/A)	0.04
Littleleaf linden	75.21	11.50	11.52	59.10	117.49	274.82	(N/A)	0.43
Broadleaf Deciduous Sma	97.68	5.04	17.40	65.49	2.06	187.68	(N/A)	0.30
Swamp white oak	50.05	5.99	7.07	32.09	55.18	150.38	(N/A)	0.24
Blue spruce	44.40	3.20	4.60	61.42	63.25	176.87	(N/A)	0.28
Other City Trees	2,844.60	324.27	434.91	3,596.17	2,625.18	9,825.13	(N/A)	1.11
Citywide Total	16,920.84	2,239.30	2,945.86	25,212.65	16,153.38	63,472.02	(N/A)	100.00

Figure 1: Species Distribution

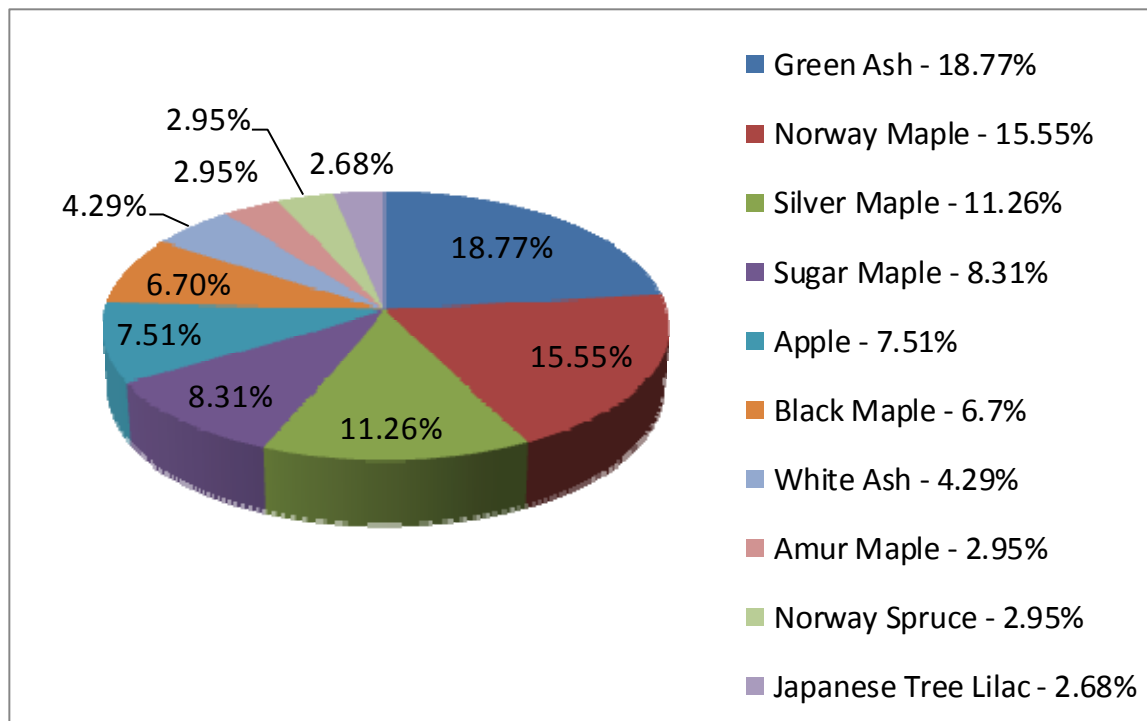


Figure 2: Relative Age Class

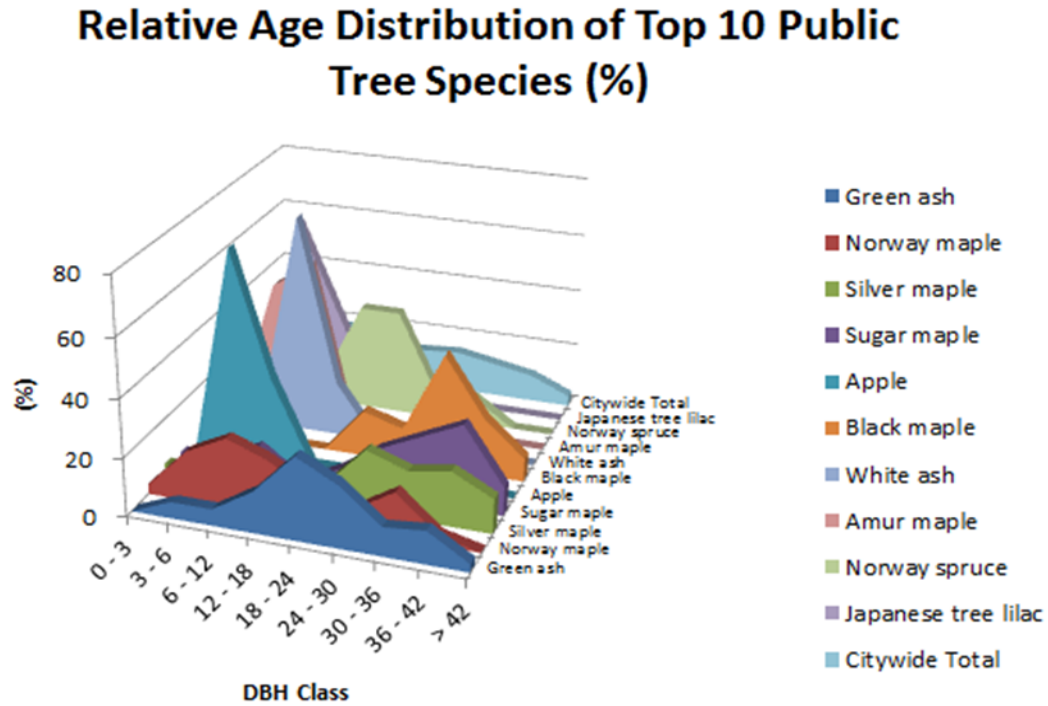


Table 8: Relative Age Class

	DBH class (in)									
Species	0 - 3	3 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	> 42	
Green ash	0.00	5.71	5.71	14.29	28.57	21.43	10.00	11.43	2.86	
Norway maple	3.45	17.24	24.14	18.97	10.34	6.90	15.52	3.45	0.00	
Silver maple	4.76	4.76	7.14	7.14	7.14	21.43	16.67	19.05	11.90	
Sugar maple	3.23	3.23	9.68	0.00	6.45	16.13	22.58	29.03	9.68	
Apple	0.00	71.43	28.57	0.00	0.00	0.00	0.00	0.00	0.00	
Black maple	0.00	4.00	0.00	0.00	16.00	12.00	40.00	20.00	8.00	
White ash	0.00	6.25	75.00	18.75	0.00	0.00	0.00	0.00	0.00	
Amur maple	0.00	45.45	54.55	0.00	0.00	0.00	0.00	0.00	0.00	
Norway spruce	0.00	0.00	9.09	36.36	36.36	9.09	9.09	0.00	0.00	
Japanese tree lilac	0.00	60.00	30.00	0.00	10.00	0.00	0.00	0.00	0.00	
Citywide Total	2.95	16.35	18.23	10.46	13.14	14.21	11.80	9.38	3.49	

