Van Horne, IA

Urban Forestry Management Plan

SUMMER 2021

JEO CONSULTING GROUP

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Executive Summary

EXECUTIVE SUMMARY

Overview

This plan was developed to assist the City of Van Horne in managing its urban forest, including budgeting and future planning. Trees bring numerous benefits to a community, and sound management helps leaders take advantage of these benefits. Management is especially important now considering the serious threats posed by forest pests like 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 except mountain ash. There is a strong possibility that 13% of Van Horne's city-owned trees will die once EAB becomes established in the community, unless local leaders begin preventative treatment. 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 2021, JEO conducted a tree inventory 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 270 trees inventoried.

- Van Horne's trees provide $40,220 of benefits annually, an average of $148.96 per tree
- There are over 36 species of trees
- The top three genera are: Maple 59%, Ash 13%, and Oak 10%
- 27% of trees need some type of management
- 93 trees should be removed

Recommendations

We detail our core recommendations in the Recommendations Section. In the Emerald Ash Borer Plan, we include management recommendations. Below are some key recommendations.

- Out of the 93 trees needing removal, 59 trees are over 24 inches in diameter at 4.5 ft and must be addressed immediately. *City ownership of the trees recommended for removal should be verified prior to any removal*
- 26 of the 36 ash trees should be carefully examined, as they have one or more symptoms that could be related to an EAB infestation.
- All trees should be pruned on a routine schedule: one third of the city every other year.
- 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 yearly with a visual survey.
- With the current budget it could take 16.5 years to remove ash. We suggest that city officials request a budget increase to $3,500 annually and apply for grants to plant replacement trees

Introduction

INTRODUCTION

This plan was developed to assist Van Horne with managing, budgeting, and future planning of their urban forest. Across the state, forestry budgets continue to decrease as a higher percentage of the budgets are devoted to 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, treatment, and replacement planting. With proper planning and management of the current canopy in Van Horne, these costs can be spread out over the years and public safety issues from dead and dying ash trees can be mitigated.

Trees are an important part of Van Horne's infrastructure and one of the city's greatest assets. The benefits of trees are immense. Trees improve air quality, intercept stormwater runoff, conserve energy, lower traffic speeds, increase property values, reduce crime, improve mental health, and create a desirable place to live, to name just a few. Good urban forestry management will maintain these important benefits for the people of Van Horne and future generations.

Urban forestry management sets goals and develops management strategies to achieve them. To develop management strategies, a comprehensive public tree inventory must be conducted. The inventory informs maintenance, removal schedules, tree planting, and budgeting. Aligning management actions with the tree inventory results will help meet Van Horne's urban forestry goals.

Assist Van Horne with Managing its Urban Forest

Inform on the Benefits of a Healthy Urban Forest

Establish Preventative Treatment for Emerald Ash Borer

Develop Efficient City Tree Management Techniques

Mitigate Public Safety Issues

Findings

INVENTORY

In 2021, JEO conducted a tree inventory that included 100% of the city-owned trees on both streets and parks. The team collected tree data 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 data collectors' programming 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, for all ash trees, the team notes signs and symptoms associated with EAB including canopy dieback, epicormic shoots, bark splitting, D-shaped borer exit holes, and wood pecker damage.

INVENTORY RESULTS

JEO entered the data collected for the 270 city trees into the USDA Forest service program Street Tree Resource Analysis Tool for Urban forestry Management as part of the i-Tree suite. Following are results from the i-Tree STREETS analysis.

ANNUAL BENEFITS

Annual Energy Benefits

Trees conserve energy by shading buildings and blocking winds. Van Horne's trees reduce energy-related costs by approximately $10,651 annually (Appendix A, Table 1). These savings are both in electricity (50.4 MWh) and in natural gas (6,961.6 Therms).

Annual Stormwater Benefits

Van Horne's trees intercept about 545,139 gallons of rainfall or snow melt per year (Appendix A, Table 2). This interception provides $14,773 in benefit 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 lessens emissions of volatile organic matter (ozone). In Van Horne, it is estimated that trees remove 636.7 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 $1,785 (Appendix A, Table 3).

Annual Carbon Benefits

Carbon sequestration and storage reduce the amount of carbon in the atmosphere, mitigating climate change. In Van Horne, trees sequester about 118,749 lbs of carbon per year with an associated value of $1,448 (Appendix A, Table 5). In addition, the trees store 2,022,593 lbs of carbon, with a yearly benefit of $15,169 (Appendix A, Table 4).

Annual Aesthetics Benefits

The social benefits of trees are hard to capture. The i-Tree 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. Van Horne receives $11,563 in annual social benefits from trees (Appendix A, Table 6).

Financial Summary of All Benefits

According to the USDA Forest Service i-Tree STREETS analysis, Van Horne's trees provide $40,220 of benefits annually. Benefits of individual trees vary based on size, species, health and location, but on average each of the 270 trees in Van Horne provide approximately $148.96 annually (Appendix A, Table 7).

ENERGY	STORMWATER	AIR QUALITY	CARBON	AESTHETICS	SUMMARY
• Reduce energy cost by **$10,651**	• Intercept **545,139 gallons** • Provides **$14,773** benefit	• Remove **636.7 lbs** of pollution • Net value of **$1,785**	• Sequester **118,749 lbs** • Value of **$1,448** • Store **2,022,593 lbs** • Value of **$15,169**	• **$11,563** in social benefits	• **$40,220** annual benefits • Each tree provides **$148.96** annually

FOREST STRUCTURE

Species Distribution

Van Horne has over 36 different tree species along city streets and parks (Appendix A, Figure 1). The distribution of trees by genera is as follows:

Maple	159	59%	Spruce	4	1.5%
Ash	36	13%	Walnut	3	1%
Oak	26	10%	Apple (Crab)	3	1%
Cedar	14	5%	Sweetgum	2	<1%
Honey locust	10	4%	Sycamore	2	<1%
Elm	9	3%	Ohio buckeye	1	<1%
Basswood/Linden	8	2.5%	Eastern redbud	1	<1%
Hackberry	5	2%	Plum	1	<1%
Birch	5	2%	Amur maple	1	<1%
Tulip tree	4	1.5%	Pear (Callery)	1	<1%
Japanese tree lilac	4	1.5%	Other conifer	3	1%
Pine	4	1.5%	Other Deciduous	4	1.5%

Age Class

Most of Van Horne's trees (32%) are between 3 and 12 inches in diameter at 4.5 ft (Appendix A, Figure 2).

To prepare for natural mortality and to maintain canopy cover, most trees should be in the smallest size category (a downward slope), indicating youth. Van Horne'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 urban forest's overall health. The foliage condition results for Van Horne indicate that 50% of the trees are in good health, with only 26% of the foliage in poor health, dead, or dying (Appendix A, Figure 3 & Appendix B, Figure 3). Similarly, 39% of Van Horne's trees are in good health for wood condition (Appendix A, Figure 4 & Appendix B, Figure 3). Twenty-five percent of the tree population's wood condition is in poor health, dead, or dying. This 25% 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).

Action	Number of Trees	Percentage
Crown Cleaning	55	20%
Crown Reduction	4	1.5%
Tree Removal	93	34%
Crown Raising	14	5%
Tree Staking	0	0%

Canopy Cover

The total canopy with both private and public trees is 55.58 acres or around 14% cover. The canopy cover included in the Van Horne inventory includes approximately 6 acres (Appendix A, Figure 4). The city's canopy goal is to increase canopy by 20% in 30 years. To achieve this goal it is estimated that 10 trees need to be planted annually on public and private lands.

Land Use and Location

The majority of Van Horne'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	Percentage
Single Family Residential	54%
Industrial/Large Commercial	2%
Park/Vacant/Other	44%
Small Commercial	0%
Multifamily Residential	0%

Recommendations

RECOMMENDATIONS

Risk Management

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

HAZARDOUS TREES

Van Horne has 93 trees that need immediate removal. These trees can be seen on the Location of Trees with Recommended Maintenance Map (Appendix B, Figure 4). We recommend starting with the large-diameter, critical concern trees first. There are 59 trees over 24 inches in diameter at 4.5 ft that should be addressed immediately. Please refer to the Proposed Work Schedule and Budget 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 73 trees with maintenance needs.

POOR TREE SPECIES

After removing the critical concern trees, ash trees in poor health should be assessed for removal (Appendix B, Figure 3 & Appendix B, Figure 4). Of the 93 removals, 26 are ash trees. There are a total of 36 ash trees, and 26 of those have signs and symptoms that have been associated with EAB. *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 removes lower branches that are two inches in diameter or larger to provide clearance for pedestrians or vehicles. Crown reduction removes individual limbs from structures or utility wires. We recommend that all trees be pruned on a routine schedule every five to seven years. Please refer to the Proposed Work Schedule and Budget for further information.

Planting

Most of the planting over the next five years will replace the trees that are removed. We recommend planting 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 Van Horne.

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 (59%) (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: any fruit bearing tree or black walnut, poplar, cottonwood, evergreens, willows, and boxelder. All trees planted must meet the restrictions in city ordinance 3-11-4 (Appendix C).

Continual Monitoring

Due to the threat of EAB, it is important to continuously check the health of ash trees. We recommend 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.

EMERALD ASH BORER PLAN

Ash Tree Removal

Tree removal will be prioritized by first removing dead, dying, hazardous trees (Appendix B, Figure 4). Next will be all ash in poor condition that display EAB signs and symptoms (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 an effective tool for communities to spread removal costs out over several years while allowing trees to continue providing 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 normally disposed of 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 3-11-4 (Appendix C). We encourage a diverse mix of species for new plantings such as Kentucky coffeetree, Honeylocust, swamp white oak, ginkgo, and eastern redbud.

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.

