TREE INVENTORY SUMMARY REPORT

VILLAGE OF PERRY, NEW YORK

AUGUST 8, 2019

wendel

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1 – INTRODUCTION

Most trees and shrubs in communities are planted to provide beauty or shade. While these are excellent benefits, woody plants serve many other purposes. The benefits of trees can be grouped into social, communal, environmental, and economic categories.

Social Benefits

Human response to trees goes well beyond simply observing their beauty. We feel serene, peaceful, restful, and tranquil in a grove of trees. We are "at home" there.

The calming effect of nearby trees and greening can significantly reduce workplace stress levels and fatigue, calm traffic, and even decrease the recovery time needed after surgery. Trees can also reduce crime.

The stature, strength, and endurance of trees give them a cathedral-like quality. Because of their potential for long life, trees are frequently planted as living memorials. We often become personally attached to trees that we, or those we love, have planted.

The strong tie between people and trees is often evident when community residents speak out against the removal of trees or rally to save a particularly large or historic tree.

Communal Benefits

The benefits provided by large trees reach well out into the community. Large growing trees, however, can come into conflict with utilities, views, adjacent structures and pavements. With proper selection and maintenance, trees can enhance and function within the public right of way without infringing on the rights and privileges of neighbors.

Community trees often serve several architectural and engineering functions. They provide privacy, emphasize views, or screen out objectionable views. They reduce glare and reflection. They direct pedestrian traffic. Trees also provide background to and soften, complement, or enhance architecture.

Trees bring natural elements and wildlife habitats into urban surroundings, all of which increase the quality of life for residents of the community.

Environmental Benefits

Trees alter the environment in which we live by moderating climate, improving air quality, reducing storm water runoff, and harboring wildlife. Local climates are moderated from extreme sun, wind, and rain. Radiant energy from the sun is absorbed or deflected by leaves on deciduous trees in the summer and is only filtered by branches of deciduous trees in winter. The larger the tree, the greater the cooling effect. By using trees in communities, we can moderate the heat-island effect caused by pavement and buildings.

Wind speed and direction is affected by trees. The more compact the foliage on the tree or group of trees, the more effective the windbreak. Rainfall, sleet, and hail are absorbed or slowed by trees, providing some protection for people, pets, and buildings. Trees intercept water, store some of it, and reduce storm water runoff.

Air quality is improved through the use of trees, shrubs, and turf. Leaves filter the air we breathe by removing dust and other particulates. Rain then washes the pollutants to the ground. Leaves absorb the greenhouse gas carbon dioxide during photosynthesis and store carbon as growth. Leaves also absorb other air pollutants – such as ozone, carbon monoxide, and sulfur dioxide – and release oxygen.

By planting trees and shrubs, we return developed areas to a more natural environment that is attractive to birds and wildlife. Ecological cycles of plant growth, reproduction, and decomposition are again present, both above and below ground. Natural harmony is restored to the urban environment.

Economic Benefits

Property values of landscaped homes are 5 to 20 percent higher than those of non-landscaped homes.

Individual trees and shrubs have value, but the variability of species, size, condition, and function makes determining their economic value difficult. The economic benefits of trees are both direct and indirect.

Direct economic benefits are usually associated with energy costs. Air-conditioning costs are lower in a tree-shaded home or building. Heating costs are reduced when a home or building has a windbreak.

Trees increase in value as they grow. Trees, as part of a well maintained landscape, can add value to your community.

The indirect economic benefits of trees within a community are even greater. Customers pay lower electricity bills when power companies build fewer new facilities to meet peak demands, use reduced amounts of fossil fuel in their furnaces, and use fewer measures to control air pollution. Communities can also save money if fewer facilities must be built to control storm water in the region. To the individual, these savings may seem small, but to the community as a whole, reductions in these expenses are often substantial.

Trees Require an Investment

Trees provide numerous aesthetic and economic benefits, but also incur some costs. Investing in a tree's maintenance will help to return the benefits you desire. The costs associated with large tree removal and replacement can be significant. In addition, the economic and environmental benefits produced by a young replacement tree are minimal when compared to those of a mature specimen. Extending the functional lifespan of large, mature trees with routine maintenance can delay these expenses and maximize returns.

An informed owner is responsible for tree maintenance practices. Corrective pruning and mulching gives young trees a good start. Shade trees, however, quickly grow to a size that may require the services of a professional arborist. Arborists have the knowledge and equipment needed to prune, treat, fertilize, and otherwise maintain a large tree.

TREE INVENTORY PROCESS

The street tree inventory data was collected by an ISA Certified Arborist for the existing trees located within the managed Right-of-Way, as well as Village Park and Barney Kalise Park in the Village of Perry over the course of two months during the summer of 2019. The available planting locations were added to the inventory by Village Tree Board volunteers in an effort to reduce costs and allow the Arborist to focus on existing tree condition and recommendations.

The planting location collection team was made up of volunteers from the Village. Wendel provided training for the volunteers for entering in the data, which included the address, planting space type and size, as well as the presence of primary overhead power lines. Wendel also provided on site quality assurance to back check approximately 5% of the collected planting space data. The locations were obtained using Apple iPads with Wi-Fi/4G LTE connectivity.

The tree diameters were measured at Diameter at Breast Height (DBH) using dendrometers.

The maintenance recommendations found in this report were determined from ground level observations of the trunk, large branches and canopy of each tree and included only a visual inspection of accessible components. No excavation of soil was performed to examine the condition of the roots or root plate. The trees were not inspected using an aerial lift, climbing or ladders. No instruments were used to probe or sound the interior of the tree to determine the extent of internal decay such as drills, increment borers, resistographs or hammers. Existing trees that warranted a more detailed assessment were noted in the inventory. It is recommended the Village engage an arborist with the equipment necessary to perform a more detailed assessment on these noted trees.

Existing trees with a “None” recommendation did not exhibit the minimum requirements for the tree to have a prune or remove recommendation as described below. The “None” recommendation as determined at the point in time the observation occurred should not be misconstrued to indicate that no maintenance is required.

Pruning recommendations were further defined in one of four priorities:

- Crown cleaning – Pruning of deadwood, dying and damaged.
- Crown raising / reducing - Pruning recommended on trees observed having limbs or branches approximately less than 10-feet in height over a sidewalk or 14-feet in height over a road. The purpose of crown raising to provide adequate clearance for pedestrians and vehicles. Reduction pruning was noted if branches were in contact with houses or other structures.
- Training – Pruning recommended for younger trees to help develop a central leader, removal of lower scaffold branches that may interfere with sidewalks and roadways as the tree matures.
- Public safety - A condition was observed that presents a required course of action be initiated to reduce the risk to an acceptable level. May include a broken hanging limb, very large deadwood or other condition that may be mitigated through pruning the affected portions of the tree. Trees observed and assigned this priority were brought to the attention of the Village Department of Public Works.

Removal recommendations were indicated for trees that were dead or dying, or if the tree appeared to be structurally compromised. Trees assigned a removal recommendation will follow the Village's standard procedures for removal, including follow up tree observations by Village staff.