Figure 3: Foliage Condition

Functional (Foliage) Condition of Public Trees

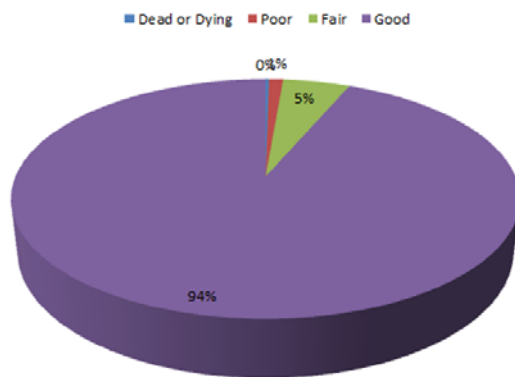


Figure 4: Wood Condition

Structural (Woody) Condition of Public Trees

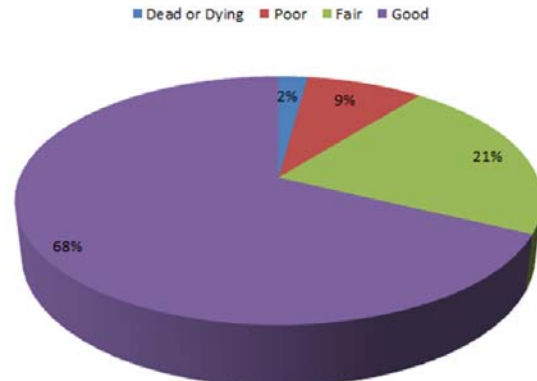


Figure 5: Land Use of City/Park Trees

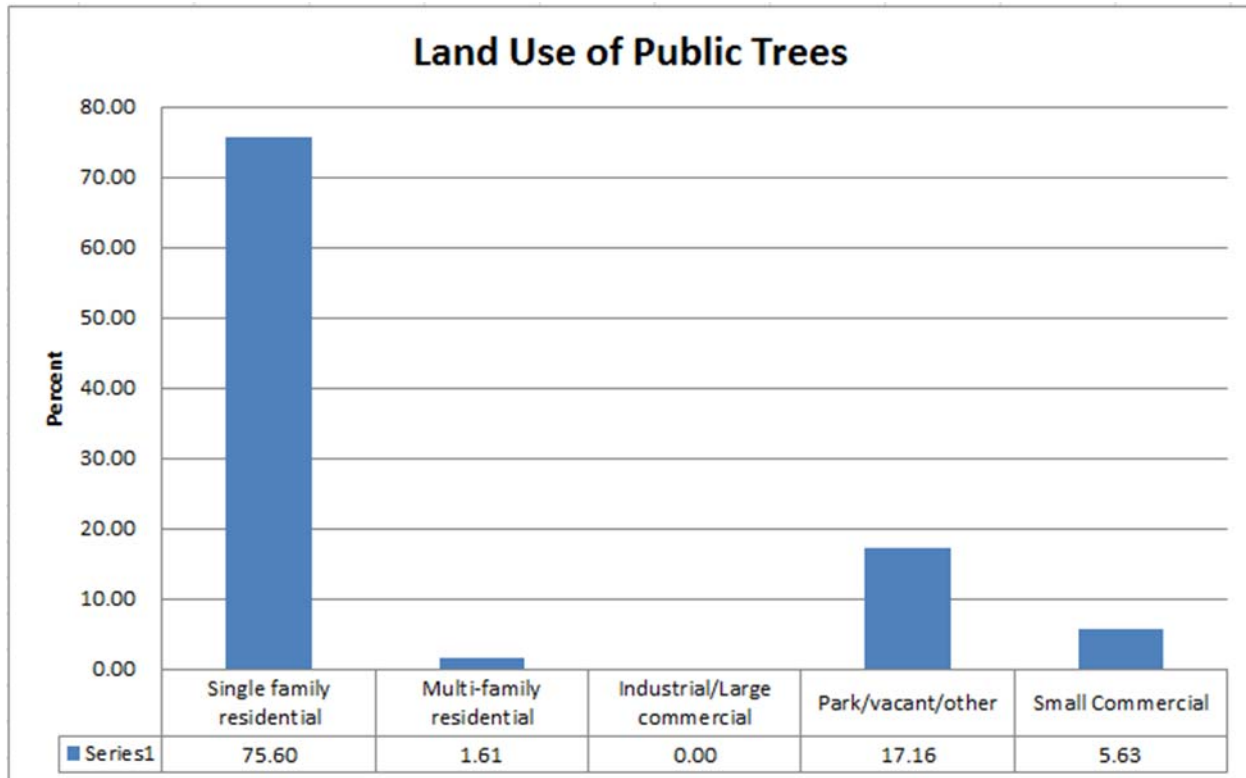
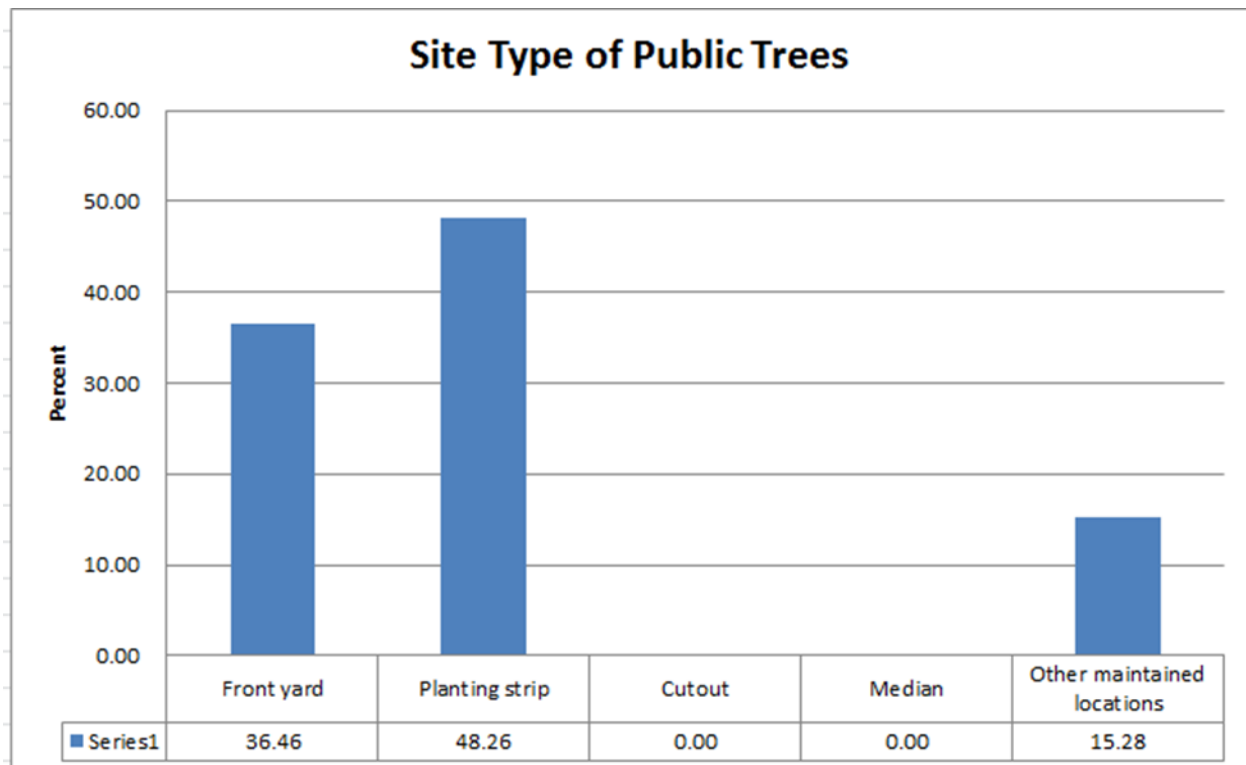