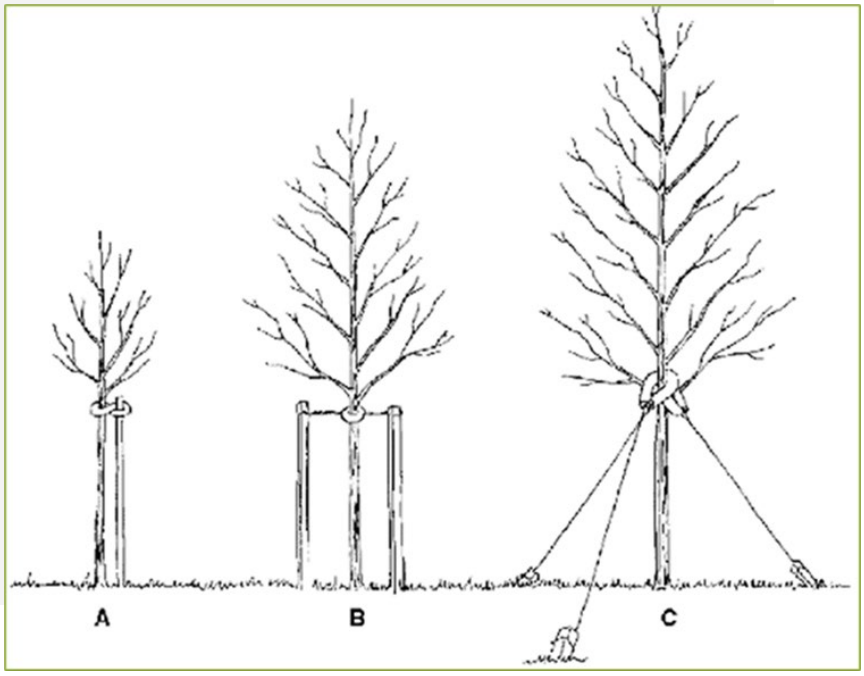
Monitoring

It is recommended that ash trees be checked with a visual survey every year for tree death and for EAB signs and symptoms including 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 if preventative treatments are not being used. City Code 3-11-8 states “The city shall have the right to cause the removal of any dead or diseased trees on private property, or harbor insects or disease which constitute a potential threat to other trees within the city.”

Schedule & Budget



PROPOSED WORK SCHEDULE & BUDGET

Budget Allowance of $1,550/Year – (Based off $2/resident Calculation)

YEAR 1	Est. Cost
Remove 1 tree recommended for immediate removal	$700
Plant 1 tree in open locations	$150
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,525**

YEAR 2	Est. Cost
Remove 1 tree recommended for immediate removal	$700
Plant 1 tree in open locations	$150
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,525**

YEAR 3	Est. Cost
Remove 1 tree recommended for immediate removal	$700
Plant 1 tree in open locations	$150
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,525**

YEAR 4	Est. Cost
Remove 1 tree recommended for immediate removal	$700
Plant 1 tree in open locations	$150
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,525**

YEAR 5	Est. Cost
Remove 1 tree recommended for immediate removal	$700
Plant 1 tree in open locations	$150
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,525**

YEAR 6	Est. Cost
Remove 1 tree recommended for immediate removal	$700
Plant 1 tree in open locations	$150
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$1,525**

Estimated costs based on average costs of $700/tree for removal, $150/tree for planting and maintenance, and $15/tree for pruning.

***To remove all ash trees alone within 6 years alone, the budget would need to be $4,200 a year. If the budget were increased to $3,500 a year all ash could be removed in 7 years.*

PROPOSED WORK SCHEDULE WITH INCREASED BUDGET

Budget Allowance of $3,500/Year – (Budget Increase Suggested to Best Manage City Trees)

YEAR 1	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 4 trees in open locations	$600
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$3,375**

YEAR 2	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 4 trees in open locations	$600
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$3,375**

YEAR 3	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 4 trees in open locations	$600
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$3,375**

YEAR 4	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 4 trees in open locations	$600
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$3,375**

YEAR 5	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 4 trees in open locations	$600
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$3,375**

YEAR 6	Est. Cost
Remove 3 trees recommended for immediate removal	$2,100
Plant 4 trees in open locations	$600
Prune 1/6 of city owned trees	$675
Visual Survey of EAB Signs/Symptoms	n/a
TOTAL	**$3,375**

Proposed Budget Increase

EAB could potentially kill all ash trees in Van Horne within four years of its arrival. To remove all ash trees alone within six years, the budget would need to be increased to $4,200 a year. If the

budget were increased to $3,500 per year all ash could be removed within 7 years. Additionally, we recommend that Van Horne 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.

Another option considered by many communities is treating selected trees, either to maintain those trees in the landscape or to delay their removal – to spread out the costs and number of trees needing removal all at once. Trunk injection is administered every two years for the life of the tree. If treatment is discontinued, the tree dies. For instance, in this treatment scenario, the average ash diameter is 20 inches and at $15 per inch, about 4 trees could be treated per year (every other year treatment). Four trees would be selected for treatment, and Van Horne would still need to find $22,400 for removal of ash. Alternatively, if there are 8 treatable trees, it would cost approximately $2,400 a year for treatment and leave $19,600 for removal of ash. These are alternatives to straight removal of ash trees. However, whether or not the treatment option is selected, there will be an increased cost of dealing with ash trees if EAB is found in Van Horne. We suggest considering an increased budget to plan for this.

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Appendices

APPENDIX A: i-TREE DATA

Table 1: Annual Energy Benefits

Van Horne

Annual Energy Benefits of Public Trees

2/8/2022

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	9.5	718	1,358.2	1,331	2,049	(N/A)	14.8	19.2	51.22
Green ash	10.0	755	1,374.4	1,347	2,102	(N/A)	11.9	19.7	65.69
Sugar maple	8.6	653	1,174.4	1,151	1,804	(N/A)	10.7	16.9	62.20
Silver maple	7.3	552	955.7	937	1,489	(N/A)	9.6	14.0	57.25
Red maple	1.3	98	174.0	171	269	(N/A)	6.7	2.5	14.94
Northern red oak	2.6	196	358.5	351	548	(N/A)	5.6	5.1	36.50
Northern white cedar	0.3	21	47.7	47	67	(N/A)	4.4	0.6	5.61
Honeylocust	1.7	130	244.1	239	369	(N/A)	3.7	3.5	36.95
Elm	1.5	116	199.9	196	312	(N/A)	3.3	2.9	34.64
Maple	0.8	61	112.6	110	172	(N/A)	2.2	1.6	28.64
River birch	0.5	35	73.6	72	107	(N/A)	1.9	1.0	21.38
Northern hackberry	0.5	36	67.0	66	102	(N/A)	1.9	1.0	20.34
Pin oak	1.9	146	256.2	251	397	(N/A)	1.9	3.7	79.45
Littleleaf linden	0.4	32	62.2	61	93	(N/A)	1.5	0.9	23.14
Norway spruce	0.4	28	48.3	47	75	(N/A)	1.5	0.7	18.86
Eastern white pine	0.2	13	29.2	29	42	(N/A)	1.5	0.4	10.42
Japanese tree lilac	0.0	1	2.5	2	3	(N/A)	1.5	0.0	0.87
Basswood	0.0	1	1.9	2	3	(N/A)	1.5	0.0	0.66
Tulip tree	0.3	24	38.1	37	62	(N/A)	1.5	0.6	15.42
Swamp white oak	0.3	24	50.6	50	73	(N/A)	1.1	0.7	24.47
Broadleaf Deciduous Small	0.0	2	5.0	5	7	(N/A)	1.1	0.1	2.38
White ash	0.5	34	55.0	54	88	(N/A)	1.1	0.8	29.44
Black walnut	0.2	18	27.9	27	46	(N/A)	1.1	0.4	15.18
Bur oak	0.7	49	84.4	83	132	(N/A)	1.1	1.2	44.02
Conifer Evergreen Large	0.1	10	23.0	23	33	(N/A)	1.1	0.3	10.92
Apple	0.0	2	5.0	5	7	(N/A)	1.1	0.1	2.38
American sycamore	0.4	27	50.5	50	77	(N/A)	0.7	0.7	38.36
Eastern red cedar	0.0	2	4.9	5	7	(N/A)	0.7	0.1	3.62
Sweetgum	0.1	4	7.4	7	12	(N/A)	0.7	0.1	5.82
Broadleaf Deciduous Large	0.2	18	27.0	26	44	(N/A)	0.4	0.4	44.23
Black ash	0.1	8	16.9	17	24	(N/A)	0.4	0.2	24.47
Plum	0.0	2	3.8	4	5	(N/A)	0.4	0.1	5.40
Eastern redbud	0.0	0	0.6	1	1	(N/A)	0.4	0.0	0.87
Amur maple	0.0	2	3.8	4	5	(N/A)	0.4	0.1	5.40
Ohio buckeye	0.1	8	16.9	17	24	(N/A)	0.4	0.2	24.47
Pear	0.0	0	0.6	1	1	(N/A)	0.4	0.0	0.87
Total	50.4	3,829	6,961.6	6,822	10,651	(N/A)	100.0	100.0	39.45

