

2014 Urban Forest Management Plan
 Prepared by Brandt Jelken
 In Partnership with the Iowa DNR



Table of Contents

Executive Summary	4
Overview	4
Inventory and Results	4
Recommendations	4
Introduction.....	5
Inventory ____.....	5
Inventory_Results	5
<i>Annual Benefits</i>	6
Annual Energy Benefits	6
Annual Stormwater Benefits	6
Annual Air Quality Benefits.....	6
Annual Carbon Benefits	6
Annual Aesthetics Benefits	6
Financial Summary of all Benefits	6
<i>Forest Structure</i>	6
Species Distribution	6
Age Class.....	7
Condition: Wood and Foliage	7
Management Needs	7
Canopy Cover.....	8
Land Use and Location.....	8
Recommendations	8
Risk Management.....	8
Pruning Cycle	9
Planting	9
Continual Monitoring	9
Six Year Maintenance Plan	9
Emerald Ash Borer	10
Ash Tree Removal.....	10
EAB Quarantines.....	10
Wood Disposal	11
Canopy Replacement.....	11
Postponed Work	11
Monitoring.....	11
Private Ash Trees	11
Budget ____	12
Works Cited.....	13
Appendix B: ArcGIS Mapping	25
.....	29

Executive Summary

Overview

This plan was developed to assist the City of Granger with managing its urban forest, including budgeting and future planning. Trees can provide a multitude of benefits to the community, and sound management allows a community 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 (this does not include mountain ash). There is a strong possibility that 24% of Granger's city owned trees (ash) will die once EAB becomes established in the community, unless preventative treatment is used. With proper planning and management, the costs of removing dead and dying trees can be extended over years, mitigating public safety issues.

Inventory and Results

In 2014, a tree inventory was conducted using Global Positioning System (GPS) data collectors. The inventory was a complete inventory of street and park trees. Below are some key findings of the 220 trees inventoried.

- Granger's trees provide \$25,179 of benefits annually, an average of \$114.45 a tree
- There are over 40 species of trees
- The top three genera are: Maple 22%, Ash 24%, and Oak 15%
- 3% of trees are in need of some type of management
- 3 trees are recommended for removal

Recommendations

The core recommendations are detailed in the Recommendations Section. The Emerald Ash Borer Plan includes management recommendations as well. Below are some key recommendations.

- Of the 3 trees needing removal, *City ownership of the trees recommended for removal should be verified prior to any removal*
- None of the 52 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation
- Plant a diverse mix of trees that do not include: ash, maple, cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut
- Check ash trees with a visual survey yearly
- With the current budget it could take 24 years to remove ash – Suggestion: request a budget increase to \$10,000 annually and apply for grants to plant replacement trees

Introduction

This plan was developed to assist Granger with the management, budgeting and future planning of their urban forest. Across the state, forestry budgets continue to decrease with more and more of that money spent on tree removal. With the anticipated arrival of Emerald Ash Borer (EAB), an invasive pest that kills native ash trees, it is time to prepare for the increased costs of tree removal and replacement planting. With proper planning and management of the current canopy in Granger, these costs can be extended over years and public safety issues from dead and dying ash trees mitigated.

Trees are an important component of Granger's infrastructure and one of the greatest assets to the community. The benefits of trees are immense. Trees provide the community with improved air quality, storm water runoff interception, energy conservation, lower traffic speeds, increased property values, reduced crime, improved mental health and create a desirable place to live, to name just a few benefits. It is essential that these benefits be maintained for the people of Granger and future generations through good urban forestry management.

Good urban forestry management involves setting goals and developing management strategies to achieve these goals. An essential part of developing management strategies is a comprehensive public tree inventory. The inventory supplies information that will be used for maintenance, removal schedules, tree planting and budgeting. Basing actions on this information will help meet Granger's urban forestry goals.

Inventory

In 2014, a tree inventory was conducted that included 100% of the city owned trees on both streets and parks. The tree data was collected using a handheld Global Positioning System (GPS) receiver. 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. Because the inventory is a digital document the data can be updated with new information and become a working document.

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. The i-Tree suite is a public domain which can be accessed for free.

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 associated with 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 wood pecker damage.

Inventory Results

The data collected for the 220 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. Findings

Annual Benefits

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Granger's trees reduce energy related costs by approximately \$2,570 annually (Appendix A, Table 1). These savings are both in Electricity (33.9 MWh) and in Natural Gas (4,654.7 Therms).

Annual Stormwater Benefits

Granger's trees intercept about 315,245 gallons of rainfall or snow melt a year (Appendix A, Table 2). This interception provides \$8,543 of benefits to the city.

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 Granger, it is estimated that trees remove 411.3lbs 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 \$1,148 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Granger, trees sequester about 73,359 lbs of carbon a year with an associated value of \$935 (Appendix A, Table 4). In addition, the trees store 1,048,563 lbs of carbon, with a yearly benefit of \$7,864 (Appendix A, Table 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. Granger receives \$7,421 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of all Benefits

According to the USDA Forest Service i-Tree STRATUM analysis, Granger's trees provide \$25,179 benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 220 trees in Granger provide approximately \$114.45 annually (Appendix A, Table 7).

Forest Structure

Species Distribution

Granger has over 40 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Species	Number of	% of Total
	Trees	Trees
Green ash	46	20.91
Silver maple	21	9.55
Apple	15	6.82
Norway maple	12	5.45
Northern red oak	11	5.00
Swamp white oak	9	4.09

Pear	7	3.18
Northern hackberry	7	3.18
Scotch pine	6	2.73
White ash	6	2.73
White oak	6	2.73
Bur oak	6	2.73
Red maple	6	2.73
Birch	6	2.73
Eastern red cedar	5	2.27
Eastern white pine	5	2.27
Spruce	5	2.27
Sugar maple	5	2.27
American sycamore	4	1.82
Blue spruce	4	1.82
Black walnut	3	1.36
Broadleaf Deciduous Large	2	0.91
Littleleaf linden	2	0.91
Amur maple	2	0.91
Cherry plum	2	0.91
Maple	2	0.91
Mulberry	2	0.91
Ohio buckeye	1	0.45
Black poplar	1	0.45
Norway spruce	1	0.45
Eastern redbud	1	0.45
American elm	1	0.45
Pin oak	1	0.45
Ponderosa pine	1	0.45
Ash	1	0.45
Broadleaf Deciduous Small	1	0.45
Black maple	1	0.45
Kentucky coffeetree	1	0.45
Cottonwood	1	0.45
American basswood	1	0.45

Age Class

Most of Granger’s trees (56%) are between 6 and 18 inches in diameter at 4.5 ft (Appendix A, Figure 2). 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. Granger’s size curve is on the smaller side, indicating a younger than average stand.

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 Granger indicate that 97% of the trees are in good health, with only 1% of the foliage in poor health, dead or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 80% of Granger’s trees are in good health for wood condition (appendix A, Figure 4 & Appendix B, Figure 3). Wood condition that is in poor health, dead or dying is about 2% of the population. This 2% is an estimate of trees that need management follow up.

Management Needs

The following outlines the specific management needs of the street and park trees by number of trees and percent of canopy (Appendix B, Figure 3).

Crown Cleaning	185	84%
Crown Raising	9	4%
Tree Staking	0	

Tree Removal	3	1%
Crown Reduction	0	

Canopy Cover

The total canopy with both private and public trees is 6%, 51.37acres. The canopy cover included in the Granger inventory includes approximately 4acres (Appendix A, Figure 4).

Land Use and Location

The majority of Granger’s city and park trees are in planting strips in single family residential neighborhoods (Appendix A, Figure 6 & Appendix A, Figure7). The following describes the land use and locations for the street and park trees.