Removal recommendations were further defined in one of three priorities:

- Dead or Dying
- Structural defect – Observation of large cavities or decay in stem or scaffold branches.
- Public safety - A condition was observed that presents a required course of action be initiated to reduce the risk to an acceptable level. May include an actively cracked stem or uprooting tree. Trees observed and assigned this priority were brought to the attention of the Village Department of Public Works.

Please note that condition is a subjective rating and will vary between individuals. Condition does not equal maintenance. Trees, as they age, will lose their interior branches. So a tree with a few dead limbs, which is normal, will be in good condition. The five condition categories and their criteria are as follows:

Good - Healthy and vigorous, no apparent mechanical, insect or disease damage, form representative of species, routine pruning may be necessary.

Fair – Average condition and vigor of species, may lack desirable form or characteristics of species, minor mechanical, insect or disease damage, and may require corrective pruning or action.

Poor – General state of decline, exhibits mechanical, insect or disease injury, death not imminent, may require major repair or renovation.

Dead or Dying – Tree is dead or death is imminent within 2 to 3 years.

Other Non-tree locations such as planting spaces or stumps.

METHODOLOGY FOR CHARTS, GRAPHS AND FINDINGS

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and community forestry analysis and benefits assessment tools. The i-Tree tools help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and assessing the structure of the urban forest.

The tree inventory data collected was imported into i-Tree Streets. Streets was developed by a team of researchers at the USDA Forest Service, PSW Research Station's Center for Urban Forest Research in Davis, CA. The Streets application was conceived and developed by Greg McPherson, Scott Maco, and Jim Simpson. James Ho programmed STRATUM. The numerical models used by Streets to calculate tree benefit data are based on years of research by Drs. McPherson, Simpson, and Qingfu Xiao (UC Davis). Reference city data on tree growth and geographic variables were developed under the direction of Paula Peper, Kelaine Vargas, and Shelley Gardner.

PESTS AND DISEASES OBSERVED WITHIN THE VILLAGE

The following pests were observed, but may not be specifically recorded within the tree inventory.

Honeylocust Plant Bug

The Honeylocust Plant Bug is found exclusively on Honeylocust trees, both nymphs and adults can feed on the foliage with piercing-sucking mouthparts, although nymphs cause the most damage. In early spring young nymphs crawl into unfolding leaves and begin feeding just after bud break. Feeding could result in leaf rolling, distortion, stunting, and chlorosis. Heavy infestations may cause complete defoliation of the host, although tree death rarely occurs. The most common damage is leaf distortion, discoloration, and dwarfed leaflets

Within the Village no severe breakout of this insect was observed during the inventory. The damage caused is aesthetic and does not affect the longevity of the trees. If the population should experience an influx the nymphs may be knocked off leaves with a high-pressure spray of water.

Apple Scab

Scab appears on leaves as roughly circular, velvety, olive-green spots on both the upper and lower leaf surfaces. The spots eventually turn dark green to brown. Heavily infected leaves may curl up, become distorted in shape, turn yellow and fall off. Highly susceptible crabapple varieties may lose most of their leaves by mid-summer. The premature leaf drop weakens the trees somewhat, but usually doesn't kill them. The damage is mainly aesthetic. Heavily defoliated trees are unattractive.

Ants

Carpenter ants normally do not need to be controlled in trees because they usually cause little or no damage to the tree.

Carpenter ants build their nests by hollowing out rotting wood located in trunks, limbs or roots; they do not eat the wood. Carpenter ant nests in trees are an indication of rotting wood.

Emerald Ash Borer

The emerald ash borer (Agrilus planipennis) is a green beetle native to Asia and Eastern Russia. Outside its native region, the emerald ash borer (also referred to as EAB) is an invasive species, and emerald ash borer infestation is highly destructive to ash trees in its introduced range. The beetle has been found with the Village limits. Yearly health assessments should be performed on the ash population to determine if a tree has to be removed before it become a liability.

Tar Spot

Rhytisma acerinum is a plant pathogen that commonly affects sycamores and maples, predominantly Norway maples, in late summer and autumn, causing Tar like Spots on the foliage. Tar Spot does not usually have an adverse effect on the trees' long-term health. R. acerinum is an Ascomycete fungus that locally infects the leaves of trees and is a biotrophic parasite. The disease is cosmetic and is therefore usually controlled only with sanitation methods.

2 – KEY FINDINGS

- 1,471 inventory locations are included in the database
- 1,053 existing trees were inventoried including street and park trees.
- 887 street trees and 166 park trees were inventoried.
- 418 available planting spaces were identified within the street right of way.
- 66% street and park trees combined were determined to be in good condition.
- 68% of the street tree inventory locations a tree exists.
- The replacement value of the inventoried trees is $6,547,000[1]
- The inventoried trees provide an annual benefit to the Village of $117,840.
- 2.1 Million gallons of rain water is intercepted annually.
- 7.5 Million pounds of carbon dioxide is stored in the urban forest as a result of sequestration.
- 61% of the trees inventoried are in the genus Acer.
- In general the tree population is aging without a strong stock of younger trees to replace the resource.

[1] Replacement values are estimates of the full cost of replacing trees in their current condition, should they be removed for some reason. Species ratings, replacement costs, and basic prices were obtained for each species in each reference city from regional appraisal guides. Because of the approximations used in these calculations, replacement values are first-order estimates for the population and are not intended to be definitive on a tree-by-tree basis.