Table 2: Annual Stormwater Benefits

Van Horne

Annual Stormwater Benefits of Public Trees

2/8/2022

Species	Total rainfall interception (Gal)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	93,098	2,523	(N/A)	14.8	17.1	63.07
Green ash	116,538	3,158	(N/A)	11.9	21.4	98.69
Sugar maple	107,844	2,923	(N/A)	10.7	19.8	100.78
Silver maple	95,709	2,594	(N/A)	9.6	17.6	99.76
Red maple	8,356	226	(N/A)	6.7	1.5	12.58
Northern red oak	25,075	680	(N/A)	5.6	4.6	45.30
Northern white cedar	2,553	69	(N/A)	4.4	0.5	5.77
Honeylocust	13,941	378	(N/A)	3.7	2.6	37.78
Elm	12,376	335	(N/A)	3.3	2.3	37.27
Maple	4,730	128	(N/A)	2.2	0.9	21.37
River birch	2,507	68	(N/A)	1.9	0.5	13.59
Northern hackberry	2,425	66	(N/A)	1.9	0.4	13.14
Pin oak	24,948	676	(N/A)	1.9	4.6	135.22
Littleleaf linden	4,392	119	(N/A)	1.5	0.8	29.75
Norway spruce	4,268	116	(N/A)	1.5	0.8	28.92
Eastern white pine	1,835	50	(N/A)	1.5	0.3	12.43
Japanese tree lilac	30	1	(N/A)	1.5	0.0	0.20
Basswood	72	2	(N/A)	1.5	0.0	0.48
Tulip tree	1,980	54	(N/A)	1.5	0.4	13.42
Swamp white oak	1,758	48	(N/A)	1.1	0.3	15.88
Broadleaf Deciduous Small	84	2	(N/A)	1.1	0.0	0.75
White ash	2,890	78	(N/A)	1.1	0.5	26.11
Black walnut	1,501	41	(N/A)	1.1	0.3	13.56
Bur oak	7,128	193	(N/A)	1.1	1.3	64.39
Conifer Evergreen Large	1,404	38	(N/A)	1.1	0.3	12.68
Apple	84	2	(N/A)	1.1	0.0	0.75
American sycamore	4,115	112	(N/A)	0.7	0.8	55.75
Eastern red cedar	367	10	(N/A)	0.7	0.1	4.97
Sweetgum	343	9	(N/A)	0.7	0.1	4.65
Broadleaf Deciduous Large	1,466	40	(N/A)	0.4	0.3	39.72
Black ash	586	16	(N/A)	0.4	0.1	15.88
Plum	69	2	(N/A)	0.4	0.0	1.86
Eastern redbud	7	0	(N/A)	0.4	0.0	0.20
Amur maple	69	2	(N/A)	0.4	0.0	1.86
Ohio buckeye	586	16	(N/A)	0.4	0.1	15.88
Pear	7	0	(N/A)	0.4	0.0	0.20
Citywide total	545,139	14,773	(N/A)	100.0	100.0	54.72

Table 3: Annual Air Quality Benefits

Van Horne

Annual Air Quality Benefits of Public Trees

2/8/2022

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								
Norway maple	19.7	3.4	9.6	0.9	106	45.8	6.6	6.3	42.9	284	-4.6	-17	130.7	373	(N/A)	14.8	9.32
Green ash	14.9	2.4	7.0	0.7	79	47.6	6.9	6.6	45.1	296	0.0	0	131.2	375	(N/A)	11.9	11.73
Sugar maple	15.0	2.5	7.3	0.7	80	41.0	6.0	5.7	39.0	256	-11.6	-44	105.5	292	(N/A)	10.7	10.09
Silver maple	15.4	2.6	7.7	0.7	83	34.3	5.0	4.8	32.9	215	-8.3	-31	95.0	267	(N/A)	9.6	10.26
Red maple	1.6	0.3	0.8	0.1	9	6.1	0.9	0.9	5.9	38	-0.6	-2	16.0	45	(N/A)	6.7	2.50
Northern red oak	5.2	0.9	2.5	0.2	28	12.4	1.8	1.7	11.7	77	-7.4	-28	29.1	77	(N/A)	5.6	5.16
Northern white cedar	0.1	0.0	0.2	0.0	1	1.4	0.2	0.2	1.2	8	-0.7	-3	2.6	7	(N/A)	4.4	0.56
Honeylocust	2.4	0.4	1.2	0.1	13	8.3	1.2	1.1	7.8	51	-1.8	-7	20.6	57	(N/A)	3.7	5.73
Elm	1.1	0.2	0.6	0.1	6	7.2	1.1	1.0	6.9	45	0.0	0	18.2	51	(N/A)	3.3	5.70
Maple	0.7	0.1	0.4	0.0	4	3.9	0.6	0.5	3.7	24	-0.3	-1	9.6	27	(N/A)	2.2	4.49
River birch	0.2	0.0	0.2	0.0	1	2.3	0.3	0.3	2.1	14	-0.1	0	5.4	15	(N/A)	1.9	3.02
Northern hackberry	0.2	0.0	0.1	0.0	1	2.3	0.3	0.3	2.2	14	0.0	0	5.4	15	(N/A)	1.9	3.06
Pin oak	4.8	0.8	2.4	0.2	26	9.1	1.3	1.3	8.7	57	-8.8	-33	19.9	50	(N/A)	1.9	10.04
Littleleaf linden	0.8	0.1	0.4	0.0	4	2.0	0.3	0.3	1.9	13	-0.4	-1	5.4	15	(N/A)	1.5	3.84
Norway spruce	0.4	0.1	0.4	0.1	3	1.7	0.3	0.2	1.7	11	-1.4	-5	3.5	9	(N/A)	1.5	2.15
Eastern white pine	0.2	0.0	0.2	0.0	1	0.9	0.1	0.1	0.8	5	-0.5	-2	1.7	4	(N/A)	1.5	1.12
Japanese tree lilac	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	0	0.0	0	0.2	0	(N/A)	1.5	0.11
Basswood	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.0	0	0.0	0	0.1	0	(N/A)	1.5	0.08
Tulip tree	0.1	0.0	0.1	0.0	1	1.5	0.2	0.2	1.5	9	0.0	0	3.6	10	(N/A)	1.5	2.51
Swamp white oak	0.2	0.0	0.1	0.0	1	1.6	0.2	0.2	1.4	10	-0.1	0	3.7	10	(N/A)	1.1	3.47
Broadleaf Deciduous Small	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	1.1	0.31
White ash	0.1	0.0	0.1	0.0	1	2.1	0.3	0.3	2.1	13	0.0	0	5.0	14	(N/A)	1.1	4.71
Black walnut	0.1	0.0	0.1	0.0	1	1.1	0.2	0.2	1.1	7	0.0	0	2.7	8	(N/A)	1.1	2.53
Bur oak	0.9	0.1	0.4	0.0	5	3.1	0.4	0.4	2.9	19	0.0	0	8.4	24	(N/A)	1.1	8.00
Conifer Evergreen Large	0.1	0.0	0.1	0.0	1	0.7	0.1	0.1	0.6	4	-0.4	-1	1.4	4	(N/A)	1.1	1.17
Apple	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	1.1	0.31
American sycamore	0.5	0.1	0.2	0.0	3	1.7	0.2	0.2	1.6	11	0.0	0	4.7	13	(N/A)	0.7	6.67
Eastern red cedar	0.0	0.0	0.0	0.0	0	0.2	0.0	0.0	0.1	1	-0.2	-1	0.2	0	(N/A)	0.7	0.20
Sweetgum	0.0	0.0	0.0	0.0	0	0.3	0.0	0.0	0.3	2	0.0	0	0.6	2	(N/A)	0.7	0.87
Broadleaf Deciduous Large	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)	0.4	7.42
Black 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)	0.4	3.47
Plum	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	0.4	0.71
Eastern redbud	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0	(N/A)	0.4	0.11
Amur maple	0.0	0.0	0.0	0.0	0	0.1	0.0	0.0	0.1	1	0.0	0	0.3	1	(N/A)	0.4	0.71
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)	0.4	3.47

Van Horne

Annual Air Quality Benefits of Public Trees

2/8/2022

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								
Pear	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0.0	0	0.0	0	(N/A)	0.4	0.11
Citywide total	84.9	14.4	42.2	3.8	459	241.2	35.1	33.4	228.6	1,502	-47.0	-176	636.7	1,785	(N/A)	100.0	6.61

Table 4: Annual Carbon Stored

Van Horne

Stored CO2 Benefits of Public Trees

2/8/2022

Species	Total Stored CO2 (lbs)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	325,757	2,443	(N/A)	14.8	16.1	61.08
Green ash	485,067	3,638	(N/A)	11.9	24.0	113.69
Sugar maple	431,100	3,233	(N/A)	10.7	21.3	111.49
Silver maple	346,504	2,599	(N/A)	9.6	17.1	99.95
Red maple	19,025	143	(N/A)	6.7	0.9	7.93
Northern red oak	109,634	822	(N/A)	5.6	5.4	54.82
Northern white cedar	458	3	(N/A)	4.4	0.0	0.29
Honeylocust	31,023	233	(N/A)	3.7	1.5	23.27
Elm	36,598	274	(N/A)	3.3	1.8	30.50
Maple	9,128	68	(N/A)	2.2	0.5	11.41
River birch	4,621	35	(N/A)	1.9	0.2	6.93
Northern hackberry	2,248	17	(N/A)	1.9	0.1	3.37
Pin oak	130,661	980	(N/A)	1.9	6.5	195.99
Littleleaf linden	16,637	125	(N/A)	1.5	0.8	31.19
Norway spruce	2,854	21	(N/A)	1.5	0.1	5.35
Eastern white pine	773	6	(N/A)	1.5	0.0	1.45
Japanese tree lilac	55	0	(N/A)	1.5	0.0	0.10
Basswood	49	0	(N/A)	1.5	0.0	0.09
Tulip tree	4,228	32	(N/A)	1.5	0.2	7.93
Swamp white oak	3,302	25	(N/A)	1.1	0.2	8.26
Broadleaf Deciduous	205	2	(N/A)	1.1	0.0	0.51
White ash	5,741	43	(N/A)	1.1	0.3	14.35
Black walnut	3,696	28	(N/A)	1.1	0.2	9.24
Bur oak	29,800	224	(N/A)	1.1	1.5	74.50
Conifer Evergreen La	552	4	(N/A)	1.1	0.0	1.38
Apple	205	2	(N/A)	1.1	0.0	0.51
American sycamore	15,958	120	(N/A)	0.7	0.8	59.84
Eastern red cedar	86	1	(N/A)	0.7	0.0	0.32
Sweetgum	371	3	(N/A)	0.7	0.0	1.39
Broadleaf Deciduous	3,672	28	(N/A)	0.4	0.2	27.54
Black ash	1,101	8	(N/A)	0.4	0.1	8.26
Plum	178	1	(N/A)	0.4	0.0	1.33
Eastern redbud	14	0	(N/A)	0.4	0.0	0.10
Amur maple	178	1	(N/A)	0.4	0.0	1.33
Ohio buckeye	1,101	8	(N/A)	0.4	0.1	8.26
Pear	14	0	(N/A)	0.4	0.0	0.10
Citywide total	2,022,593	15,169	(N/A)	100.0	100.0	56.18

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.