Figure 6: Location of City/Park Trees



Appendix B: ArcGIS Mapping

Image 1: Location of Ash Trees

Image 2: Location of EAB Symptoms

Image 3: Location of Poor Condition Ash Trees

Image 4: Location of Trees with Recommended Maintenance

Image 5: Maintenance Tasks



Image 1. Location of Ash Trees

Legend

-  Green ash
-  White ash
-  Ash
-  Black ash

Lime Springs, Iowa

0 0.0425 0.085 0.17 Miles



Map created by Northeast Iowa RC&D
11/13/2014



Image 2. Location of Trees with One or More Symptoms of EAB
(Canopy Dieback, Epicormic Shoots, Woodpecker Damage, Bark Splitting, or D-Shaped Exit Holes)

Legend



EAB
Symptoms



City Limits

Lime Springs, Iowa

0 0.0425 0.085 0.17 Miles



Map created by Northeast Iowa RC&D
11/13/2014



Image 3. Location of Poor Condition Ash Trees
(Wood and/or Leaves are Dead/Dying or in Poor Condition)

Legend

Dead or Dying Poor

Lime Spings, Iowa

0 0.0425 0.085 0.17 Miles



Map created by Northeast Iowa RC&D
11/13/2014

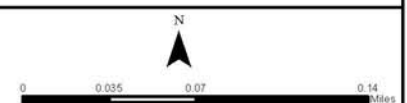


Image 4. Location of Trees with Recommended Maintenance

Lime Springs, Iowa

Legend

- | | | | | | | | | | |
|---|------------------|---|-----------------------|---|---------------------|---|----------------------|---|--------------------|
|  | Critical Concern |  | Mature Tree Immediate |  | Mature Tree Routine |  | Young Tree Immediate |  | Young Tree Routine |
|---|------------------|---|-----------------------|---|---------------------|---|----------------------|---|--------------------|



Map created by Northeast Iowa RC&D
11/13/2014



Image 5. Location of Maintenance Tasks

Lime Springs, Iowa

Legend

- Clean
- Raise
- Reduce
- Remove*
- Stake/Train
- Treat pest/disease

*City owned trees recommended for removal should be verified prior to any removal



Map created by Northeast Iowa RC&D
11/20/2014

Appendix C: Lime Springs Tree Ordinance

TITLE VI PHYSICAL ENVIRONMENT

CHAPTER 15 TREES

6-15-1	Definitions	6-15-4	Regulations for Planting Trees in Boulevards
6-15-2	Permits for Planting Trees in Boulevards	6-15-5	Removal of Trees
6-15-3	Tree Trimming	6-15-6	Abuse of Mutilation of Trees

6-15-1 DEFINITIONS. For use in this chapter, the following terms are defined:

1. "Boulevard" means the area given between the proposed or existing sidewalk and curb on a public street.
2. "Maintenance Superintendent" also means Director of Public Works of the City or a duly appointed representative.