Land Use

Single family residential	100%
Park/vacant/other	
Industrial/Large commercial	
Small commercial	
Multifamily residential	

Location

Planting strip	31%
Other maintained locations	
Cutout (surrounded by pavement)	
Front yard	69%

Recommendations

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.

Hazardous trees

Granger has 3 critical concern trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance map (Appendix B, Figure 4). It is recommended to start with the large diameter critical concern trees first. There are 0 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. There are a total of 16 trees with these needs.

Poor tree species

After the removal of the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 10 removals, 1 is an ash trees. There are a total of 52 ash trees, and 0 of those have signs and symptoms that have been associated with EAB. In addition, there are

5 trees that are in poor health. *City ownership of the trees recommended for removal should be verified prior to any removal*

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.

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%. Please refer to the six year maintenance plan at the end of this section. 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 Granger.

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 (22%) (Appendix A, Figure 1). Maples 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, as outlined in section 151.02 of the city ordinance (Appendix C). All trees planted must meet the restrictions in city ordinance 151.02 (Appendix C).

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. It is recommended that ash trees be checked with a visual survey every year for tree decline and for the following signs and symptoms: canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Six Year Maintenance Plan

Year 1

Removal: 3 largest critical concern trees

Planting and Replacement: 5 trees to be planted in open locations

Visual Survey for signs and symptoms of EAB

Year 2

Removal: 2 additional ash trees with poor health

*Or saving for ash tree treatment

Planting and Replacement: 5 trees in open locations from year one removals

Routine trimming: Contract to trim the city trees

Visual Survey for signs and symptoms of EAB

Year 3

Removal: 2 trees - removal of any new critical concern trees and ash in poor health

*Or saving for ash tree treatment

Planting and Replacement: 5 trees to be planted in open locations and locations from previous removals

Visual Survey for signs and symptoms of EAB

Year 4

Removal: 2 trees - removal of any new critical concern trees and ash in poor health

*Or saving for ash tree treatment

Planting and Replacement: 5 trees in open locations from previous removals

Routine trimming: Contract to trim the city trees

Visual Survey for signs and symptoms of EAB

Year 5

Removal: 2 trees - removal of any new critical concern trees and ash in poor health

*Or saving for ash tree treatment

Planting and Replacement: 5 trees to be planted in open locations and locations from previous removals

Visual Survey for signs and symptoms of EAB

Year 6

Removal: 2 trees - removal of any new critical concern trees and ash in poor health

*Or saving for ash tree treatment

Planting and Replacement: 5 trees in open locations from previous removals

Routine trimming: Contract to trim the city trees

Visual Survey for signs and symptoms of EAB

*Reduction of ash over 6 years: Approximately 13 ash trees removed (approximately 25% of ash). It will take approximately 24 years to remove all 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, the budget would need to be increased to \$5,400 a year. If the budget were increased to \$2,400 a year all ash could be removed in 13 years.

Emerald Ash Borer Plan

Ash Tree Removal

Tree removal will be prioritized with dead, dying, hazardous trees to be removed first (Appendix B, Figure 4). Next will be all ash in poor condition and displaying signs and symptoms of EAB (Appendix B, Figure 2 & Appendix B, Figure 3). *City ownership of the tree recommended for removal should be verified prior to any removal*

Treatment of Ash Trees

Chemical treatment can be effective tool for communities to spread 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/>

EAB Quarantines

EAB is an extremely destructive plant pest and it is responsible for the death and decline of millions of 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.

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. Wood waste can be disposed of as you normally would if your county is not part of a quarantine.

Canopy Replacement

As budget permits, all removed trees will be replaced. All trees will meet the restrictions in city ordinance 151.02 (Appendix C). 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.

Postponed Work

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

Monitoring

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 dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

Private Ash Trees

It is strongly recommended that private property owners start removing ash trees on their property upon arrival of EAB. City Code 151.06 states "If it is determined with reasonable certainty that any such condition exists (trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests) on private property and that the danger to other trees or to adjoining property or passing motorists or pedestrians is imminent, the Council shall notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days

of said notification. If such owner, occupant or person in charge of said property fails to comply within 14 days of receipt of notice, the Council may cause the condition to be corrected and the cost assessed against the property.”

Budget

Current Budget

Total \$20,600 over 6 years (\$3,434/year)

FY 2015 Budget

Removal: \$1,200

*Or saving for ash tree treatment

Planting: \$100

Watering & Maintenance: \$300

FY 2016 Budget

Removal: \$1,200

*Or saving for ash tree treatment

Planting: \$100

Routine trimming: \$3,667

Watering & Maintenance: \$300

FY 2017 Budget

Removal: \$1,200

*Or saving for ash tree treatment

Planting: \$100

Watering & Maintenance: \$300

FY 2018 Budget

Removal: \$1,200

*Or saving for ash tree treatment

Planting: \$100

Routine trimming: \$3,667

Watering & Maintenance: \$300

FY 2019 Budget

Removal: \$1,200

*Or saving for ash tree treatment

Planting: \$100

Watering & Maintenance: \$300

FY 2020 Budget

Removal: \$1,200

*Or saving for ash tree treatment

Planting: \$100

Routine trimming: \$3,667

Watering & Maintenance: \$300

***Reduction of ash over 6 years: approximately 13 ash trees removed (approximately 25% of ash). It will take approximately 24 years to remove all ash with the current budget.**

Purposed Budget Increase

EAB could potentially kill all ash trees in [Granger](#) within 4 years of its arrival. To remove all ash trees within 6 years the budget would need to be increased to \$5,200 a year. If the budget were increased \$0 a year all ash

could be removed within 13 years. Additionally, it is recommended that Granger 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.

Works Cited

Census Bureau. 2010. <http://censtats.census.gov/data/IA/1601964290.pdf> (April, 2013)

USDA Forest Service, et al. 2006. i-Tree Software Suite v1.0 User's Manual. Pp. 27-40.

McPherson EG, Simpson JR, Peper PJ, Gardner SL, Vargas KE, Ho J, Maco S, Xiao Q. 2005b. City of Charleston, South Carolina, municipal forest resource analysis. Internal Tech Rep. Davis, CA: U.S. Department of Agriculture, Center for Urban Forest Research. p. 57

Nowak, D.J. and J.F. Dwyer. 2007. Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J. (ed.) Urban and Community Forestry in the Northeast. New York: Springer. Pp. 25-46.

Peper, Paula J.; McPherson, E. Gregory; Simpson, James R.; Vargas, Kelaine E.; Xiao, Qingfu 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. p.115