3 – INVENTORY SUMMARY

DIAMETER DISTRIBUTION

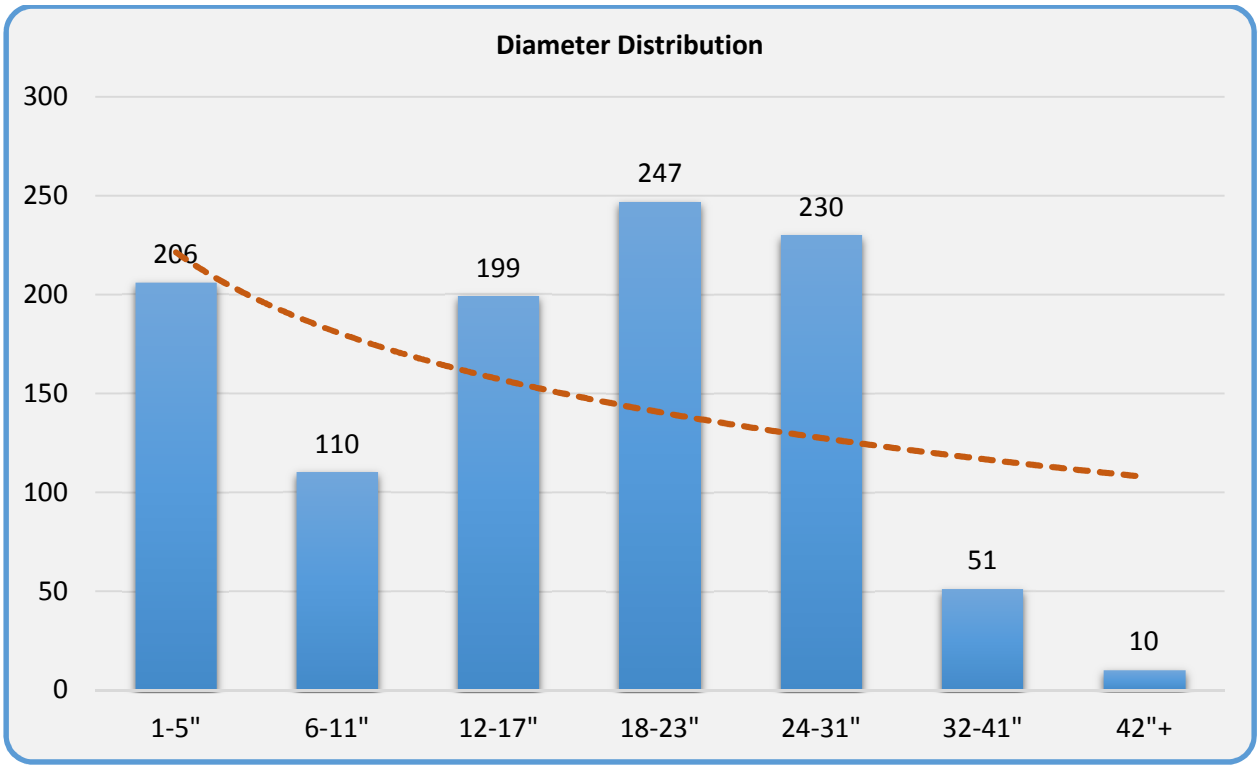

Table 1. Diameter Distribution by Size class.

Using size as a proxy for age, Richards identified an "ideal" distribution for municipal forests as having about 40% of the urban tree population in the smallest diameter class.[1] Too many in the smallest class means the urban area is not yet receiving the full benefits of a tree canopy. Larger trees do offer more ecological benefits to a community, such as, storm water retention and energy savings. When too many trees are in the larger diameter classes, concerns arise about mortality and replacement.

Whenever possible, it is recommend to plant larger growing trees to maximize benefits in areas where they would not be a nuisance and smaller growing trees where it is more applicable.

The smaller size class of 0-6" DBH has 206 trees of various species comprising approximately 20% of the urban forest. Many of the trees found in this size class have been planted in the last 5-10 years. A minority, 40% of the trees in this size class are expected to become large trees at maturity.

As Table 1 indicates, the Village has recently engaged in a street tree planting program resulting in a trend curve starting to reach towards the ideal diameter distribution. The Village is encouraged to continue with a street tree planting program to renew the resource as the larger or older trees decline and are removed. An urban forest that has a large percentage of young trees is one that supports the variety of values the urban forest provides as the population ages.

[1] Richards, N.A., 1983. Diversity and stability in a street tree population. *Urban Ecology*. 7: 159-171

SPECIES DISTRIBUTION

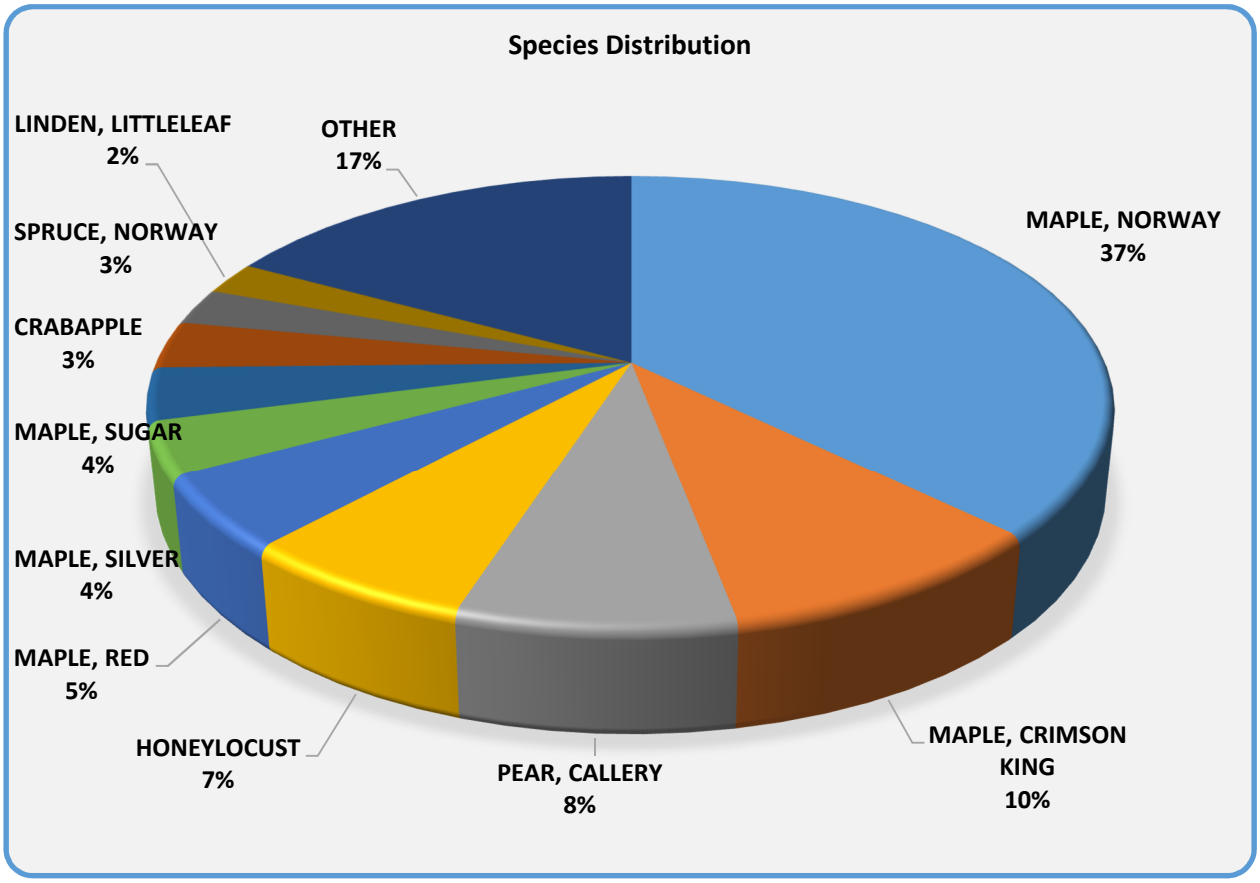

Table 2. Species Distribution.

The current street tree population lacks diversity. Urban foresters and municipal arborists should use the following guidelines for tree diversity within their area of jurisdiction: (1) plant no more than 10% of any species, (2) no more than 20% of any genus, and (3) plant no more than 30% of any family.[2]

The genus Acer (Maple), which includes, but not limited to silver, red, sugar and hedge maples comprises approximately 61% of the street tree population. This percentage well exceeds the 20% guideline and demonstrates that the Village should endeavor to diversify its tree population.