6-15-2 PERMITS FOR PLANTING TREES IN BOULEVARDS. Permission must be secured at the office of Maintenance Superintendent or City Hall before planting any tree in any boulevard within the corporate limits of the City. Trees are to be purchased and planted by the property owner of the land abutting the boulevard, or by a person retained by the property owner. Varieties of trees approved are those trees of the hard wood variety, having good appearance, adaptability to the climate, being long lived and generally free from injurious insects and diseases.

6-15-3 TREE TRIMMING. All property owners shall trim boulevard trees to a ground clearance of eight (8) feet. The City or City's agent will perform trimming of boulevard trees as deemed necessary. Public utilities may do such trimming as necessary to protect their utilities.

6-15-4 REGULATIONS FOR PLANTING TREES IN BOULEVARDS.

1. Trees must be of an approved variety and of nursery stock with a straight trunk.
2. No trees shall be placed so as to cause a traffic hazard, in the opinion of the Maintenance Superintendent.
3. Trees shall be planted at least twenty-five (25) feet apart.
4. Trees shall not be planted closer than twenty-five (25) feet from intersections.
5. Trees shall be planted at least five (5) feet from driveways, visible or identifiable underground utility or light poles.

6. Except where a special permit is obtained from the Maintenance Superintendent, no tree shall be planted on any boulevard where the distance between the nearest edge of the sidewalk and curb is less than four (4) feet.
7. The Maintenance Superintendent may assist in staking out the location of the tree planting.
8. Trees shall be planted at least twenty-five (25) feet from fire hydrants.

6-15-5 REMOVAL OF TREES IN BOULEVARD.

1. The City will remove trees that are determined by the Maintenance Superintendent to be diseased, dangerous or a public nuisance.
 - a. All trees on private property are the property owner's responsibility and liability.
 - b. Cotton-bearing cottonwood trees and all other cotton-bearing poplar trees in the City.
2. Ordinary removal by the City will leave the stump in the ground, cut off at about boulevard level, then ground to below surface of the boulevard.
3. Removal of any tree is to be approved by the Maintenance Superintendent before removal.

6-15-6 ABUSE OF MITILATION OF TREES. No person shall willfully damage, injure, mar deface or destroy any tree on any boulevard in the City.

Appendix D: Suitable Shade Tree Lists

Shade Trees for Iowa

This document lists several shade tree selections suitable for the Iowa landscape. Nursery and landscape professionals have eliminated green, white, black, pumpkin, and blue ash from their inventories and designs since they are susceptible to the emerald ash borer, which kills ash trees. This destructive pest has been found in several states in the upper Midwest.

While not all-inclusive, this list does describe many useful species, many which are also pest-resistant. Not all trees appearing on this list will “work” in every landscape situation. Great care must be taken to carefully match trees to sites (including above- and below-ground spatial and environmental constraints) and to complement species existing nearby so that a diverse tree canopy will be maintained. *A healthy and diverse tree population is the best defense against current and future tree pests.*

<u>Deciduous Shade Trees</u>	<u>Height/Width</u>	<u>Growth Habit</u>
Alder		
<u>Manchurian alder</u> – <i>Alnus hirsuta</i> 'Harbin' (Prairie Horizon [®])	40'/30'	Upright
Amur maackia – <i>Maackia amurensis</i>	25'/25'	Upright-spreading
Baldcypresses		
<u>Baldcypress</u> – <i>Taxodium distichum</i> 'Mickelson' (Shawnee Brave [®]) 'JFS-SGPN' (Green Whisper [™])	55'/20' 55'/30'	Narrow-pyramid Pyramidal
Birches		
<u>Asian white birch</u> – <i>Betula platyphylla</i> 'VerDale' (Prairie Vision [®])	35'/30'	Upright-oval
<u>Gray birch</u> – <i>Betula populifolia</i> 'Whitespire Sr.'	40'/25'	Pyramidal-oval
<u>Hybrid birch</u> – <i>Betula</i> × 'Penci-2' (Royal Frost [®])	40'/25'	Pyramidal
<u>River birch</u> – <i>Betula nigra</i> 'Cully' (Heritage [®])	45'/30'	Oval
<u>Whitebarked Himalayan birch</u> – <i>Betula utilis</i> 'Madison' (White Satin [™])	35'/20'	Broadly-pyramidal