Table 5: Annual Carbon Sequestered

Van Horne

Annual CO2 Benefits of Public Trees

2/8/2022

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total Standard ($) Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	10,654	80	-1,565	-103	-13	15,861	119	24,846	186 (N/A)	14.8	12.9	4.66
Green ash	23,873	179	-2,328	-105	-18	16,691	125	38,131	286 (N/A)	11.9	19.7	8.94
Sugar maple	21,068	158	-2,070	-96	-16	14,431	108	33,333	250 (N/A)	10.7	17.3	8.62
Silver maple	27,740	208	-1,663	-78	-13	12,199	91	38,197	286 (N/A)	9.6	19.8	11.02
Red maple	1,585	12	-92	-14	-1	2,173	16	3,652	27 (N/A)	6.7	1.9	1.52
Northern red oak	3,702	28	-526	-33	-4	4,337	33	7,480	56 (N/A)	5.6	3.9	3.74
Northern white cedar	216	2	-2	-7	0	454	3	660	5 (N/A)	4.4	0.3	0.41
Honeylocust	4,426	33	-149	-14	-1	2,878	22	7,140	54 (N/A)	3.7	3.7	5.35
Elm	3,394	25	-176	-15	-1	2,560	19	5,764	43 (N/A)	3.3	3.0	4.80
Maple	1,310	10	-44	-8	0	1,359	10	2,617	20 (N/A)	2.2	1.4	3.27
River birch	991	7	-23	-5	0	768	6	1,731	13 (N/A)	1.9	0.9	2.60
Northern hackberry	331	2	-11	-4	0	797	6	1,112	8 (N/A)	1.9	0.6	1.67
Pin oak	11,002	83	-627	-21	-5	3,231	24	13,584	102 (N/A)	1.9	7.0	20.38
Littleleaf linden	1,461	11	-81	-6	-1	698	5	2,072	16 (N/A)	1.5	1.1	3.89
Norway spruce	336	3	-14	-6	0	622	5	938	7 (N/A)	1.5	0.5	1.76
Eastern white pine	161	1	-4	-4	0	289	2	443	3 (N/A)	1.5	0.2	0.83
Japanese tree lilac	35	0	0	-1	0	22	0	56	0 (N/A)	1.5	0.0	0.10
Basswood	10	0	0	-1	0	18	0	27	0 (N/A)	1.5	0.0	0.05
Tulip tree	668	5	-20	-4	0	539	4	1,183	9 (N/A)	1.5	0.6	2.22
Swamp white oak	672	5	-16	-4	0	528	4	1,180	9 (N/A)	1.1	0.6	2.95
Broadleaf Deciduous Smal	55	0	-1	-1	0	48	0	102	1 (N/A)	1.1	0.1	0.25
White ash	858	6	-28	-4	0	760	6	1,586	12 (N/A)	1.1	0.8	3.96
Black walnut	451	3	-18	-2	0	402	3	832	6 (N/A)	1.1	0.4	2.08
Bur oak	1,479	11	-143	-7	-1	1,092	8	2,421	18 (N/A)	1.1	1.3	6.05
Conifer Evergreen Large	123	1	-3	-3	0	227	2	344	3 (N/A)	1.1	0.2	0.86
Apple	55	0	-1	-1	0	48	0	102	1 (N/A)	1.1	0.1	0.25
American sycamore	931	7	-77	-4	-1	601	5	1,451	11 (N/A)	0.7	0.8	5.44
Eastern red cedar	27	0	0	-1	0	53	0	78	1 (N/A)	0.7	0.0	0.29
Sweetgum	148	1	-2	-1	0	97	1	243	2 (N/A)	0.7	0.1	0.91
Broadleaf Deciduous Larg	445	3	-18	-2	0	393	3	819	6 (N/A)	0.4	0.4	6.14
Black ash	224	2	-5	-1	0	176	1	393	3 (N/A)	0.4	0.2	2.95
Plum	38	0	-1	-1	0	37	0	74	1 (N/A)	0.4	0.0	0.55

Annual CO $_2$ Benefits of Public Trees

2/8/2022

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total Standard ($) Error	% of Total Trees	% of Total $	Avg. $/tree
Eastern redbud	9	0	0	0	0	6	0	14	0 (N/A)	0.4	0.0	0.10
Amur maple	38	0	-1	-1	0	37	0	74	1 (N/A)	0.4	0.0	0.55
Ohio buckeye	224	2	-5	-1	0	176	1	393	3 (N/A)	0.4	0.2	2.95
Pear	9	0	0	0	0	6	0	14	0 (N/A)	0.4	0.0	0.10
Citywide total	118,749	891	-9,715	-560	-77	84,611	635	193,085	1,448 (N/A)	100.0	100.0	5.36

Table 6: Annual Social and Aesthetic Benefits

Van Horne

Annual Aesthetic/Other Benefits of Public Trees

2/8/2022

Species	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Norway maple	1,015	(N/A)	14.8	8.8	25.36
Green ash	1,897	(N/A)	11.9	16.4	59.27
Sugar maple	2,113	(N/A)	10.7	18.3	72.85
Silver maple	2,284	(N/A)	9.6	19.8	87.83
Red maple	243	(N/A)	6.7	2.1	13.48
Northern red oak	275	(N/A)	5.6	2.4	18.30
Northern white cedar	82	(N/A)	4.4	0.7	6.83
Honeylocust	1,006	(N/A)	3.7	8.7	100.58
Elm	336	(N/A)	3.3	2.9	37.32
Maple	215	(N/A)	2.2	1.9	35.85
River birch	118	(N/A)	1.9	1.0	23.55
Northern hackberry	89	(N/A)	1.9	0.8	17.88
Pin oak	801	(N/A)	1.9	6.9	160.25
Littleleaf linden	158	(N/A)	1.5	1.4	39.57
Norway spruce	95	(N/A)	1.5	0.8	23.87
Eastern white pine	52	(N/A)	1.5	0.4	13.01
Japanese tree lilac	0	(N/A)	1.5	0.0	0.03
Basswood	21	(N/A)	1.5	0.2	5.26
Tulip tree	90	(N/A)	1.5	0.8	22.51
Swamp white oak	79	(N/A)	1.1	0.7	26.22
Broadleaf Deciduous Small	2	(N/A)	1.1	0.0	0.71
White ash	131	(N/A)	1.1	1.1	43.53
Black walnut	56	(N/A)	1.1	0.5	18.79
Bur oak	127	(N/A)	1.1	1.1	42.40
Conifer Evergreen Large	38	(N/A)	1.1	0.3	12.56
Apple	2	(N/A)	1.1	0.0	0.71
American sycamore	80	(N/A)	0.7	0.7	40.16
Eastern red cedar	27	(N/A)	0.7	0.2	13.37
Sweetgum	29	(N/A)	0.7	0.3	14.73
Broadleaf Deciduous Large	46	(N/A)	0.4	0.4	45.86
Black ash	26	(N/A)	0.4	0.2	26.22
Plum	2	(N/A)	0.4	0.0	2.06
Eastern redbud	0	(N/A)	0.4	0.0	0.03
Amur maple	2	(N/A)	0.4	0.0	2.06
Ohio buckeye	26	(N/A)	0.4	0.2	26.22
Pear	0	(N/A)	0.4	0.0	0.03
Citywide total	11,563	(N/A)	100.0	100.0	42.83

Table 7: Summary of Benefits in Dollars

Van Horne

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

2/8/2022

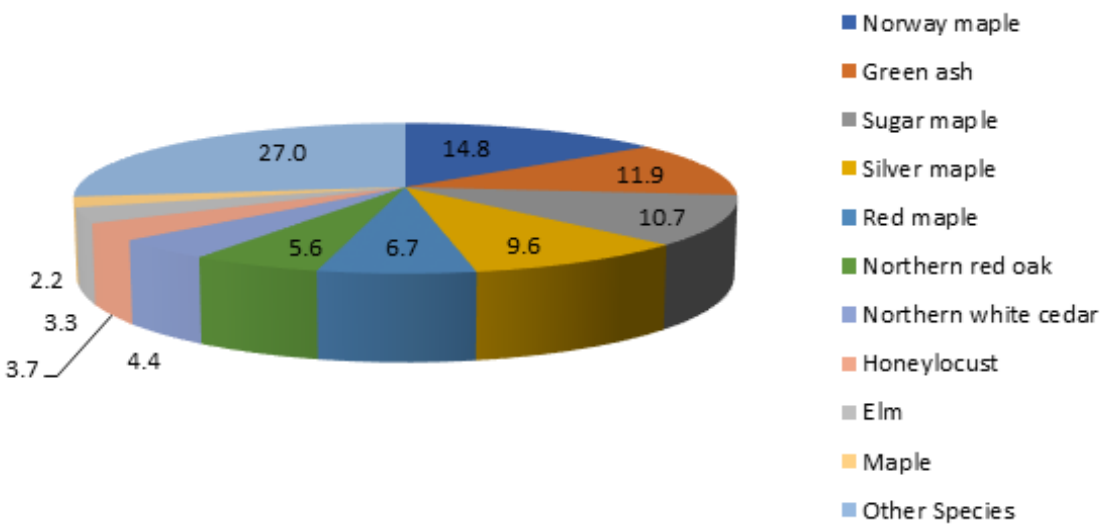
Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	10,651	(N/A)	39.45	(N/A)	0.00	(N/A)
CO2	1,448	(N/A)	5.36	(N/A)	0.00	(N/A)
Air Quality	1,785	(N/A)	6.61	(N/A)	0.00	(N/A)
Stormwater	14,773	(N/A)	54.72	(N/A)	0.00	(N/A)
Aesthetic/Other	11,563	(N/A)	42.83	(N/A)	0.00	(N/A)
Total Benefits	40,220	(N/A)	148.96	(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	40,220	(N/A)	148.96	(N/A)	0.00	(N/A)
Benefit-cost ratio	0.00	(N/A)				