Appendix A: i-Tree Data

Granger

Annual Energy Benefits of Public Trees

3/1/2015

Species	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total Standard (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	8.4	640	1,102.1	1,080	1,720	(N/A)	20.9	24.1	37.40
Silver maple	6.1	460	804.6	788	1,248	(N/A)	9.5	17.5	59.43
Apple	1.1	85	183.8	180	265	(N/A)	6.8	3.7	17.67
Norway maple	1.9	146	290.9	285	431	(N/A)	5.5	6.0	35.90
Northern red oak	1.2	95	174.5	171	266	(N/A)	5.0	3.7	24.15
Swamp white oak	1.1	84	170.1	167	251	(N/A)	4.1	3.5	27.89
Pear	0.7	51	101.3	99	150	(N/A)	3.2	2.1	21.41
Northern hackberry	1.4	104	196.2	192	296	(N/A)	3.2	4.2	42.36
Scotch pine	0.8	60	92.9	91	151	(N/A)	2.7	2.1	25.19
White ash	0.7	55	95.0	93	149	(N/A)	2.7	2.1	24.77
White oak	0.4	27	50.1	49	76	(N/A)	2.7	1.1	12.68
Bur oak	0.1	9	15.7	15	25	(N/A)	2.7	0.3	4.10
Red maple	0.5	39	67.5	66	105	(N/A)	2.7	1.5	17.49
Birch	0.9	72	146.5	144	215	(N/A)	2.7	3.0	35.88
Eastern red cedar	0.2	14	28.7	28	42	(N/A)	2.3	0.6	8.33
Eastern white pine	0.1	7	15.5	15	22	(N/A)	2.3	0.3	4.39
Spruce	0.6	42	72.9	71	114	(N/A)	2.3	1.6	22.72
Sugar maple	1.1	82	139.4	137	219	(N/A)	2.3	3.1	43.70
American sycamore	1.1	87	139.9	137	224	(N/A)	1.8	3.1	55.93
Blue spruce	0.3	19	40.8	40	59	(N/A)	1.8	0.8	14.80
Black walnut	0.8	58	103.2	101	159	(N/A)	1.4	2.2	52.96
Broadleaf Deciduous Large	0.5	36	54.0	53	88	(N/A)	0.9	1.2	44.23
Littleleaf linden	0.5	37	65.8	65	101	(N/A)	0.9	1.4	50.69
Amur maple	0.3	21	44.5	44	64	(N/A)	0.9	0.9	32.17
Cherry plum	0.1	11	25.7	25	36	(N/A)	0.9	0.5	18.19
Maple	0.3	20	30.8	30	50	(N/A)	0.9	0.7	24.99
Mulberry	0.4	30	63.2	62	92	(N/A)	0.9	1.3	46.14
Ohio buckeye	0.1	8	16.9	17	24	(N/A)	0.5	0.3	24.47
Black poplar	0.2	18	27.0	26	44	(N/A)	0.5	0.6	44.23
Norway spruce	0.2	14	24.6	24	38	(N/A)	0.5	0.5	38.17
Eastern redbud	0.2	15	31.6	31	46	(N/A)	0.5	0.6	46.14
American elm	0.4	29	52.8	52	80	(N/A)	0.5	1.1	80.37
Pin oak	0.4	33	56.2	55	88	(N/A)	0.5	1.2	87.97
Ponderosa pine	0.1	4	9.5	9	14	(N/A)	0.5	0.2	13.58
Ash	0.1	8	16.9	17	24	(N/A)	0.5	0.3	24.47
Broadleaf Deciduous Small	0.2	15	31.6	31	46	(N/A)	0.5	0.6	46.14
Black maple	0.1	8	16.5	16	25	(N/A)	0.5	0.3	24.58
Kentucky coffeetree	0.0	2	3.7	4	6	(N/A)	0.5	0.1	5.82
Cottonwood	0.3	20	38.1	37	57	(N/A)	0.5	0.8	57.32
American basswood	0.1	7	13.8	14	20	(N/A)	0.5	0.3	20.27
Total	33.9	2,570	4,654.7	4,562	7,132	(N/A)	100.0	100.0	32.42

Table 1: Annual Energy Benefits

Granger

Annual Stormwater Benefits of Public Trees

3/1/2015

Species	Total rainfall interception (Gal)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	71,868	1,948	(N/A)	20.9	22.8	42.34
Silver maple	78,974	2,140	(N/A)	9.5	25.1	101.91
Apple	4,434	120	(N/A)	6.8	1.4	8.01
Norway maple	14,820	402	(N/A)	5.5	4.7	33.47
Northern red oak	10,039	272	(N/A)	5.0	3.2	24.73
Swamp white oak	9,937	269	(N/A)	4.1	3.2	29.92
Pear	2,398	65	(N/A)	3.2	0.8	9.29
Northern hackberry	11,949	324	(N/A)	3.2	3.8	46.26
Scotch pine	10,662	289	(N/A)	2.7	3.4	48.16
White ash	4,731	128	(N/A)	2.7	1.5	21.37
White oak	3,141	85	(N/A)	2.7	1.0	14.19
Bur oak	722	20	(N/A)	2.7	0.2	3.26
Red maple	2,778	75	(N/A)	2.7	0.9	12.55
Birch	7,302	198	(N/A)	2.7	2.3	32.98
Eastern red cedar	2,344	64	(N/A)	2.3	0.7	12.71
Eastern white pine	955	26	(N/A)	2.3	0.3	5.17
Spruce	8,873	240	(N/A)	2.3	2.8	48.09
Sugar maple	9,137	248	(N/A)	2.3	2.9	49.52
American sycamore	11,636	315	(N/A)	1.8	3.7	78.83
Blue spruce	3,022	82	(N/A)	1.8	1.0	20.47
Black walnut	6,647	180	(N/A)	1.4	2.1	60.04
Broadleaf Deciduous Large	2,931	79	(N/A)	0.9	0.9	39.72
Littleleaf linden	5,003	136	(N/A)	0.9	1.6	67.80
Amur maple	1,439	39	(N/A)	0.9	0.5	19.49
Cherry plum	529	14	(N/A)	0.9	0.2	7.17
Maple	1,616	44	(N/A)	0.9	0.5	21.89
Mulberry	2,348	64	(N/A)	0.9	0.7	31.82
Ohio buckeye	586	16	(N/A)	0.5	0.2	15.88
Black poplar	1,466	40	(N/A)	0.5	0.5	39.72
Norway spruce	4,605	125	(N/A)	0.5	1.5	124.79
Eastern redbud	1,174	32	(N/A)	0.5	0.4	31.82
American elm	4,551	123	(N/A)	0.5	1.4	123.33
Pin oak	6,412	174	(N/A)	0.5	2.0	173.76
Ponderosa pine	596	16	(N/A)	0.5	0.2	16.14
Ash	586	16	(N/A)	0.5	0.2	15.88
Broadleaf Deciduous Small	1,174	32	(N/A)	0.5	0.4	31.82
Black maple	625	17	(N/A)	0.5	0.2	16.95
Kentucky coffeetree	172	5	(N/A)	0.5	0.1	4.65
Cottonwood	2,591	70	(N/A)	0.5	0.8	70.21
American basswood	474	13	(N/A)	0.5	0.2	12.83
Citywide total	315,245	8,543	(N/A)	100.0	100.0	38.83