	<u>Height/Width</u>	<u>Growth Habit</u>
Coffeetree		
<u>Kentucky coffeetree</u> – <i>Gymnocladus dioica</i>		
'Espresso'	50'/35'	Oval
Cork trees		
<u>Cork tree</u> – <i>Phellodendron</i> species		
'Longenecker' (Eye Stopper [™])	40'/35'	Rounded
'His Majesty'	40'/35'	Vase-shaped
Elms		
<u>American elm</u> – <i>Ulmus americana</i>		
'Jefferson'	70'/50'	Vase-shaped
'Princeton'	60'/40'	Vase-shaped
'Lewis & Clark' (Prairie Expedition [™])	60'/50'	Umbrella-shaped
'New Harmony'	70'/70'	Vase-shaped
'Valley Forge'	70'/70'	Vase-shaped
<u>Asian Elm Cultivars and Hybrids</u>		
'Morton' (Accolade [™])	70'/60'	Vase-shaped
'Morton Glossy' (Triumph [™])	55'/45'	Vase-shaped
'New Horizon'	55'/40'	Upright-oval
'Prospector'	40'/30'	Vase-shaped
'Discovery'	50'/40'	Vase-shaped
<u>European and Eurasian Hybrid Elm Cultivars</u>		
'Patriot'	50'/40'	Stiff vase-shaped
Filbert		
Turkish filbert – <i>Corylus colurna</i>	40'/30'	Pyramidal
Ginkgoes		
<u>Ginkgo</u> – <i>Ginkgo biloba</i>		
'Autumn Gold'	45'/35'	Broadly-pyramidal
'Halka'	45'/40'	Oval
'Magyar'	60'/40'	Upright-oval
'PNI 2720' (Princeton Sentry [®])	40'/15'	Narrow-pyramidal
'JFS-UGA2' (Golden Colonnade [®])	45'/25'	Narrow-oval
'The President' (Presidential Gold [®])	50'/40'	Broadly-pyramidal

	<u>Height/Width</u>	<u>Growth Habit</u>
Hackberries		
<u>Hackberry – <i>Celtis occidentalis</i></u>		
'JFS-KSU1' (Prairie Sentinel [™])	45'/12'	Columnar
'Chicagoland'	50'/40'	Broadly-pyramidal
'Prairie Pride'	50'/40'	Oval
Honeylocusts		
<u>Honeylocust – <i>Gleditsia triacanthos</i> var. <i>inermis</i></u>		
'Draves' (Street Keeper [™])	45'/20'	Narrow-upright
'Harve' (Northern Acclaim [™])	45'/35'	Upright-spreading
'Skycole' (Skyline [®])	50'/35'	Pyramidal
Hornbeams		
<u>European hornbeam – <i>Carpinus betulus</i></u>		
'JFS-KW1CB' (Emerald Avenue [®])	40'/30'	Broadly-pyramidal
'Windy City'	45'/40'	Upright-spreading
Hophornbeam		
American hophornbeam – <i>Ostrya virginiana</i>	40'/25'	Upright-oval
Horsechestnuts		
<u>Common horsechestnut – <i>Aesculus hippocastanum</i></u>		
'Baumannii'	50'/40'	Broadly-oval
<u>Red horsechestnut – <i>Aesculus</i> × <i>carnea</i></u>		
'Briotii'	30'/35'	Round
'Fort McNair'	30'/30'	Round
Lindens		
<u>American linden – <i>Tilia americana</i></u>		
'Boulevard'	60'/30'	Pyramidal
'Continental Appeal'	50'/30'	Narrow-oval
'Wandell' (Legend [®])	40'/30'	Broad-pyramidal
'McKSentry' (American Sentry [®])	45'/30'	Pyramidal
'Lincoln'	35'/25'	Pyramidal
'Redmond'	50'/35'	Pyramidal
<u>Hybrid Linden – <i>Tilia</i> × <i>flavescens</i> (<i>americana</i> × <i>cordata</i>)</u>		
'Glenleven'	50'/30'	Pyramidal