Figure 1: Species Distribution

Van Horne

Species Distribution of Public Trees

2/8/2022



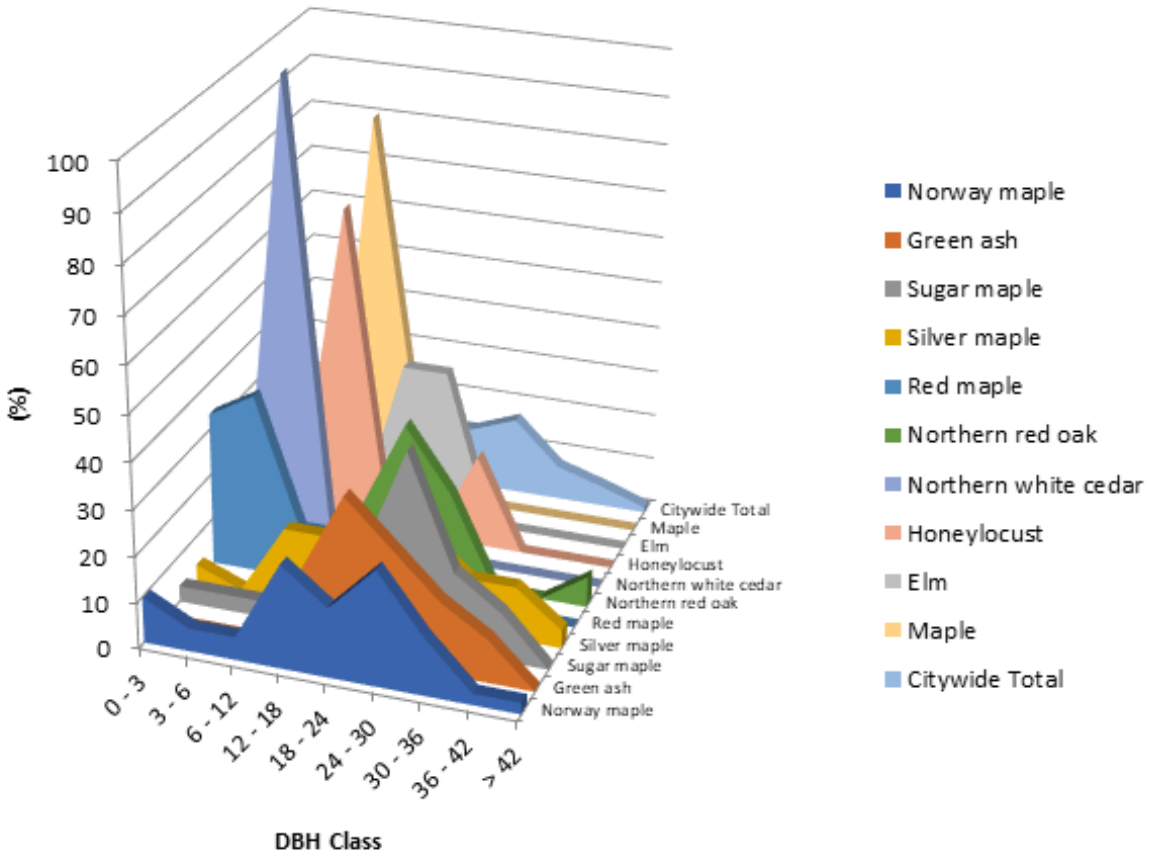
Species	Percent
Norway maple	14.8
Green ash	11.9
Sugar maple	10.7
Silver maple	9.6
Red maple	6.7
Northern red oak	5.6
Northern white cedar	4.4
Honeylocust	3.7
Elm	3.3
Maple	2.2
Other Species	27.0
Total	100.0

Figure 2: Relative Age Class

Van Horne

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

2/8/2022



	DBH class (in)								
Species	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42
Norway maple	10.00	5.00	5.00	22.50	15.00	25.00	12.50	2.50	2.50
Green ash	0.00	0.00	0.00	15.63	34.38	25.00	15.63	9.38	0.00
Sugar maple	3.45	3.45	3.45	3.45	17.24	41.38	17.24	10.34	0.00
Silver maple	3.85	0.00	15.38	15.38	19.23	19.23	11.54	11.54	3.85
Red maple	33.33	38.89	11.11	11.11	0.00	5.56	0.00	0.00	0.00
Northern red oak	13.33	13.33	0.00	13.33	33.33	20.00	0.00	0.00	6.67
Northern white cedar	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Honeylocust	0.00	10.00	70.00	0.00	0.00	20.00	0.00	0.00	0.00
Elm	22.22	11.11	0.00	33.33	33.33	0.00	0.00	0.00	0.00
Maple	0.00	0.00	83.33	16.67	0.00	0.00	0.00	0.00	0.00
Citywide Total	12.59	16.67	15.19	12.96	12.96	16.67	7.41	4.44	1.11