Species diversity is important to prevent the sudden loss of a large amount of the tree canopy at one time due a disease or insect. The Asian Long Horned Beetle feeds primarily on maple trees, but will also impact birch, common horsechestnut, elm, hackberry, London plane, mountain ash, poplar, aspen, and willow. If this insect should become established in the Village it could mean the loss of over 60% of the current tree population. As the Village plans future plantings, a variety of genus and species should be considered to ensure the diversity of the overall tree population continues.

[2] Trees for Urban Planting: Diversity, Uniformity and Common Sense; Santamour

GENUS DISTRIBUTION

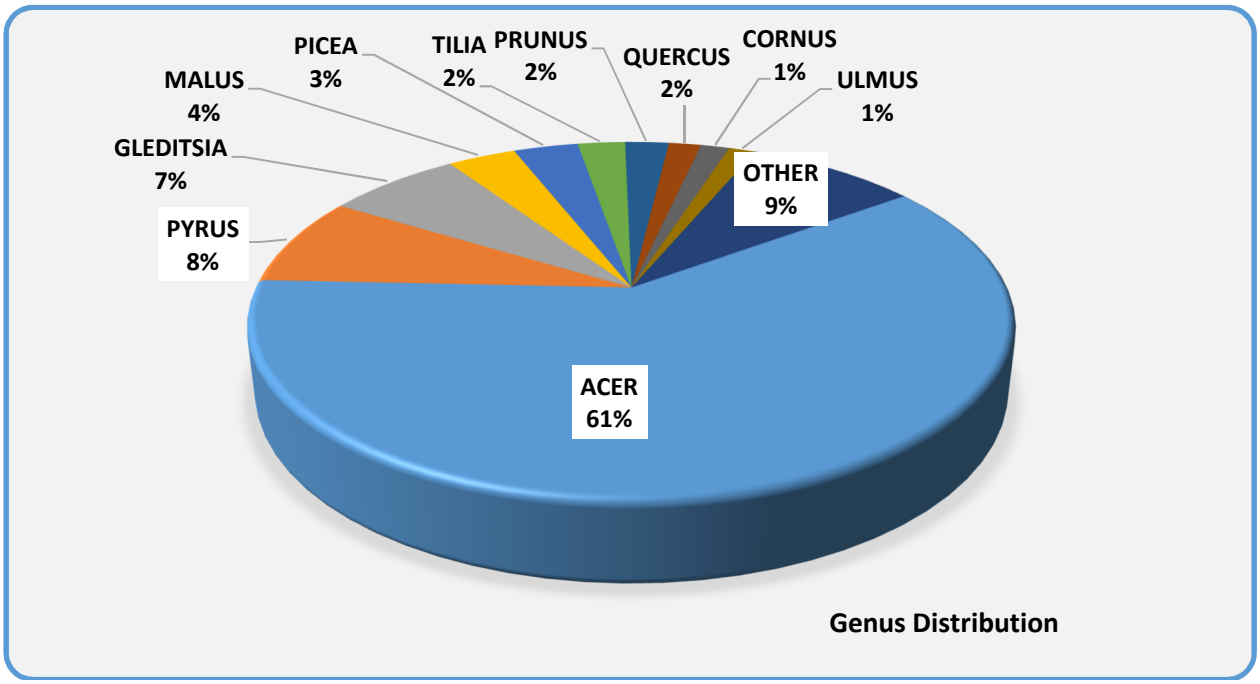

Table 3. Genus Distribution

Considering the majority of the trees, 630 in total, are within the Acer genus a closer look was taken at the diameter distribution for this genus. Table 4 indicates that a majority of the Acer inventoried are maturing trees, or planted some time ago. It is noted that 106 of the Acer genus are trees less than 12" DBH, which is approximately 10% of the total inventoried population.

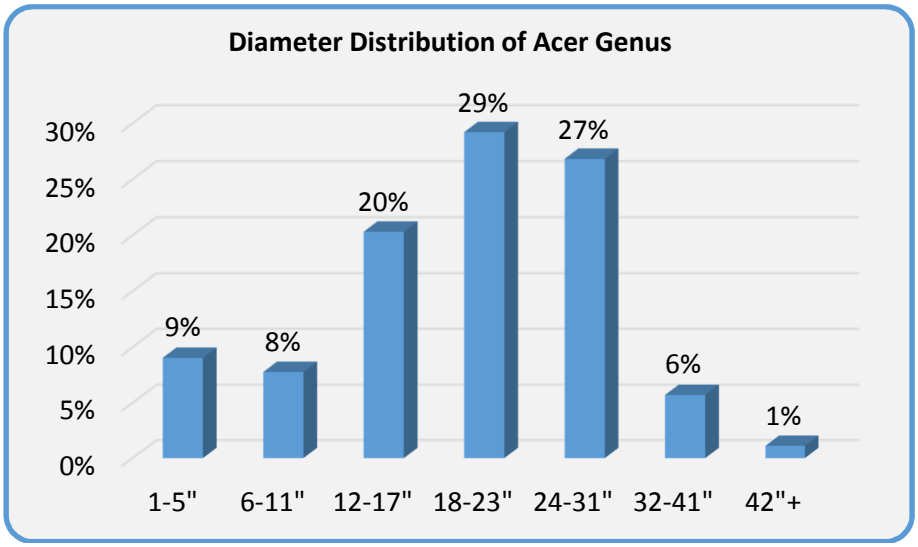

Table 4. Diameter Distribution for Acer Genus

TREE CONDITION

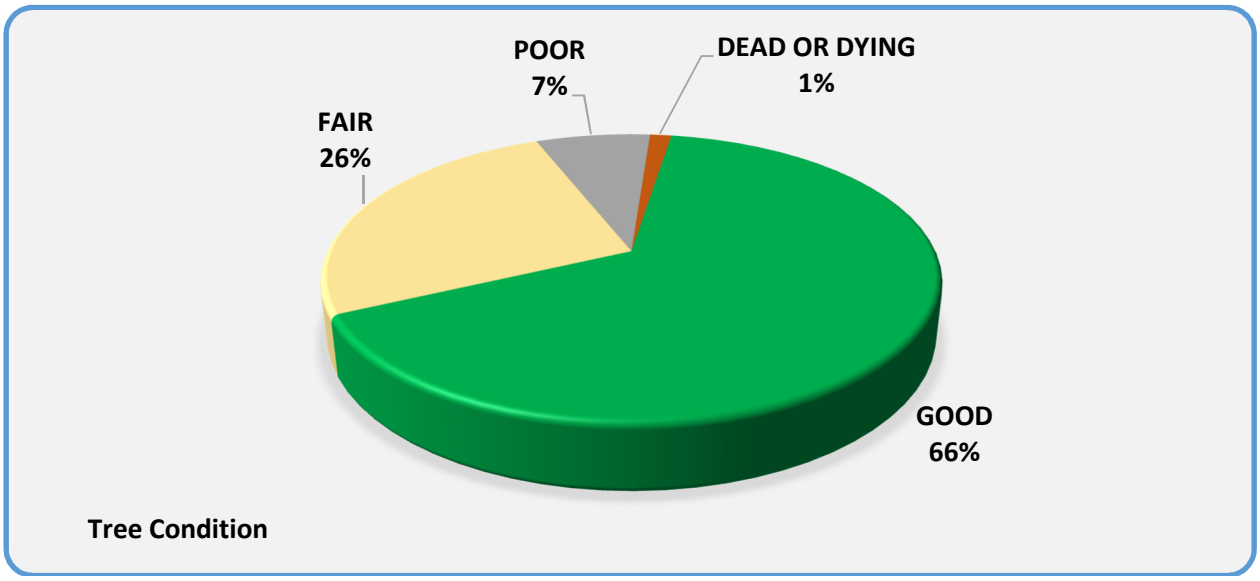

Table 5. Tree condition of tree population.