1

Table 2: Annual Stormwater Benefits

Annual Air Quality Benefits of Public Trees

3/1/2015

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 ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂							
Green ash	7.6	1.2	3.9	0.3	41	39.8	5.8	5.6	38.2	249	0.0	0	102.5	290 (N/A)	20.9	6.31
Silver maple	13.1	2.2	6.6	0.6	71	28.6	4.2	4.0	27.4	179	-7.3	-27	79.4	223 (N/A)	9.5	10.60
Apple	1.1	0.2	0.5	0.0	6	5.6	0.8	0.8	5.1	34	0.0	0	14.1	40 (N/A)	6.8	2.67
Norway maple	2.5	0.4	1.3	0.1	14	9.4	1.4	1.3	8.7	58	-0.6	-2	24.5	70 (N/A)	5.5	5.80
Northern red oak	1.9	0.3	1.0	0.1	10	6.0	0.9	0.8	5.6	37	-2.7	-10	13.8	37 (N/A)	5.0	3.39
Swamp white oak	1.9	0.3	1.0	0.1	10	5.5	0.8	0.7	5.0	34	-0.5	-2	14.9	42 (N/A)	4.1	4.71
Pear	0.6	0.1	0.3	0.0	3	3.3	0.5	0.4	3.0	20	0.0	0	8.2	23 (N/A)	3.2	3.34
Northern hackberry	1.8	0.3	0.9	0.1	10	6.6	1.0	0.9	6.2	41	0.0	0	17.8	51 (N/A)	3.2	7.26
Scotch pine	1.2	0.2	1.0	0.1	8	3.6	0.5	0.5	3.6	23	-4.1	-15	6.8	16 (N/A)	2.7	2.59
White ash	0.2	0.0	0.2	0.0	1	3.4	0.5	0.5	3.3	22	0.0	0	8.2	23 (N/A)	2.7	3.81
White oak	0.3	0.0	0.2	0.0	2	1.7	0.2	0.2	1.6	11	0.0	0	4.3	12 (N/A)	2.7	2.02
Bur oak	0.0	0.0	0.0	0.0	0	0.6	0.1	0.1	0.5	4	0.0	0	1.3	4 (N/A)	2.7	0.61
Red maple	0.4	0.1	0.2	0.0	2	2.4	0.4	0.3	2.3	15	-0.2	-1	6.0	17 (N/A)	2.7	2.81
Birch	1.2	0.2	0.6	0.1	7	4.7	0.7	0.6	4.3	29	-0.3	-1	12.1	34 (N/A)	2.7	5.70
Eastern red cedar	0.2	0.0	0.2	0.0	1	0.9	0.1	0.1	0.8	5	-1.2	-5	1.2	2 (N/A)	2.3	0.45
Eastern white pine	0.1	0.0	0.1	0.0	0	0.5	0.1	0.1	0.4	3	-0.3	-1	0.9	2 (N/A)	2.3	0.44
Spruce	1.0	0.2	0.8	0.1	7	2.6	0.4	0.4	2.5	16	-4.3	-16	3.8	7 (N/A)	2.3	1.40
Sugar maple	1.0	0.2	0.6	0.0	6	5.1	0.7	0.7	4.9	32	-0.9	-3	12.4	34 (N/A)	2.3	6.88
American sycamore	1.5	0.2	0.7	0.1	8	5.3	0.8	0.7	5.2	33	0.0	0	14.5	41 (N/A)	1.8	10.32
Blue spruce	0.3	0.1	0.3	0.0	2	1.3	0.2	0.2	1.1	8	-0.9	-4	2.5	6 (N/A)	1.8	1.53
Black walnut	0.6	0.1	0.3	0.0	4	3.6	0.5	0.5	3.4	23	0.0	0	9.2	26 (N/A)	1.4	8.70
Broadleaf Deciduous Large	0.2	0.0	0.1	0.0	1	2.1	0.3	0.3	2.1	14	0.0	0	5.3	15 (N/A)	0.9	7.42
Littleleaf linden	0.9	0.2	0.4	0.0	5	2.3	0.3	0.3	2.2	14	-0.4	-2	6.3	18 (N/A)	0.9	8.82
Amur maple	0.5	0.1	0.2	0.0	3	1.4	0.2	0.2	1.2	8	0.0	0	3.8	11 (N/A)	0.9	5.45
Cherry plum	0.1	0.0	0.1	0.0	1	0.8	0.1	0.1	0.7	5	0.0	0	1.8	5 (N/A)	0.9	2.55
Maple	0.3	0.1	0.2	0.0	2	1.2	0.2	0.2	1.2	8	-0.1	0	3.2	9 (N/A)	0.9	4.44
Mulberry	0.9	0.1	0.4	0.0	5	2.0	0.3	0.3	1.8	12	0.0	0	5.8	17 (N/A)	0.9	8.35
Ohio buckeye	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3 (N/A)	0.5	3.47
Black poplar	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.6	7 (N/A)	0.5	7.42
Norway spruce	0.6	0.1	0.4	0.1	4	0.9	0.1	0.1	0.8	5	-2.9	-11	0.3	-2 (N/A)	0.5	-1.58
Eastern redbud	0.4	0.1	0.2	0.0	2	1.0	0.1	0.1	0.9	6	0.0	0	2.9	8 (N/A)	0.5	8.35
American elm	0.5	0.1	0.3	0.0	3	1.8	0.3	0.3	1.7	11	0.0	0	4.9	14 (N/A)	0.5	14.10
Pin oak	1.3	0.2	0.7	0.1	7	2.0	0.3	0.3	2.0	13	-2.4	-9	4.5	11 (N/A)	0.5	10.96
Ponderosa pine	0.1	0.0	0.1	0.0	0	0.3	0.0	0.0	0.3	2	-0.2	-1	0.6	1 (N/A)	0.5	1.48
Ash	0.1	0.0	0.0	0.0	0	0.5	0.1	0.1	0.5	3	0.0	0	1.2	3 (N/A)	0.5	3.47
Broadleaf Deciduous Small	0.4	0.1	0.2	0.0	2	1.0	0.1	0.1	0.9	6	0.0	0	2.9	8 (N/A)	0.5	8.35

Table 3: Annual Air Quality Benefits

Granger

Annual CO Benefits of Public Trees

3/1/2015

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 \$
Green ash	17,817	134	-1,228	-86	-1	14,149	106	30,652	230 (N/A)	20.9	24.6
Silver maple	24,161	181	-1,514	-66	0	10,158	76	32,739	246 (N/A)	9.5	26.2
Apple	1,415	11	-89	-18	0	1,878	14	3,186	24 (N/A)	6.8	2.6
Norway maple	3,487	26	-204	-20	0	3,220	24	6,483	49 (N/A)	5.5	5.2
Northern red oak	1,091	8	-187	-16	0	2,091	16	2,980	22 (N/A)	5.0	2.4
Swamp white oak	1,054	8	-160	-14	0	1,863	14	2,743	21 (N/A)	4.1	2.2
Pear	999	7	-47	-9	0	1,119	8	2,063	15 (N/A)	3.2	1.7
Northern hackberry	1,470	11	-132	-13	0	2,303	17	3,628	27 (N/A)	3.2	2.9
Scotch pine	765	6	-44	-12	0	1,329	10	2,037	15 (N/A)	2.7	1.6
White ash	1,404	11	-42	-8	0	1,226	9	2,580	19 (N/A)	2.7	2.1
White oak	887	7	-43	-5	0	596	4	1,435	11 (N/A)	2.7	1.2
Bur oak	302	2	-4	-3	0	203	2	499	4 (N/A)	2.7	0.4
Red maple	803	6	-27	-5	0	858	6	1,629	12 (N/A)	2.7	1.3
Birch	1,836	14	-97	-10	0	1,583	12	3,312	25 (N/A)	2.7	2.7
Eastern red cedar	146	1	-4	-5	0	299	2	436	3 (N/A)	2.3	0.3
Eastern white pine	81	1	-1	-2	0	150	1	228	2 (N/A)	2.3	0.2
Spruce	336	3	-50	-11	0	933	7	1,208	9 (N/A)	2.3	1.0
Sugar maple	1,974	15	-143	-11	0	1,811	14	3,631	27 (N/A)	2.3	2.9
American sycamore	2,248	17	-241	-11	0	1,913	14	3,909	29 (N/A)	1.8	3.1
Blue spruce	154	1	-5	-5	0	425	3	569	4 (N/A)	1.8	0.5
Black walnut	1,765	13	-99	-7	0	1,276	10	2,934	22 (N/A)	1.4	2.4
Broadleaf Deciduous Large	891	7	-35	-4	0	786	6	1,637	12 (N/A)	0.9	1.3
Littleleaf linden	1,632	12	-90	-5	0	815	6	2,351	18 (N/A)	0.9	1.9
Amur maple	592	4	-37	-4	0	459	3	1,011	8 (N/A)	0.9	0.8
Cherry plum	228	2	-9	-2	0	248	2	465	3 (N/A)	0.9	0.4
Maple	486	4	-18	-2	0	438	3	904	7 (N/A)	0.9	0.7
Mulberry	0	0	-65	-7	0	670	5	598	4 (N/A)	0.9	0.5
Ohio buckeye	224	2	-5	-1	0	176	1	393	3 (N/A)	0.5	0.3
Black poplar	445	3	-18	-2	0	393	3	819	6 (N/A)	0.5	0.7
Norway spruce	0	0	-36	-4	0	311	2	271	2 (N/A)	0.5	0.2
Eastern redbud	0	0	-32	-4	0	335	3	299	2 (N/A)	0.5	0.2
American elm	454	3	-59	-4	0	632	5	1,023	8 (N/A)	0.5	0.8
Pin oak	2,912	22	-181	-5	0	728	5	3,454	26 (N/A)	0.5	2.8