Figure 3: Foliage Condition

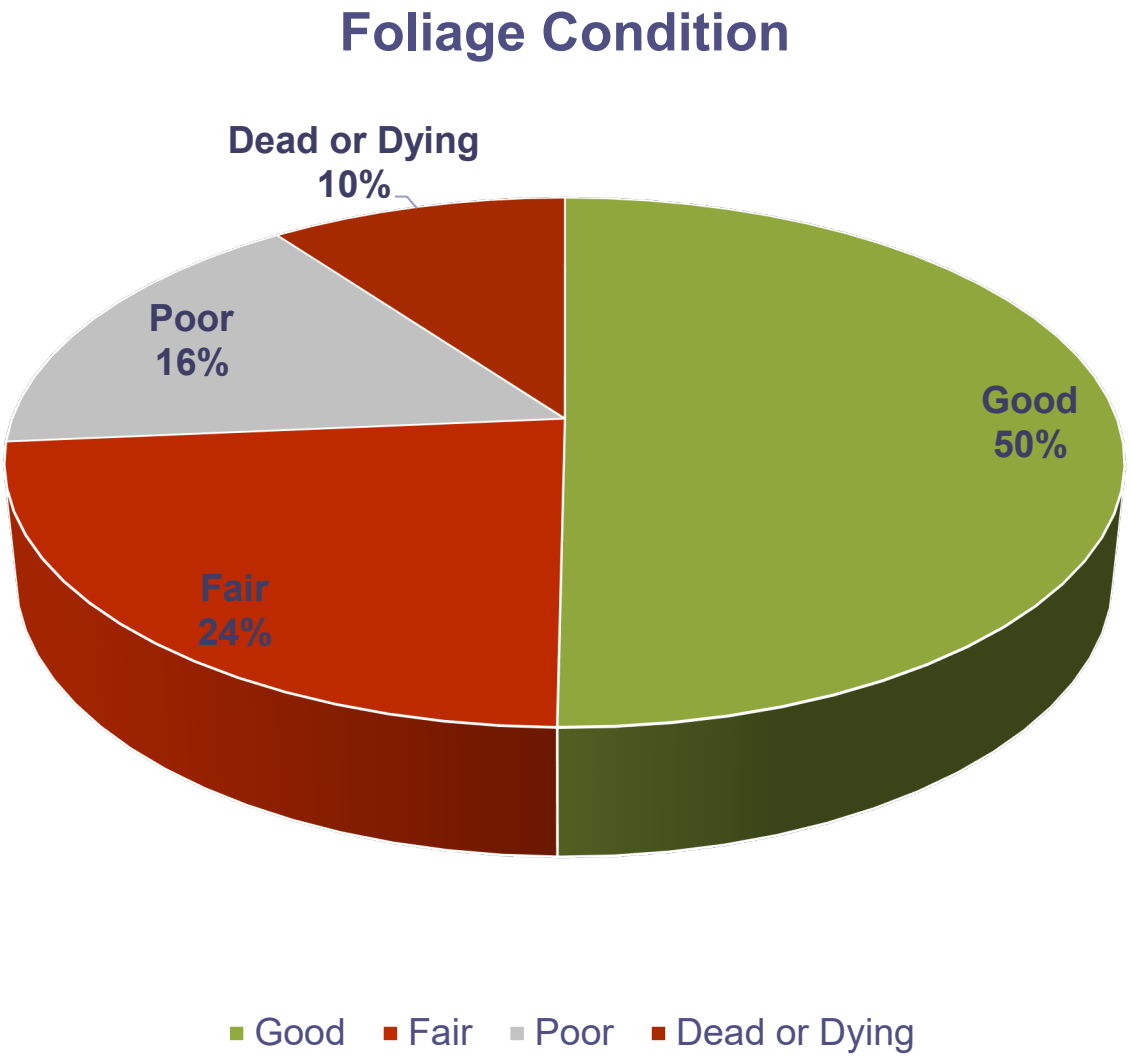


Figure 4: Wood Condition

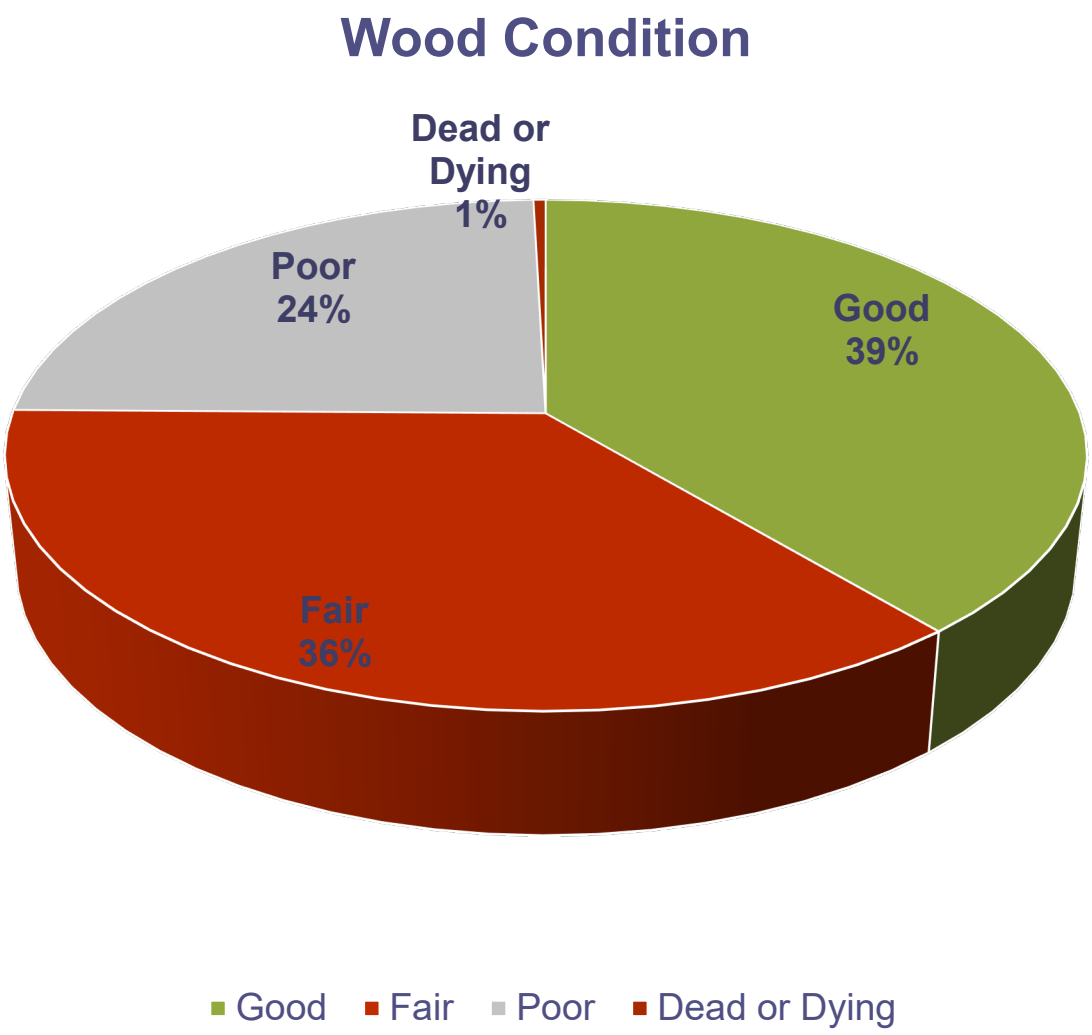
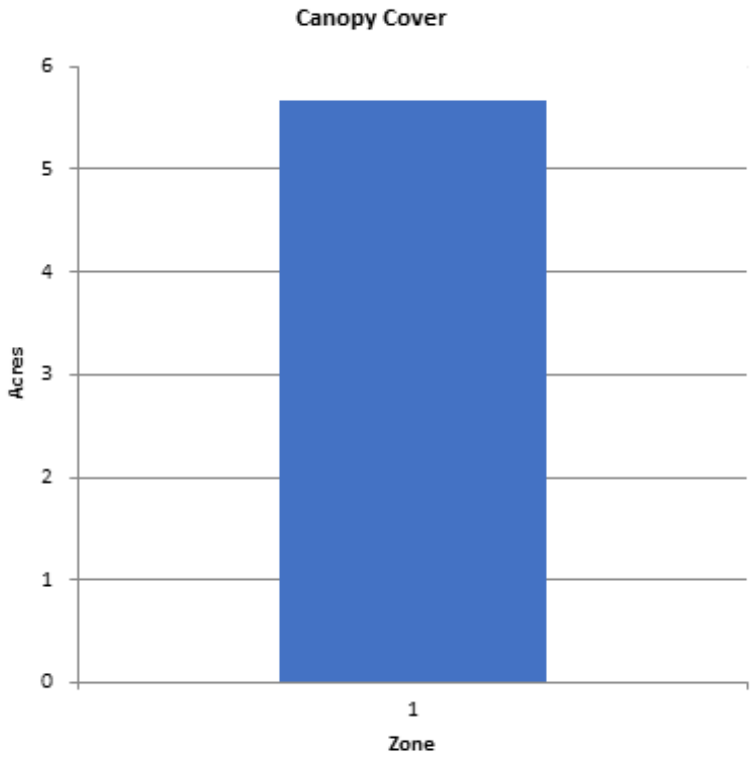


Figure 5: Canopy Cover in Acres

Van Horne

Canopy Cover of Public Trees (Acres)

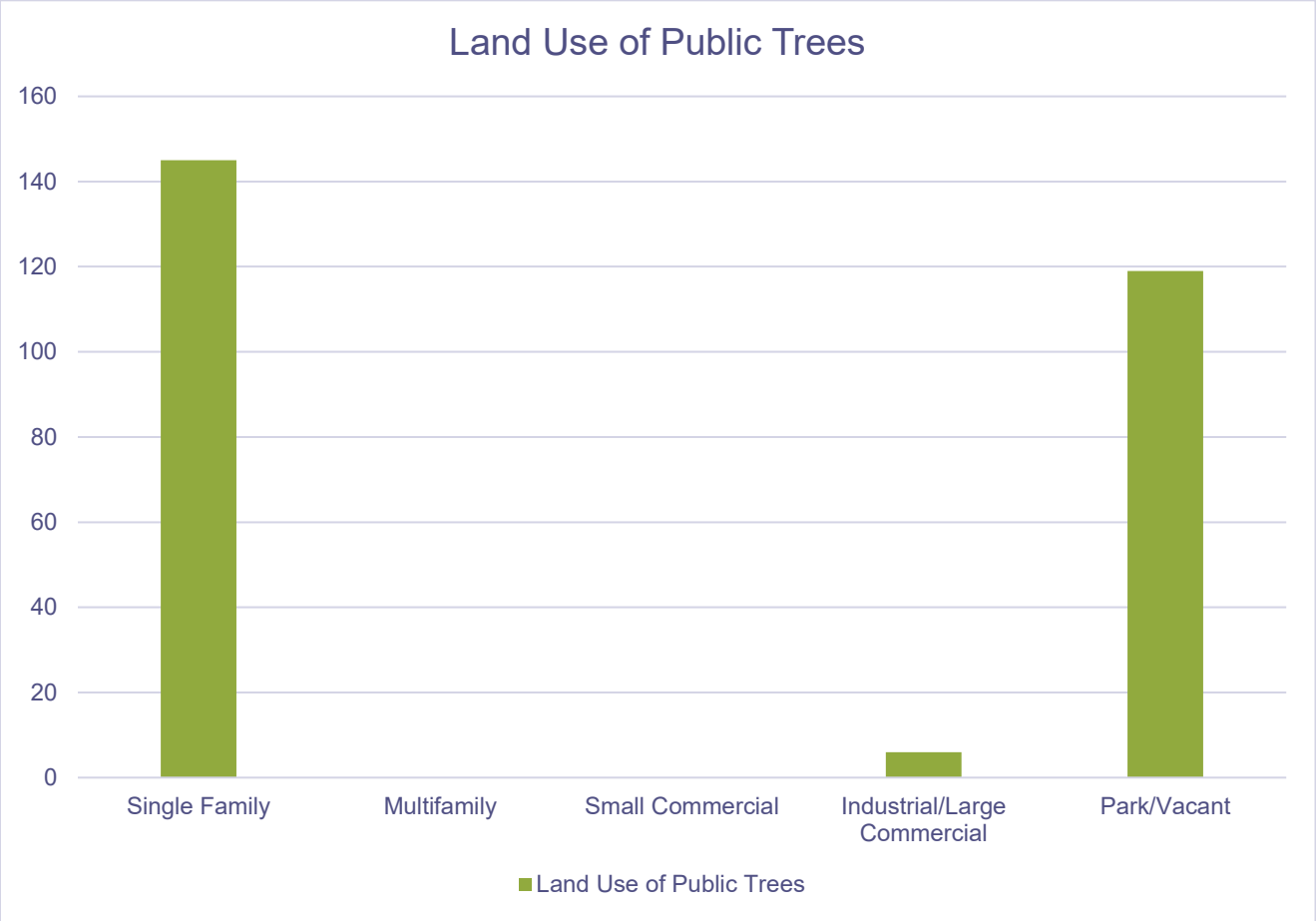
2/8/2022



Zone	Acres	% of Total Canopy Cover
1	6	100.0
Citywide total	6	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	6	0.00	0.00

Figure 6: Land Use of City/Park Trees



APPENDIX B: ArcGIS MAPPING

Figure 1: Location of Ash Trees

Figure 2: Location of EAB Symptoms

Figure 3: Location of Poor Condition Trees

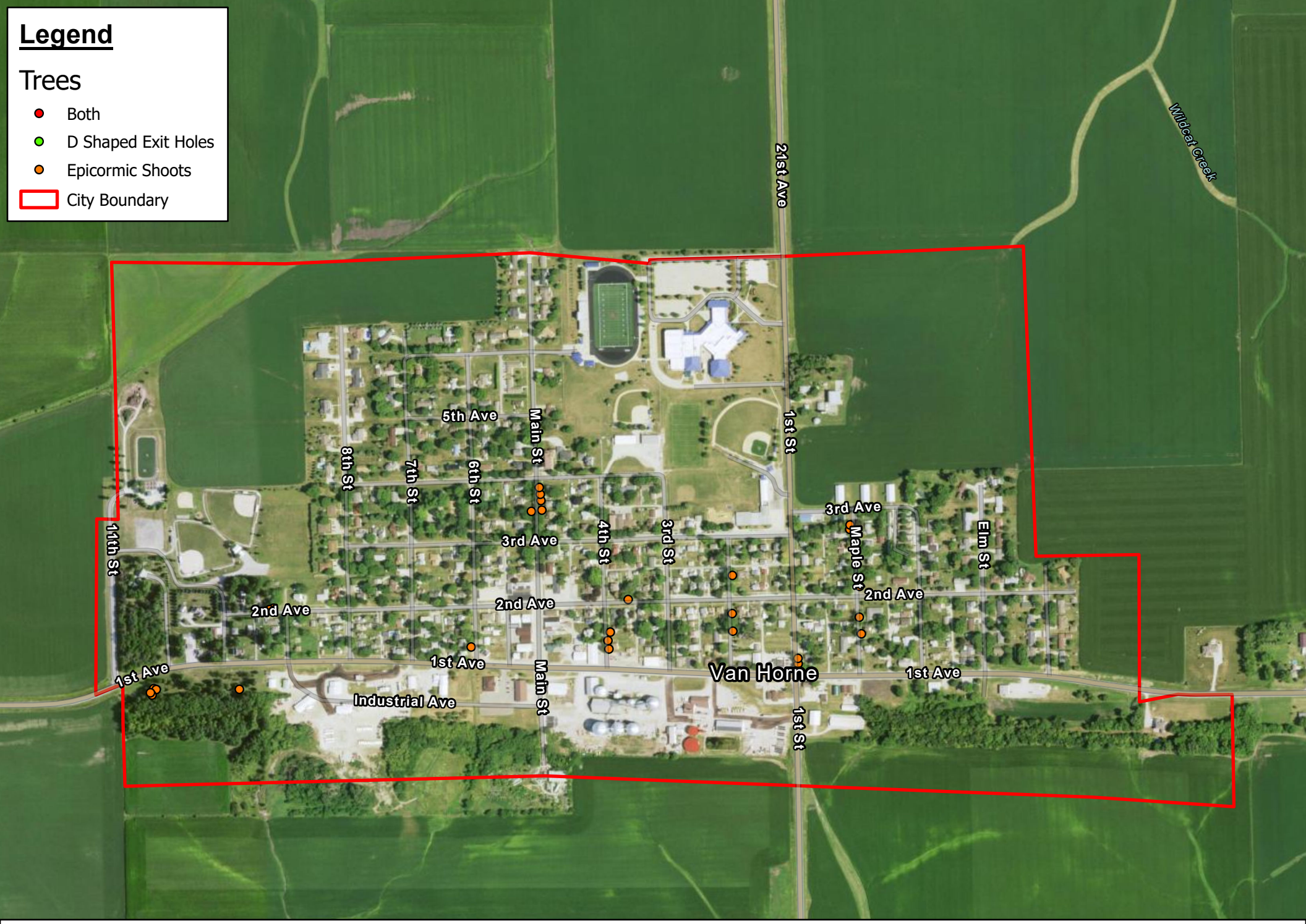
Figure 4: Location of Trees with Recommended Maintenance