	<u>Height/Width</u>	<u>Growth Habit</u>
<u>Littleleaf linden</u> – <i>Tilia cordata</i>		
'Bailey' (Shamrock [®])	40'/30'	Pyramidal
'Corzam' (Corinthian [®])	45'/15'	Narrow-pyramid
'Ronald' (Norlin [™])	40'/30'	Pyramidal
<u>Mongolian linden</u> – <i>Tilia mongolica</i>		
'Harvest Gold'	30-40'/25-30'	Upright-oval
<u>Silver linden</u> – <i>Tilia tomentosa</i>		
'PNI 6051' (Green Mountain [®])	45'/35'	Broad-pyramidal
'Sterling'	45'/35'	Broad-pyramidal
Magnolias		
Cucumbertree – <i>Magnolia acuminata</i>	50-80'/40-60'	Upright-oval
Maples		
<u>Black maple</u> – <i>Acer nigrum</i>	60'/60'	Round-spreading
<u>Freeman maple</u> – <i>Acer × freemanii</i>		
'Jeffersred' (Autumn Blaze [®])	50'/45'	Broadly-oval
'DTR 102' (Autumn Fantasy [®])	40'/30'	Broadly-oval
'Marmo'	50'/30'	Upright-oval
'Bailston' (Matador [™])	40'/30'	Upright-oval
'Morgan' ('Indian Summer')	45'/40'	Rounded
'Sienna' (Sienna Glen [®])	45'/35'	Pyramidal
'UMNAF#1' (Firefall [™])	50'/30'	Upright-oval
<u>Hybrid maple</u> – <i>Acer truncatum × platanoides</i>		
'Warrenred' (Pacific Sunset [®])	30'/25'	Upright-spreading
'JFS-KW202' (Crimson Sunset [™])	35'/25'	Upright-oval
<u>Miyabe maple</u> – <i>Acer miyabei</i>		
'Morton' (State Street [™])	45'/30'	Upright-oval
'JFS-KW3AMI' (Rugged Ridge [™])	55'/40'	Upright-oval
<u>Norway maple</u> – <i>Acer platanoides</i>		
'Columnarbroad' (Parkway [®])	40'/25'	Oval
'Deborah'	45'/40'	Rounded
'Emerald Queen'	50'/40'	Oval-upright
'Ezestre' (Easy Street [™])	40'/20'	Narrow-pyramidal
'Fairview'	45'/35'	Upright-oval

	<u>Height/Width</u>	<u>Growth Habit</u>
'Pond' (Emerald Lustre [™])	45'/40'	Rounded
'Princeton Gold'	35'/30'	Oval
<u>Red maple – <i>Acer rubrum</i></u>		
'Bailcraig' (Scarlet Jewell [™])	50'/30'	Upright
'Franksred' (Red Sunset [®])	45'/35'	Upright-oval
'Magnificent Magenta' (Burgundy Belle [®])	50'/40'	Oval
'Frank Jr.' (Redpointe [™])	45'/30'	Pyramidal
'New World'	40'/20'	Narrow-oval
'Polara' (Rubyfrost [™])	45'/40'	Broadly-oval
'Somerset'	45'/35'	Broadly-oval
<u>Sugar maple – <i>Acer saccharum</i></u>		
'Autumn Splendor'	45'/40'	Broadly-oval
'JFS-KW8' (Autumn Fest [™])	50'/35'	Upright-oval
'JFS-Caddo2' (Flashfire [™])	45'/40'	Broadly-oval
'Bailsta' (Fall Fiesta [™])	50'/50'	Upright-rounded
'Commemoration'	50'/35'	Oval-rounded
'Endowment'	50'/20'	Columnar
'Legacy'	50'/35'	Oval
'Morton' (Crescendo [™])	40'/30'	Broadly-oval
'Green Mountain'	45'/35'	Broadly-oval
Planetrees		
<u>London planetree – <i>Platanus × acerifolia</i></u>		
'Bloodgood'	50'/40'	Broadly-pyramidal
'Morton Circle' (Exclamation [™])	55'/35'	Upright-pyramidal
Oaks		
<u>Bur oak – <i>Quercus macrocarpa</i></u>		
'JFS-KW3' (Urban Pinnacle [™])	50-80'/40-80'	Spreading
	55'/25'	Narrow-pyramidal
Chinkapin oak – <i>Quercus muehlenbergii</i>	45'/45'	Round
<u>English/white oak – <i>Quercus bimundorum</i></u>		
'Crimschmidt' (Crimson Spire [™])	45'/15'	Columnar
'Midwest' (Prairie Stature [™])	50'/40'	Broadly-pyramidal
<u>Hybrid oak – <i>Quercus</i> ×</u>		
'Clemons' (Heritage [®])	40-50'/40-50'	Broadly-pyramidal
'Long' (Regal Prince [®])	45'/18'	Narrow-oval

	<u>Height/Width</u>	<u>Growth Habit</u>
Red oak – <i>Quercus rubra</i>	60-75'/60'	Spreading
Shingle oak – <i>Quercus imbricaria</i>	50'/40'	Broadly-oval
Swamp white oak – <i>Quercus bicolor</i>	60'/60'	Round
White oak – <i>Quercus alba</i>	50-70'/40-80'	Spreading
Sweetgums		
<u>Sweetgum – <i>Liquidambar styraciflua</i></u>		
'Clydesform' (Emerald Sentinel[®])	30'/12'	Narrow-pyramid
'Moraine'	40'/25'	Pyramidal

Compiled by Jeff Iles, Department of Horticulture, Iowa State University
10-January-2013

Small-stature Trees for Iowa

This document lists several small-stature tree selections suitable for the Iowa landscape. Nursery and landscape professionals have eliminated green, white, black, pumpkin, and blue ash from their inventories and designs since they are susceptible to the emerald ash borer, which kills ash trees. This destructive pest has been found in several states in the upper Midwest.