The tree population was determined to be 66% in Good condition. It should be noted that Good classification is only an indication of a tree being healthy and vigorous, no apparent mechanical, insect or disease damage, good form representative of species, and still be recommended for routine pruning. In some cases trees found in Fair condition, 26%, may only need corrective pruning to correct poor form or to remove deadwood to bring the tree up to a good condition rating.

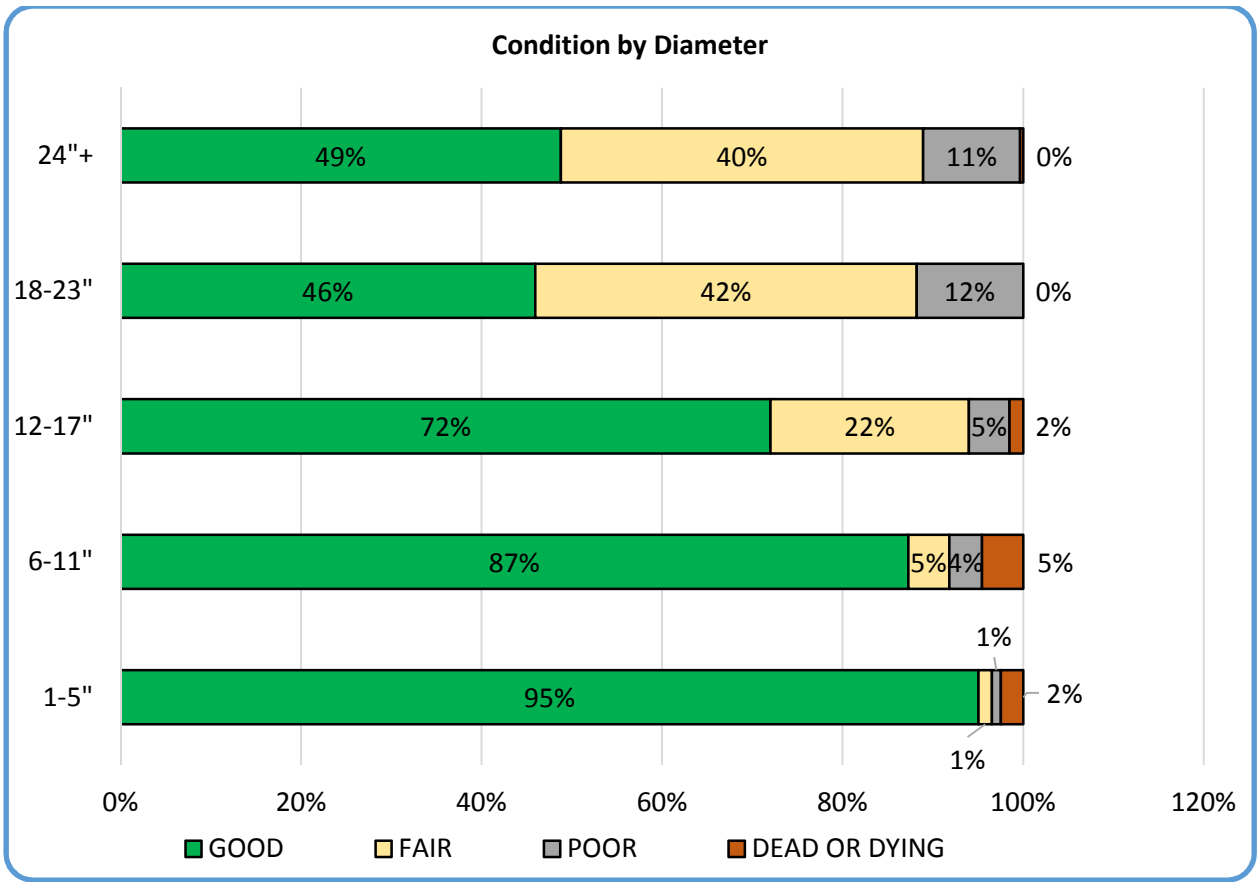

Table 6. Tree condition of tree population by size class.

The highest percentage of dead or dying were found in the younger 1-5" and the 6-11" inch diameter class. A majority of the trees in the 0-6 inch class have been recently planted, some decline is expected due to stress from planting, poor soil conditions or improper planting methods. It is recommended the Village track any trees that fail to determine what the determining factor may be so it can be prevented for future plantings.

MAINTENANCE DISTRIBUTION

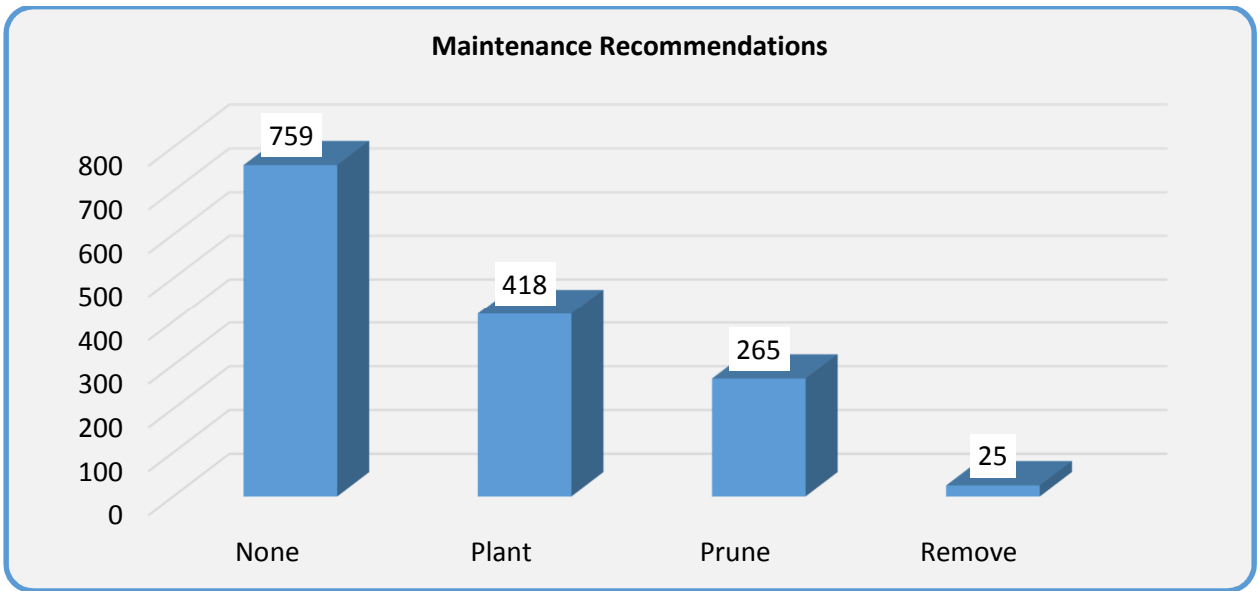

Table 7. Maintenance Recommendations

A majority of the trees inventoried do not have a recommended maintenance associated with it. This is a result of the guidelines that were established for the data collection. If a tree did not exhibit the factors required for either a pruning or removal recommendation the default recommendation was no maintenance.