City ownership of the trees recommended for removal should be verified prior to any removal

Ash Tree Location

0 345 690 1,380 Feet

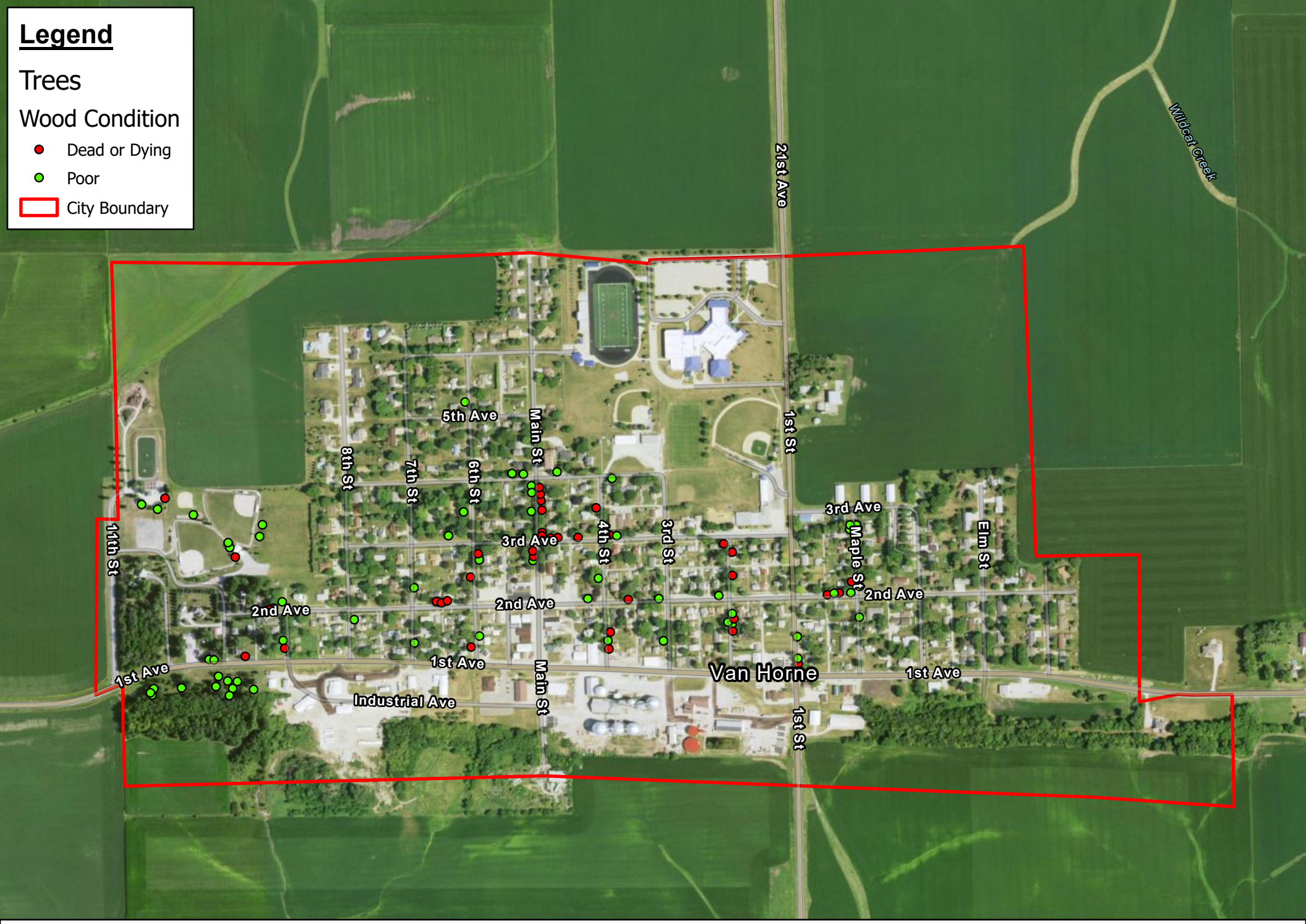
N



EAB Signs/Symptoms

0 345 690 1,380 Feet

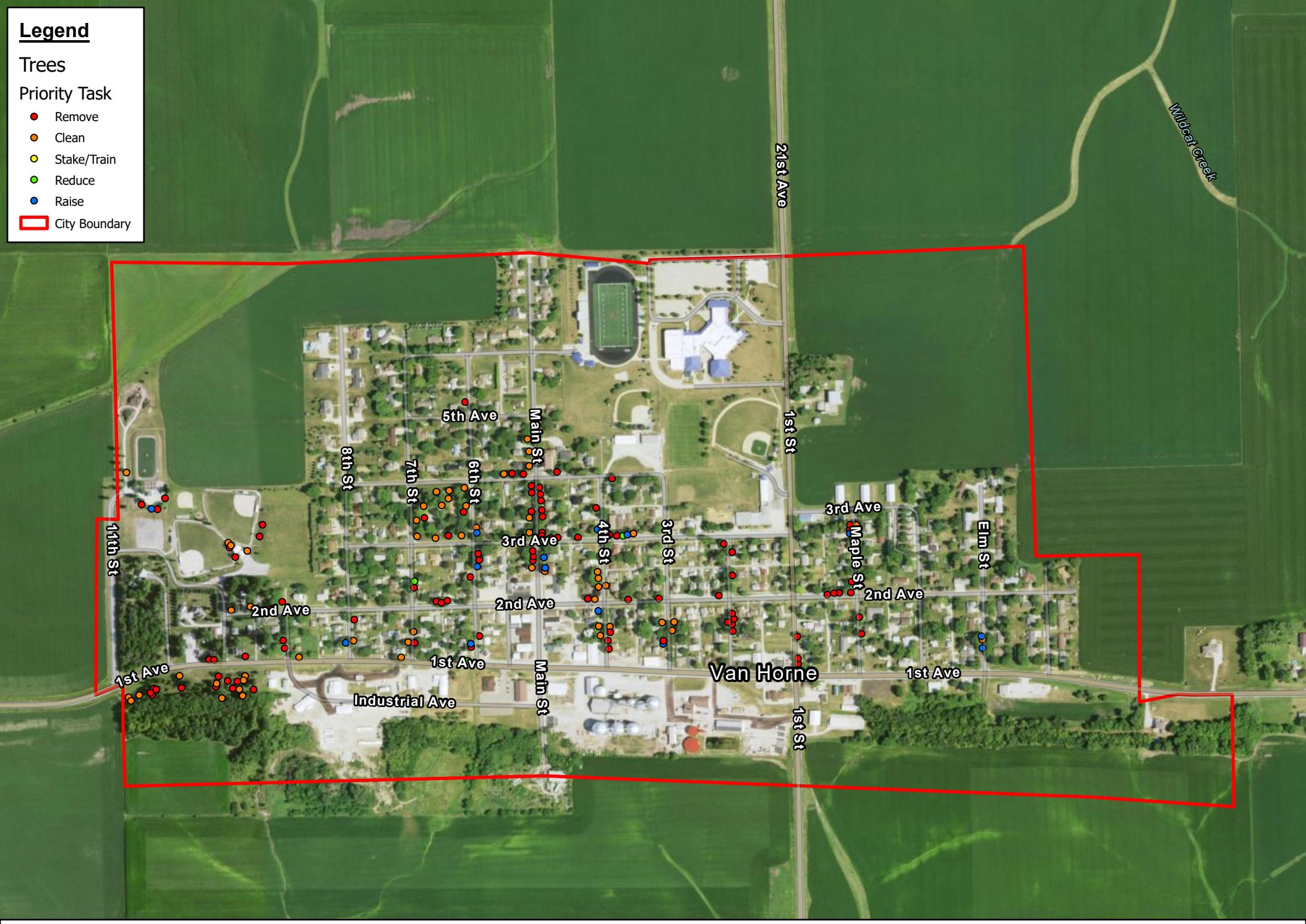
N



Poor Condition Trees

0 345 690 1,380 Feet

N



Priority Task

0 345 690 1,380 Feet

N

APPENDIX C: VAN HORNE TREE ORDINANCES

ORDINANCE NO. III: Chapter 11; 3-11-6

AN ORDINANCE TO AMEND TITLE III, CHAPTER 11
OF THE CITY CODE OF VAN HORNE, IOWA

Be it ordained by the City Council of the City of Van Horne, Iowa:

SECTION 1. Title III, Chapter 11 of the City Code of Van Horne, Iowa, is hereby amended by deleting said chapter in its entirety and inserting in lieu thereof the following, to-wit:

3-11-1 PURPOSE. The purpose of this ordinance is to beautify and preserve the appearance of the city by requiring street trees to be uniformly located and maintained.