Table 5: Annual Carbon Sequestered

Granger

Stored CO2 Benefits of Public Trees

3/1/2015

Species	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	255,850	1,919	(N/A)	20.9	24.4	41.71
Silver maple	315,423	2,366	(N/A)	9.5	30.1	112.65
Apple	18,498	139	(N/A)	6.8	1.8	9.25
Norway maple	42,600	320	(N/A)	5.5	4.1	26.63
Northern red oak	38,918	292	(N/A)	5.0	3.7	26.53
Swamp white oak	32,736	246	(N/A)	4.1	3.1	27.28
Pear	9,720	73	(N/A)	3.2	0.9	10.41
Northern hackberry	27,324	205	(N/A)	3.2	2.6	29.28
Scotch pine	9,194	69	(N/A)	2.7	0.9	11.49
White ash	8,844	66	(N/A)	2.7	0.8	11.06
White oak	9,038	68	(N/A)	2.7	0.9	11.30
Bur oak	766	6	(N/A)	2.7	0.1	0.96
Red maple	5,599	42	(N/A)	2.7	0.5	7.00
Birch	20,293	152	(N/A)	2.7	1.9	25.37
Eastern red cedar	917	7	(N/A)	2.3	0.1	1.38
Eastern white pine	302	2	(N/A)	2.3	0.0	0.45
Spruce	10,344	78	(N/A)	2.3	1.0	15.52
Sugar maple	29,692	223	(N/A)	2.3	2.8	44.54
American sycamore	50,274	377	(N/A)	1.8	4.8	94.26
Blue spruce	1,137	9	(N/A)	1.8	0.1	2.13
Black walnut	20,587	154	(N/A)	1.4	2.0	51.47
Broadleaf Deciduous :	7,344	55	(N/A)	0.9	0.7	27.54
Littleleaf linden	18,834	141	(N/A)	0.9	1.8	70.63
Amur maple	7,651	57	(N/A)	0.9	0.7	28.69
Cherry plum	1,816	14	(N/A)	0.9	0.2	6.81
Maple	3,641	27	(N/A)	0.9	0.3	13.65
Mulberry	13,485	101	(N/A)	0.9	1.3	50.57
Ohio buckeye	1,101	8	(N/A)	0.5	0.1	8.26
Black poplar	3,672	28	(N/A)	0.5	0.4	27.54
Norway spruce	7,490	56	(N/A)	0.5	0.7	56.18
Eastern redbud	6,743	51	(N/A)	0.5	0.6	50.57
American elm	12,245	92	(N/A)	0.5	1.2	91.84
Pin oak	37,616	282	(N/A)	0.5	3.6	282.12
Ponderosa pine	257	2	(N/A)	0.5	0.0	1.93
Ash	1,101	8	(N/A)	0.5	0.1	8.26
Broadleaf Deciduous	6,743	51	(N/A)	0.5	0.6	50.57
Black maple	1,101	8	(N/A)	0.5	0.1	8.26
Kentucky coffeetree	185	1	(N/A)	0.5	0.0	1.39
Cottonwood	8,458	63	(N/A)	0.5	0.8	63.43
American basswood	1,025	8	(N/A)	0.5	0.1	7.68
Citywide total	1,048,563	7,864	(N/A)	100.0	100.0	35.75

The value of stored carbon dioxide is calculated as the total amount of carbon dioxide sequestered annually over the life of each tree, summed for the population. This value should not be added to the Replacement Value or double-counting of the carbon dioxide storage benefit will occur.

1

Table 4: Annual Carbon Stored

Granger

Annual Aesthetic/Other Benefits of Public Trees

3/1/2015

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Green ash	1,806	(N/A)	20.9	24.3	39.27
Silver maple	1,932	(N/A)	9.5	26.0	92.01
Apple	79	(N/A)	6.8	1.1	5.29
Norway maple	366	(N/A)	5.5	4.9	30.54
Northern red oak	118	(N/A)	5.0	1.6	10.72
Swamp white oak	130	(N/A)	4.1	1.8	14.47
Pear	57	(N/A)	3.2	0.8	8.09
Northern hackberry	241	(N/A)	3.2	3.2	34.38
Scotch pine	209	(N/A)	2.7	2.8	34.78
White ash	231	(N/A)	2.7	3.1	38.47
White oak	112	(N/A)	2.7	1.5	18.74
Bur oak	69	(N/A)	2.7	0.9	11.58
Red maple	125	(N/A)	2.7	1.7	20.81
Birch	191	(N/A)	2.7	2.6	31.83
Eastern red cedar	91	(N/A)	2.3	1.2	18.15
Eastern white pine	40	(N/A)	2.3	0.5	7.91
Spruce	95	(N/A)	2.3	1.3	19.10
Sugar maple	221	(N/A)	2.3	3.0	44.28
American sycamore	196	(N/A)	1.8	2.6	48.98
Blue spruce	84	(N/A)	1.8	1.1	21.08
Black walnut	161	(N/A)	1.4	2.2	53.74
Broadleaf Deciduous Large	92	(N/A)	0.9	1.2	45.86
Littleleaf linden	161	(N/A)	0.9	2.2	80.56
Amur maple	35	(N/A)	0.9	0.5	17.60
Cherry plum	13	(N/A)	0.9	0.2	6.40
Maple	66	(N/A)	0.9	0.9	32.96
Mulberry	0	(N/A)	0.9	0.0	0.00
Ohio buckeye	26	(N/A)	0.5	0.4	26.22
Black poplar	46	(N/A)	0.5	0.6	45.86
Norway spruce	0	(N/A)	0.5	0.0	0.00
Eastern redbud	0	(N/A)	0.5	0.0	0.00
American elm	64	(N/A)	0.5	0.9	64.36
Pin oak	206	(N/A)	0.5	2.8	205.74
Ponderosa pine	15	(N/A)	0.5	0.2	15.42
Ash	26	(N/A)	0.5	0.4	26.22
Broadleaf Deciduous Small	0	(N/A)	0.5	0.0	0.00
Black maple	30	(N/A)	0.5	0.4	29.84
Kentucky coffeetree	15	(N/A)	0.5	0.2	14.73
Cottonwood	58	(N/A)	0.5	0.8	57.69
American basswood	13	(N/A)	0.5	0.2	13.08
Citywide total	7,421	(N/A)	100.0	100.0	33.73