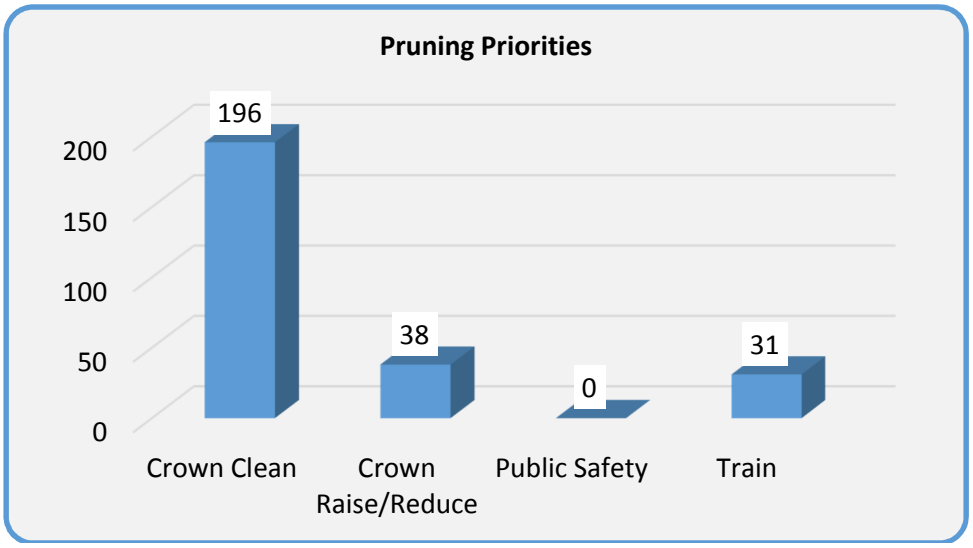

Table 8. Pruning Priorities

Pruning was the most prevalent recommended maintenance for trees within the Village. Of the 265 pruning recommendations a majority of them were for the removal of deadwood, or crown cleaning. It is common for trees to develop deadwood and it is not always an indication of poor health. Trees shed interior branches as they become shaded out by new canopy growth. Four public safety priorities, broken branches, were brought to the attention of the DPW and were addressed.

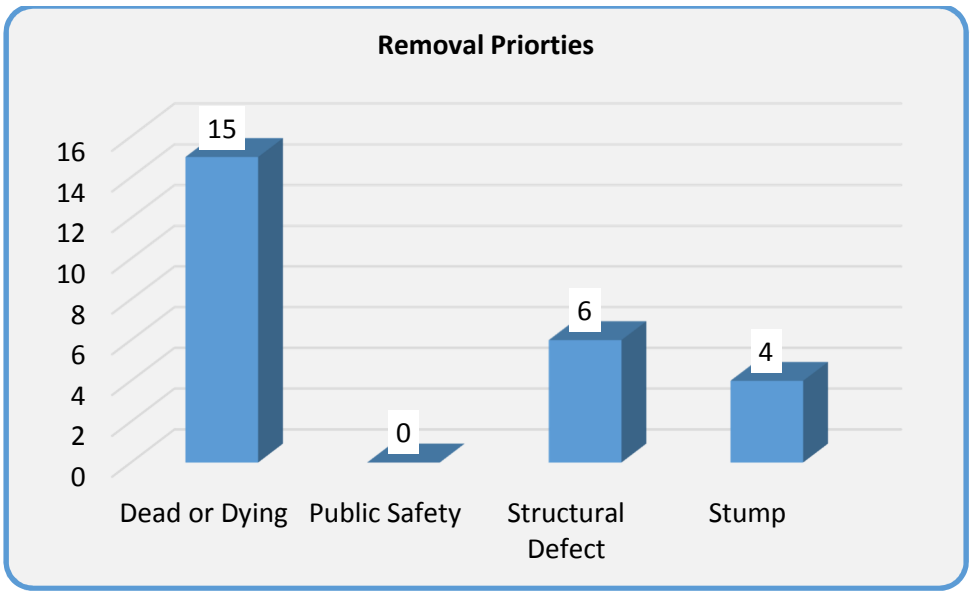

Table 9. Removal Priorities

Of the 25 removal recommendations 21 were trees and 4 were stumps. A majority of the removal recommendation were prioritized as trees that were dead or dying with a majority of these trees being smaller in diameter. The trees with structural defects were primarily larger, greater than 24" DBH Norway Maple. One public safety priority, a tree with a cracked trunk, was brought to the attention of the DPW and was addressed accordingly.

PLANTING SITE CHARACTERISTIC

The Village currently has a majority of their planting strips with 4 feet or greater growing space. The larger the growing space the potential for a large mature tree the site can accommodate. It should be noted that approximately 37% of the inventoried locations have overhead primary electrical utilities present, which will limit future tree selections to "wire friendly" species. The primary electrical utility locations were identified as the utility company does perform clearance pruning for this service. Locations not noted as having primary electrical utilities still may have other overhead utilities present, such as phone, cable, secondary wires or electrical service to a house or building. Each site should be inspected before planting to choose the right tree for the right place in the event there are other restrictions such as light poles, fire hydrants, overhead utilities, etc. In addition sites that are closer to being 4 feet in width a smaller tree should be considered while sites closer to 8 feet in width should be considered for larger growing trees.