3-11-2 DEFINITIONS.

1. "Parking" means that part of the street not covered by sidewalk and lying between the lot line and curb line or, on unpaved streets, between the lot line and that portion of the street usually traveled by vehicular traffic.

2. "Street Trees" are those trees, shrubs, bushes, and all other woody vegetation located on the parking.

3. "Park Trees" are those trees, shrubs, bushes, and all other woody vegetation located in public parks and other public places.

3-11-3 CREATION AND ESTABLISHMENT OF CITY TREE BOARDS.

1. The City Tree Board shall consist of three persons who shall be appointed by the Mayor, subject to the approval of the City Council.

2. The term of persons so appointed shall be for three years except that the term of the members of the initial City Tree Board shall be as follows: one member shall be appointed for two years and two members shall be appointed for three years. In the event a vacancy shall occur, any replacement appointed to the board shall be for the unexpired portion of the term.

3. Members of the City Tree Board shall serve without compensation.

4. The duties and responsibilities of the City Tree Board shall be as follows:

A. To prepare a written plan for the care, preservation, pruning, planting, replanting, removal or disposition of trees and shrubs in parks, along streets and in other public areas and to update the same on an annual basis.

B. Such plan, as updated, shall be presented to the City Council on an annual basis for its consideration and upon its approval shall constitute the official "Comprehensive Tree Plan" for the City.

C. The City Tree Board shall be responsible for administering the "Comprehensive Tree Plan."

D. Upon request by the Mayor or City Council, the City Tree Board shall consider, investigate, and report a recommendation as to any matter falling within their duties and responsibilities.

E. Shall establish three classes of trees: Small Trees, Medium Trees, Large Trees, and shall designate at least six species of tree within each category. This list shall be known as the "Official Street Tree Species" for the City and shall be subject to approval by the City Council.

3-11-4 PLANTING RESTRICTIONS.

1. The spacing of Street Trees will be in accordance with the three species size classes established herein and no tree may be planted closer together than the following: Small Trees, 30 feet; Medium Trees, 40 feet; Large Trees, 50 feet; except in special plantings designed or approved in writing by a landscape architect.

2. The distance trees may be planted from curbs or curb lines and sidewalks will be in accordance with the three species size classes established herein, and no trees may be planted closer to any curb or sidewalk than the following: Small Trees, 2 feet; Medium Trees, 3 feet; Large Trees, 4 feet.

3. No trees shall be planted in the area adjacent to a street corner formed by the nearest intersecting curb lines and a straight line connecting said intersecting curb lines at a point 35 feet distant along each curb line.

4. No Street Trees shall be planted closer than ten feet to any fire hydrant.

5. No Street Trees, other than those species designated as Small Trees, may be planted under or within ten feet of any overhead utility wire or over or within five lateral feet of any underground water line, sewer line, transmission line or other utility line.

6. All Street Trees shall be of sufficient size to warrant satisfactory results and withstand the abuse to which Street Trees may be subject.

7. All Street Trees shall have comparatively straight trunks, well-developed leaders and top and root characteristics of the species or variety showing evidence of proper nursery pruning. All trees must be free of insect, disease, mechanical injuries and other objectionable features at the time of planting. To compensate for any serious loss of roots, the top of the tree should be reduced by thinning or cutting back as determined by the growth characteristics of the tree species. The leader shall not be cut off in such trimming.

8. All trees now or hereafter planted in any street, avenue or highway, that interfere with the making of any improvements thereon, or with travel, or becomes dangerous, shall be removed by order of the council, and any tree planted in any street, avenue or highway shall be planted upon such condition and subject to such removal.

3-11-5 TRIMMING RESTRICTIONS.

1. All dead and diseased wood shall be removed.

2. All limbs one inch in diameter or more must be precut to prevent splitting. All limbs or branches that might injure the tree or adjacent property, streets or sidewalks shall be lowered by ropes.

3. A crossed or rubbing branch shall be removed where practicable but removal shall not leave large holes in the general outline of the tree. Crossed or rubbing branches may be cabled apart.

4. All cuts, old or new, one inch in diameter or more, shall be painted with an approved tree wound dressing. On old wounds, only exposed wood shall be painted.

5. Where there is a danger of transmitting disease by tools, said tools shall be disinfected with alcohol before use on another tree.

6. The owner of the abutting property shall be responsible for trimming of Street Trees on the adjacent parking and shall keep the Street Trees trimmed so that all branches will be at least thirteen feet above the surface of the street and ten feet above the sidewalks.

7. The owner of the abutting property shall, upon twenty days notice in writing, remove all dead, diseased, or dangerous trees, or broken or decayed limbs which constitute a danger to the public safety or property or constitute a nuisance.

8. It shall be unlawful to trim or cut in any manner, any tree in the street, avenue, highway or public place, unless such trimming or cutting shall be done under the personal supervision of the City Tree Board.

3-11-6 PUBLIC TREE CARE. The City shall have the right to plant, prune, maintain and remove trees, plants and shrubs within the lines of all streets, alleys, avenues, lanes, squares and public

grounds, as may be necessary to insure public safety or to preserve or enhance the symmetry and beauty of such public grounds. The City may remove or cause or order to be removed, any tree or part thereof which is in an unsafe condition or which by reason of its nature is injurious to sewers, electric power lines, gas lines, water lines, or other public improvements, or is infected with any injurious fungus, insect or other pest, in the same manner as provided in Section 3-11-8, below.

3-11-7 TREE TOPPING. It shall be unlawful as a normal practice for any person, firm, or City department to top any Street Tree, Park Tree, or other tree on public property. Topping is defined as the severe cutting back of limbs to stubs larger than three inches in diameter within the tree's crown to such a degree so as to remove the normal canopy and disfigure the tree. Trees severely damaged by storms or other causes, or certain trees under utility wires or other obstructions where other pruning practices are impractical may be exempted from this ordinance at the determination of the City Tree Board. No topping shall occur without the prior consent of the City Tree Board.

3-11-8 DEAD OR DISEASED TREE REMOVAL. The City shall have the right to cause the removal of any dead or diseased trees on private property within the city, when such trees constitute a hazard to life and property, or harbor insects or disease which constitute a potential threat to other trees within the city. The City Tree Board will notify in writing the owners of such trees. Removal shall be done by said owners at their own expense within twenty days after the date of service of the notice. In the event of failure of owners to comply with such provisions, the City shall have the authority to remove such trees and assess the cost thereof to the property owner.

3-11-9 REMOVAL OF STUMPS. All stumps of Street and Park Trees shall be removed below the surface of the ground so that the top of the stump shall not project above the surface of the ground.

3-11-10 INTERFERENCE WITH CITY TREE BOARD. It shall be unlawful for any person to prevent, delay or interfere with the City Tree Board, or any of its agents, while engaging in and about the planting, cultivating, mulching, pruning, spraying, or removing any Street Trees, Park Trees or trees on private grounds, as authorized in this ordinance.

3-11-11 TREE TRIMMERS.

1. Purpose. The purpose of this Section is to protect and preserve the public safety and well being by issuing permits to tree trimmers and tree surgeons.

2. Tree Trimmer Defined. The words "tree trimmer" and "tree surgeon" as used herein shall mean any person, firm or corporation who solicits or performs the work of felling trees, or who cuts or trims any tree or limbs or branches of any tree, or who offers services in the diagnosis and treatment of diseases of any tree, for a valuable consideration.

3. Permit Required. It shall be unlawful for any person to engage in the activity of tree trimmer as herein defined without a valid permit from the City.

4. Application. Application for a tree trimmer's permit shall be made in writing to the clerk on forms furnished by said clerk. The application shall include:

A. Name and address. The applicant's full name and address and if a corporation the names and addresses of its principal officers.

5. Insurance Required. Each applicant shall also have filed a certificate of insurance indicating that he is carrying public liability insurance in effect for the duration of the permit covering himself and his agents and employees for the following amounts:

Personal Injury - $100,000.00 per person
Property Damage - $50,000.00

6. Permit Issued. Upon completion of the application, filing insurance certificate, and payment of the required fee the clerk shall issue a license.

7. Public Safety. At all times when working in the City of Van Horne, the permit holder shall maintain adequate warning signs and by the use of barricades or otherwise shall take reasonable precautions to insure that no injury is done to persons or property.

8. Time Limit. No tree trimmer shall permit or allow any tree limbs, branches, clippings or other debris to remain upon any street or other public way for a period of more than four (4) hours without having first secured the written approval of the City.

9. Removal by the City. In the event any tree trimmer is found to be in violation of Section 8 above, the City is authorized to remove such material and assess the costs thereof against the permit holder and the surety on his bond.

10. The provisions of Section 6 requiring insurance shall not apply in the following cases:

A. Where the tree trimmer or tree surgeon does not cut or trim any tree within the city of Van Horne in excess of twenty feet in height.

B. Where the tree trimmer or tree surgeon does not cut or trim any branch in excess of six inches in diameter or any part of which is more than twenty feet above the surface of the ground.

C. Where the tree to be cut or trimmed has been felled and is lying upon the surface of the ground.

11. Each applicant for a permit shall, as a condition to the issuance of said permit, execute and deliver, in a form approved by the City, an agreement to indemnify and hold harmless the City from the liability arising from services rendered by the applicant as a tree trimmer or tree surgeon.

12. Exemption. A city employee directed by the Van Horne City Council or Mayor to trim a tree or trees shall be exempt from the requirements of this Section.

SECTION 2. This ordinance which is an amendment to the City Code of Van Horne, Iowa, shall be in full force and effect from and after proceedings required by law in connection therewith and from and after its final passage and publication as provided by law.

Passed and approved by the Van Horne City Council this 9th day of December, 1996.

Ilene Strellner, Mayor

ATTEST:

Sandra S. Gibney, City Clerk

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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 515-725-8200.