1

Table 6: Annual Social and Aesthetic Benefits

Total Annual Benefits, Net Benefits, and Costs for Public Trees

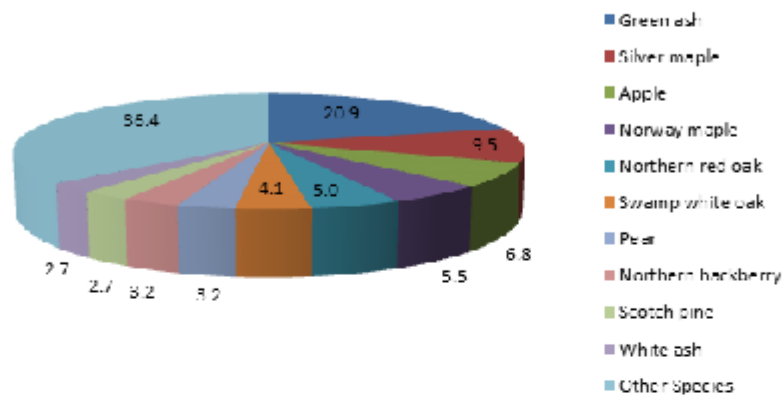
3/1/2015

Benefits	Total (\$)	Standard Error	\$/tree	Standard Error	\$/capita	Standard Error
Energy	7,132	(N/A)	32.42	(N/A)	0.00	(N/A)
CO2	935	(N/A)	4.25	(N/A)	0.00	(N/A)
Air Quality	1,148	(N/A)	5.22	(N/A)	0.00	(N/A)
Stormwater	8,543	(N/A)	38.83	(N/A)	0.00	(N/A)
Aesthetic/Other	7,421	(N/A)	33.73	(N/A)	0.00	(N/A)
Total Benefits	25,179	(N/A)	114.45	(N/A)	0.00	(N/A)
Costs						
Planting	0		0.00		0.00	
Contract Pruning	0		0.00		0.00	
Pest Management	0		0.00		0.00	
Irrigation	0		0.00		0.00	
Removal	0		0.00		0.00	
Administration	0		0.00		0.00	
Inspection/Service	0		0.00		0.00	
Infrastructure Repairs	0		0.00		0.00	
Litter Clean-up	0		0.00		0.00	
Liability/Claims	0		0.00		0.00	
Other Costs	0		0.00		0.00	
Total Costs	0		0.00		0.00	
Net Benefits	25,179	(N/A)	114.45	(N/A)	0.00	(N/A)
Benefit-cost ratio	0.00	(N/A)				

Table 7: Summary of Benefits in Dollars

Species Distribution of Public Trees

3/1/2015



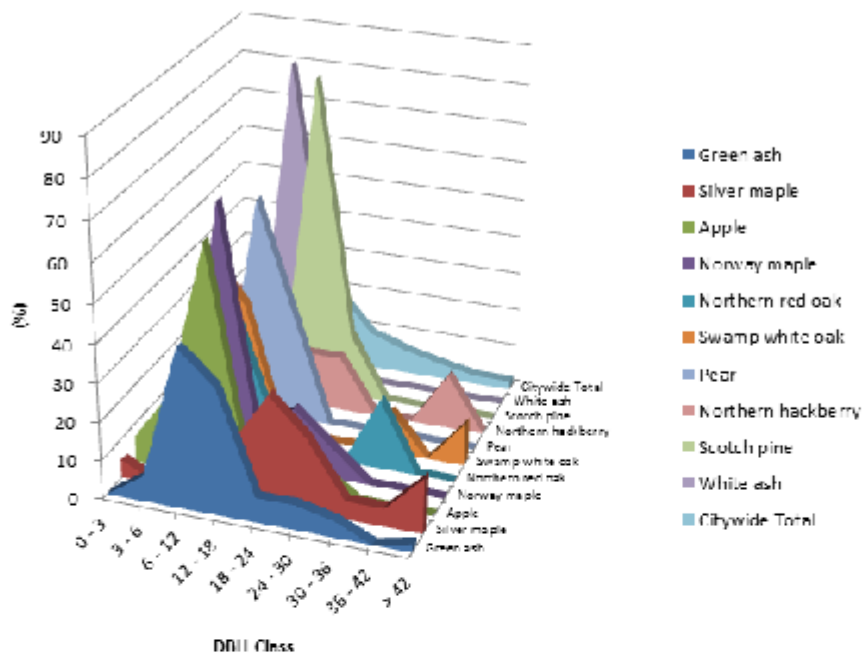
Species	Percent
Green ash	20.9
Silver maple	9.5
Apple	6.8
Norway maple	5.5
Northern red oak	5.0
Swamp white oak	4.1
Pear	3.2
Northern hackberry	3.2
Scotch pine	2.7
White ash	2.7
Other Species	36.4
Total	100.0

1

Figure 1: Species Distribution

Relative Age Distribution of Top 10 Public Tree Species for All Zones (%)

3/1/2015

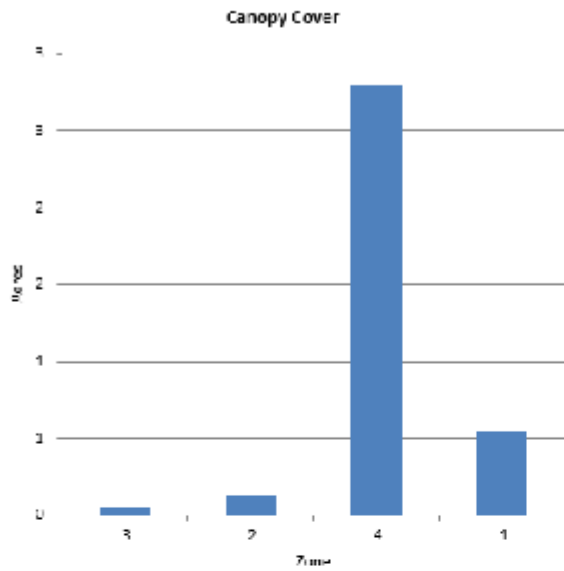


Species	DBH class (in)								
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Green ash	0.00	6.52	41.30	32.61	6.52	6.52	4.35	0.00	2.17
Silver maple	4.76	0.00	9.52	14.29	28.57	19.05	4.76	4.76	14.29
Apple	6.67	20.00	60.00	6.67	0.00	6.67	0.00	0.00	0.00
Norway maple	0.00	0.00	66.67	8.33	16.67	8.33	0.00	0.00	0.00
Northern red oak	0.00	36.36	36.36	9.09	0.00	0.00	18.18	0.00	0.00
Swamp white oak	0.00	44.44	33.33	0.00	0.00	0.00	11.11	0.00	11.11
Pear	14.29	0.00	57.14	28.57	0.00	0.00	0.00	0.00	0.00
Northern hackberry	0.00	28.57	28.57	14.29	14.29	0.00	0.00	14.29	0.00
Scotch pine	0.00	0.00	0.00	83.33	16.67	0.00	0.00	0.00	0.00
White ash	0.00	0.00	83.33	16.67	0.00	0.00	0.00	0.00	0.00
Citywide Total	5.00	14.55	35.91	20.00	9.55	6.36	4.09	2.27	2.27

Figure 2: Relative Age Class

Canopy Cover of Public Trees (Acres)

3/1/2015



Zone	Acres	% of Total Canopy Cover
3	0	1.6
2	0	3.4
4	3	79.5
1	1	15.5
Citywide total	4	100.0

	Total Land Area	Total Street and Sidewalk Area	Total Canopy Cover	Canopy Cover as % of Total Land Area	Canopy Cover as % of Total Streets and Sidewalks
Citywide Total	0	0	4	0.00	0.00