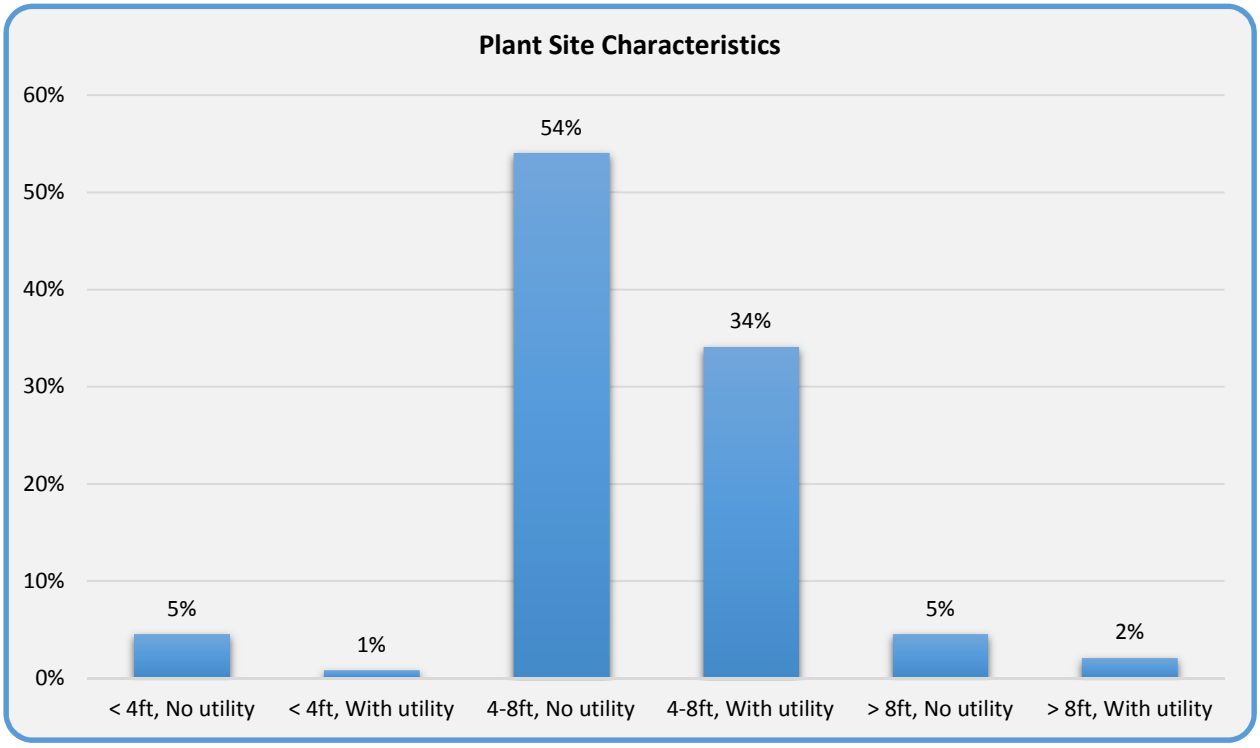

Table 10. Planting widths of inventoried tree sites.

APPRAISED VALUE DISTRIBUTION

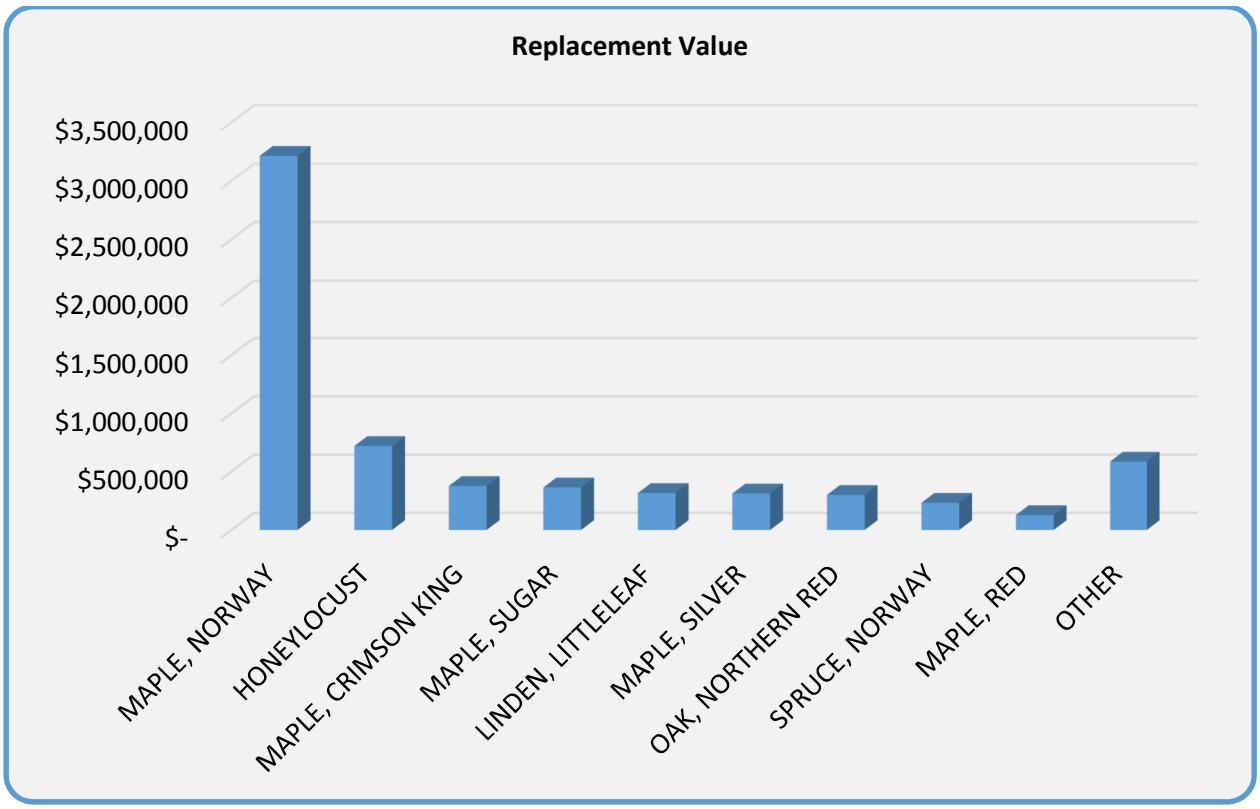

Table 11. Replacement Value.

The replacement value for the inventoried street and park trees is estimated to be $6,546,945[3]. Norway Maples have the greatest replacement value at $3.2 million, this is in part due to them being the most dominant species and their large size. Larger trees have a greater replacement value in general but species also has a factor in value as well. For example a large Norway Maple will have a greater value than a large Spruce. As trees are added or removed the overall value can fluctuate. It is anticipated this number will fluctuate in the future due to new trees being planted and some trees of various size being removed due to disease or decline.

[3] Replacement values are estimates of the full cost of replacing trees in their current condition, should they be removed for some reason. Species ratings, replacement costs, and basic prices were obtained for each species in each reference city from regional appraisal guides. Because of the approximations used in these calculations, replacement values are first-order estimates for the population and are not intended to be definitive on a tree-by-tree basis.