While not all-inclusive, this list does describe many useful species, many which are also pest-resistant. Not all trees appearing on this list will “work” in every landscape situation. Great care must be taken to carefully match trees to sites (including above- and below-ground spatial and environmental constraints) and to complement species existing nearby so that a diverse tree canopy will be maintained. *A healthy and diverse tree population is the best defense against current and future tree pests.*

<u>Deciduous Small-stature Trees</u>	<u>Height/Width</u>	<u>Growth Habit</u>
Amur maackia – <i>Maackia amurensis</i>	20'/20'	Upright-spreading
Cherries		
<u>Sargent cherry</u> – <i>Prunus sargentii</i>		
'JFS-KW58' (Pink Flair [®])	25'/15'	Upright
'Hokkaido Normandale' (Spring Wonder [™])	25'/20'	Upright-spreading
Crabapples – <i>Malus</i> species		
'Adirondack'	18'/12'	Vase-shaped
'Beeson' (May's Delight [®])	8'/8'	Upright-spreading
'Hub Tures' (Spring Sensation [™])	10'/12'	Wide-spreading
'JFS-KW5' (Royal Raindrops [®])	20'/15'	Upright-spreading
'Malusquest' (Pink Sparkles [®])	15'/12'	Upright
'Orange Crush'	15'/15'	Round-spreading
Dogwoods		
Cornelian cherry dogwood – <i>Cornus mas</i>	20'/20'	Round-spreading
<u>Gray dogwood</u> – <i>Cornus racemosa</i>		
'Jade' (Snow Mantle [™])	15'/8'	Upright-spreading
Pagoda dogwood – <i>Cornus alternifolia</i>	20'/20'	Spreading

	<u>Height/Width</u>	<u>Growth Habit</u>
Hophornbeams		
American hophornbeam – <i>Ostrya virginiana</i>	25'/20'	Upright-spreading
Hornbeams		
<u>American hornbeam</u> – <i>Carpinus caroliniana</i>		
'J.N. Strain'	25'/25'	Spreading
'J.N. Upright' (Firespire™)	20'/10'	Upright
Lilacs		
<u>Japanese tree lilac</u> – <i>Syringa reticulata</i>		
'Bailnce' (Snowdance™)	18'/20'	Round-spreading
'Ivory Silk'	25'/15'	Upright
<u>Pekin lilac</u> – <i>Syringa reticulata</i> subsp. <i>pekinensis</i>		
'Morton' (China Snow®)	20'/20'	Upright-spreading
'SunDak' (Copper Curls®)	20'/15'	Upright-spreading
Magnolias		
<u>Loebner magnolia</u> – <i>Magnolia × loebneri</i>		
'Merrill'	25'/25'	Upright-spreading
'Ruth' (Spring Welcome®)	20'/20'	Round-spreading
Maples		
<u>Tatarian maple</u> – <i>Acer tataricum</i>		
'GarAnn' (Hot Wings®)	20'/25'	Round-spreading
Three-flower maple – <i>Acer triflorum</i>	25'/25'	Upright-spreading
Pears		
<u>Callery pear</u> – <i>Pyrus calleryana</i>		
'Glen's Form' (Chanticleer®)	40'/15'	Narrow-pyramid
<u>Ussurian pear</u> – <i>Pyrus ussuriensis</i>		
'MorDak' (Prairie Gem®)	25'/20'	Oval
'Bailfrost' (Mountain Frost®)	20'/15'	Upright-oval
Redbud		
<u>American redbud</u> – <i>Cercis canadensis</i>		
'Pink Trim' (Northern Herald™)	25'/25'	Spreading

Serviceberries

Allegheny serviceberry – *Amelanchier laevis*

'Cumulus'	20'/15'	Upright-spreading
'JFS-Arb' (Spring Flurry ®)	28'/20'	Upright-oval

Apple serviceberry – *Amelanchier* × *grandiflora*

'Autumn Brilliance'	20'/15'	Upright-spreading
'Strata'	20'/20'	Horizontal

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10-January-2013

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