Figure 5: Canopy Cover in Acres

Land Use of Public Trees by Zone

3/1/2015

Zone	Land Use	Tree Count	Standard Error	% of Zone	% of Public Trees
1	Single family residential	26	(N/A)	100.00	11.82
	Multi-family residential	0	(N/A)	0.00	0.00
	Small commercial	0	(N/A)	0.00	0.00
	Industrial/Large commercial	0	(N/A)	0.00	0.00
	Park/vacant/other	0	(N/A)	0.00	0.00
	Total	26	(N/A)	100.00	11.82
3	Single family residential	4	(N/A)	100.00	1.82
	Multi-family residential	0	(N/A)	0.00	0.00
	Small commercial	0	(N/A)	0.00	0.00
	Industrial/Large commercial	0	(N/A)	0.00	0.00
	Park/vacant/other	0	(N/A)	0.00	0.00
	Total	4	(N/A)	100.00	1.82
2	Single family residential	8	(N/A)	100.00	3.64
	Multi-family residential	0	(N/A)	0.00	0.00
	Small commercial	0	(N/A)	0.00	0.00
	Industrial/Large commercial	0	(N/A)	0.00	0.00
	Park/vacant/other	0	(N/A)	0.00	0.00
	Total	8	(N/A)	100.00	3.64
4	Single family residential	182	(N/A)	100.00	82.73
	Multi-family residential	0	(N/A)	0.00	0.00
	Small commercial	0	(N/A)	0.00	0.00
	Industrial/Large commercial	0	(N/A)	0.00	0.00
	Park/vacant/other	0	(N/A)	0.00	0.00
	Total	182	(N/A)	100.00	82.73
Citywide	Single family residential	220	(N/A)	100.00	100.00
	Multi-family residential	0	(N/A)	0.00	0.00
	Small commercial	0	(N/A)	0.00	0.00
	Industrial/Large commercial	0	(N/A)	0.00	0.00
	Park/vacant/other	0	(N/A)	0.00	0.00
	Total	220	(N/A)	100.00	100.00

Figure 6: Land Use of city/park trees

Appendix B: ArcGIS Mapping

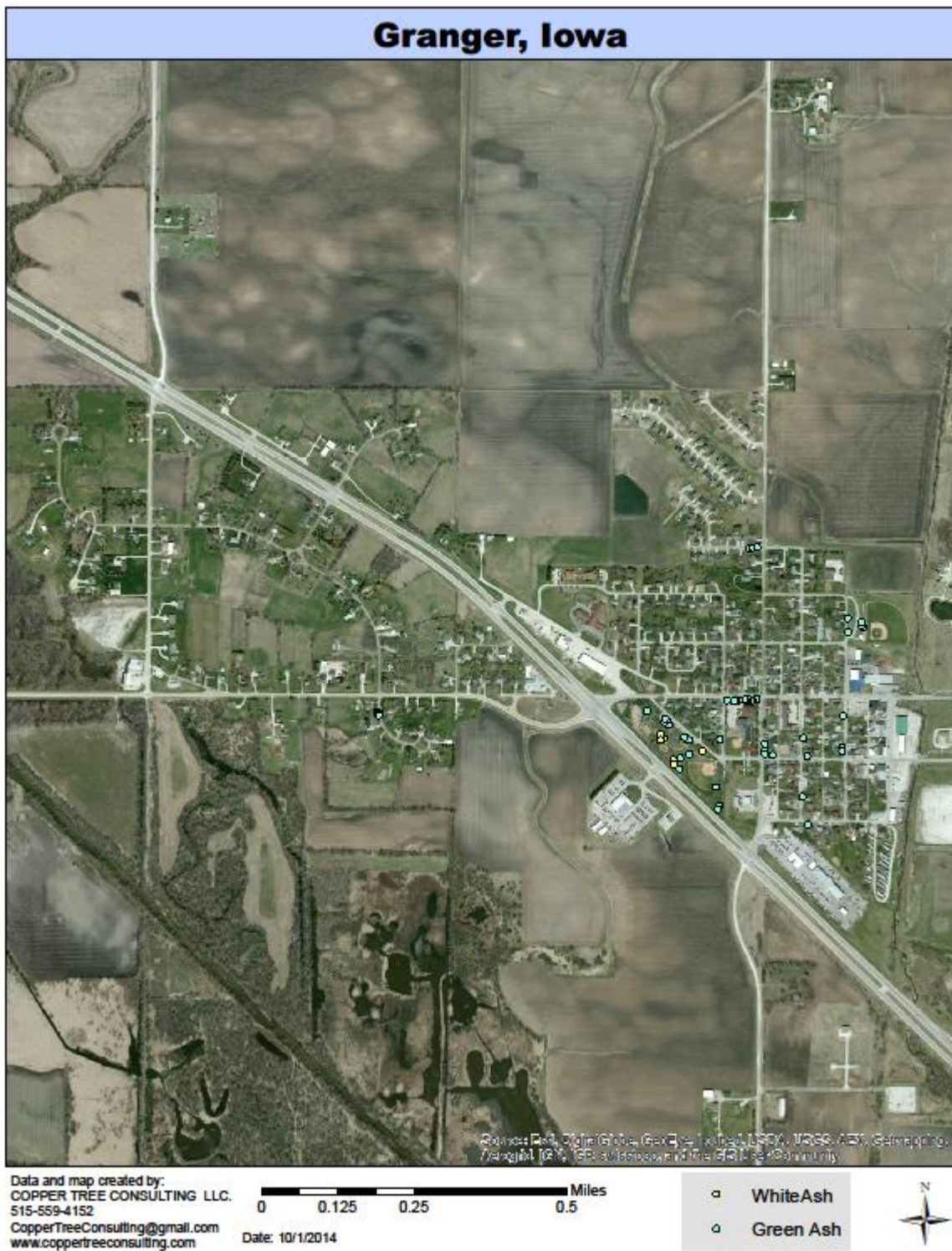


Figure 1: Location of Ash Trees



Figure 2: Location of EAB symptoms

Granger, Iowa



Data and map created by:
COPPER TREE CONSULTING LLC.
515-559-4152
CopperTreeConsulting@gmail.com
www.coppertreeconsulting.com

0 0.125 0.25 0.5 Miles
Date: 10/1/2014

Recommended Maint

- Immediate Young Tree (0)
- Immediate Mature Tree (4)
- Critical Concern (0)

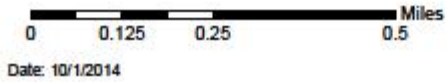


Figure 4: Location of Trees with Recommended Maintenance

Granger, Iowa



Data and map created by:
COPPER TREE CONSULTING LLC.
 515-559-4152
 CopperTreeConsulting@gmail.com
 www.coppertreeconsulting.com



Date: 10/1/2014

Recommended Maint	
●	Immediate Young Tree (0)
■	Immediate Mature Tree (4)
●	Critical Concern (0)



Granger, Iowa



Data and map created by:
COPPER TREE CONSULTING LLC.
515-559-4152
CopperTreeConsulting@gmail.com
www.coppertreeconsulting.com

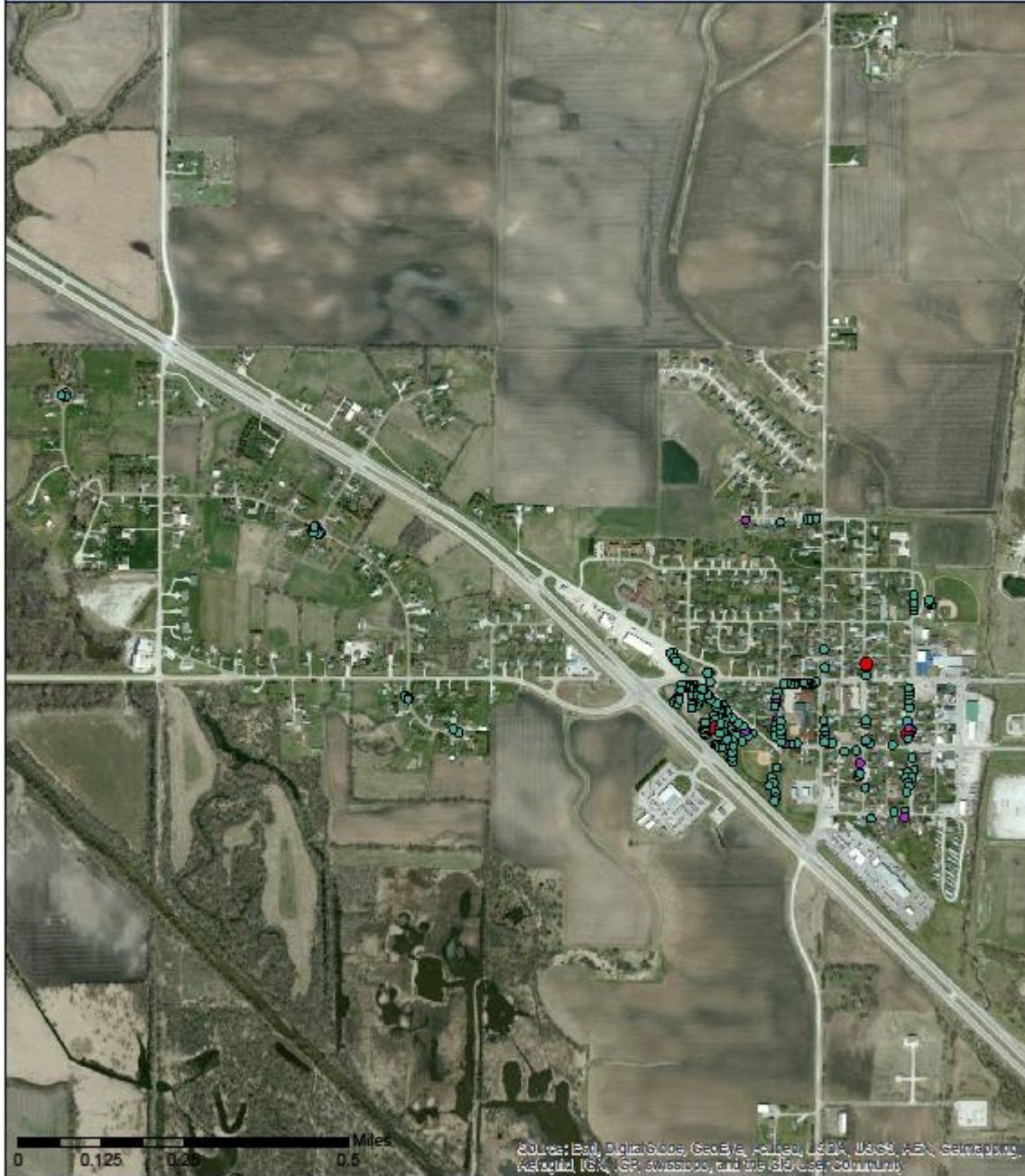
0 0.125 0.25 0.5 Miles
Date: 10/1/2014

Recommended Maint
● Immediate Young Tree (0)
■ Immediate Mature Tree (4)
● Critical Concern (0)



Figure 4: Location of Trees with Recommended Maintenance

Granger, Iowa



Data and map created by:
 COPPER TREE CONSULTING LLC.
 515-559-4152
 CopperTreeConsulting@gmail.com
 www.coppertreeconsulting.com

Date: 10/1/2014

Task	Count
Stake/Train	0
Crown Cleaning	186
Crown Raising	9
Crown Reduction	0
Remove	3
Treat Pests/Disease	0



Figure 5: Maintenance Tasks *City ownership of the trees recommended for removal should be verified prior to any removal*

Appendix C: Granger Tree Ordinances

Chapter 151 – Trees

151.01 Definition

151.02 Planting Restrictions

151.03 Duty to Trim Trees

151.04 Trimming Trees to be Supervised

151.05 Disease Control

151.06 Inspection and Removal

151.01 DEFINITION.

For use in this chapter, “parking” means that part of the street, avenue or highway in the City not covered by sidewalk and lying between the lot line and the curb line; or, on unpaved streets, that part of the street, avenue or highway lying between the lot line and that portion of the street usually traveled by vehicular traffic.

151.02 PLANTING RESTRICTIONS.

No tree shall be planted in any parking or street except in accordance with the following:

1. Alignment. All trees hereafter planted in any street shall be planted in the parking midway between the outer line of the sidewalk and the curb. In the event a curb line is not established, trees shall be planted on a line ten (10) feet from the property line.
2. Spacing. Trees shall not be planted on any parking which is less than nine (9) feet in width, or contains less than eighty-one (81) square feet of exposed soil surface per tree. Trees shall not be planted closer than twenty (20) feet from street intersections (property lines extended) and ten (10) feet from driveways. If it is at all possible trees should be planted inside the property lines and not between the sidewalk and the curb.
3. Prohibited Trees. No person shall plant in any street any fruit-bearing tree or any tree of the kinds commonly known as cottonwood, poplar, box elder, Chinese elm, evergreen, willow or black walnut.

151.03 DUTY TO TRIM TREES.

The owner or agent of the abutting property shall keep the trees on, or overhanging the street, trimmed so that all branches will be at least fifteen (15) feet above the surface of the street and eight (8) feet above the sidewalks. If the abutting property owner fails to trim the trees, the City may serve notice on the abutting property owner requiring that such action be taken within five (5) days. If such action is not taken within that time, the City may perform the required action and assess the costs against the abutting property for collection in the same manner as a property tax.

(Code of Iowa, Sec. 364.12[2c, d & e])

151.04 TRIMMING TREES TO BE SUPERVISED.

Except as allowed in Section 151.03, it is unlawful for any person to trim or cut any tree in a street or public place unless the work is done under the supervision of the City.

151.05 DISEASE CONTROL.

Any dead, diseased or damaged tree or shrub which may harbor serious insect or disease pests or disease injurious to other trees is hereby declared to be a nuisance.

151.06 INSPECTION AND REMOVAL.

The Council shall inspect or cause to be inspected any trees or shrubs in the City reported or suspected to be infected with or damaged by any disease or insect or disease pests, and such trees and shrubs shall be subject to removal as follows:

1. Removal from City Property. If it is determined that any such condition exists on any public property, including the strip between the curb and the lot line of private property, and that danger to other trees within the City is imminent, the Council shall immediately cause such condition to be corrected by treatment or removal so as to destroy or prevent as fully as possible the spread of the disease or the insect or disease pests. The Council may also order the removal of any trees on the streets of the City which interfere with the making of improvements or with travel thereon.

2. Removal from Private Property. If it is determined with reasonable certainty that any such condition exists on private property and that the danger to other trees within the City is imminent, the Council shall immediately notify by certified mail the owner, occupant or person in charge of such property to correct such condition by treatment or removal within fourteen (14) days of said notification. If such owner, occupant or person in charge of said property fails to comply within fourteen (14) days of receipt of notice, the Council may cause the nuisance to be removed and the cost assessed against the property.

The State of Iowa is an Equal Opportunity Employer and provider of ADA services.

Federal law prohibits employment discrimination on the basis of race, color, age, religion, national origin, sex or disability. State law prohibits employment discrimination on the basis of race, color, creed, age, sex, sexual orientation, gender identity, national origin, religion, pregnancy, or disability. State law also prohibits public accommodation (such as access to services or physical facilities) discrimination on the basis of race, color, creed, religion, sex, sexual orientation, gender identity, religion, national origin, or disability. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please contact the Iowa Civil Rights Commission, 1-800-457-4416, or write to the Iowa Department of Natural Resources, Wallace State Office Bldg., 502 E. 9th St., Des Moines, IA 50319.

If you need accommodations because of disability to access the services of this Agency, please contact the Director at 515-281-5918.