STORM WATER INTERCEPTION

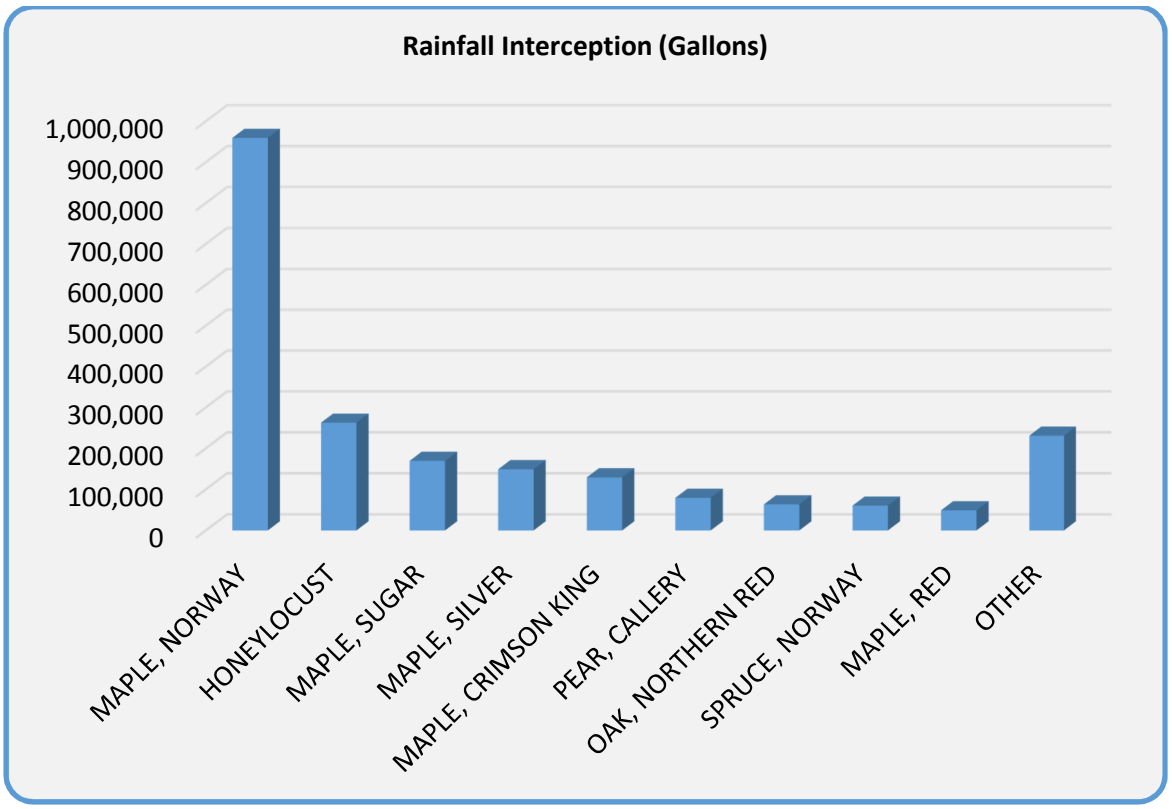

Table 12. Storm Water Interception.

The inventoried street and park trees in the Village are intercepting annually approximately 2.15 million gallons of rain water. Trees provide a direct benefit to the streams and lakes through uptake, storage and interception of rainwater and preventing pollutants from entering the waterways. They also help to filter particles out of the rain that may otherwise go to the river and lake.

CARBON STORED

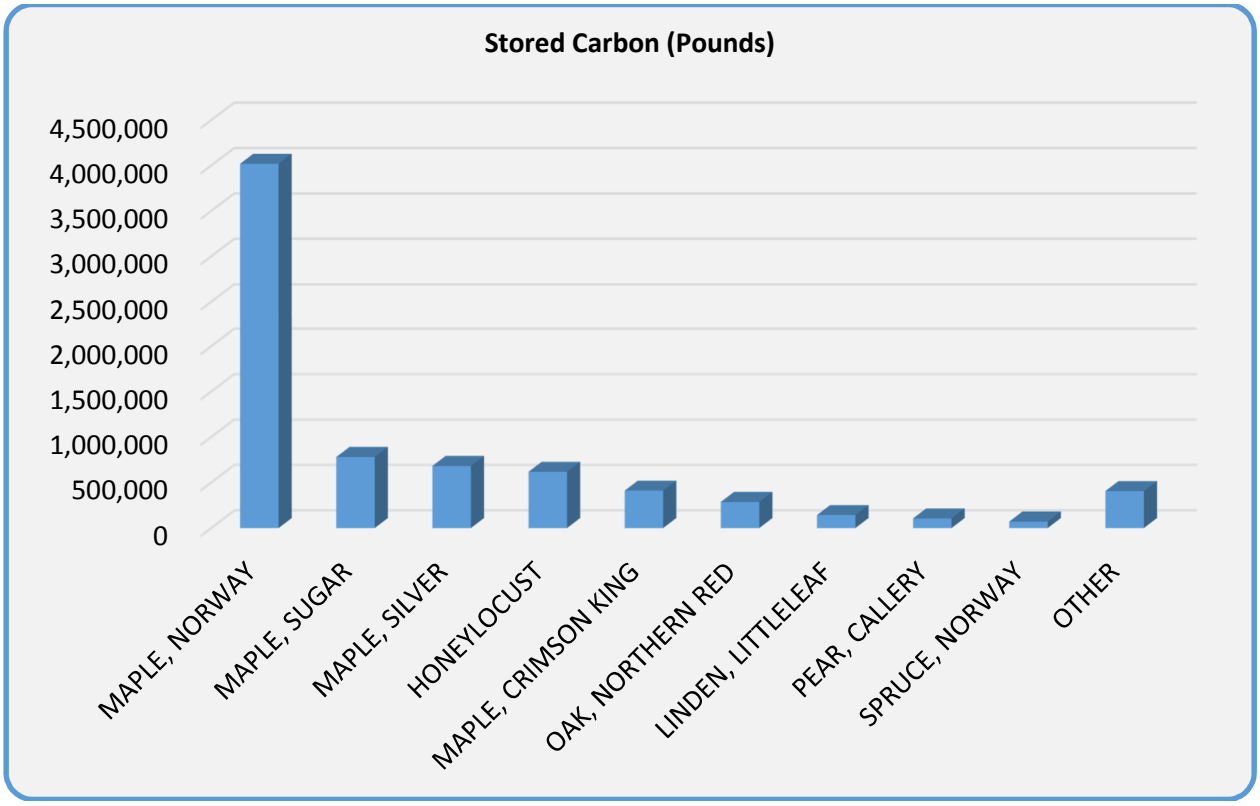

Table 13. Carbon Stored

The inventoried street and park trees in the Village are storing approximately 7.5 million pounds of carbon. Trees store carbon in the woody material. Increased carbon storage can be useful in offsetting emissions of carbon from fossil fuel burning and other sources. As new trees are planted and the current population continues to grow in diameter this number is predicted to increase. 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.

4 – SUMMARY OF KEY RECOMMENDATIONS

- Tree removals and risk reduction pruning should be undertaken in accordance with the Village's policies and procedures to reduce the potential risk to residents and property.
- Maintenance pruning should adhere to standard industry and best management practices as defined by the International Society of Arboriculture. These standards are developed with the long term health of the tree in mind.
- The percentage of Acer (Maple) inventoried exceeds the Best Management Practices recommended stocking level of 20% of population from a single genus. Through careful tree species selection the diversity of the urban forest should be increased.
    - It is recommended not to plant trees in the genus Acer (Maple) until such time as the population percentage approaches closer to the 20% guideline.
    - 61% of existing street trees are in the genus Acer, which accounts for approximately 630 trees.
- Continual monitoring of the Ash population is encouraged to determine if trees become infested and if they should be removed. In addition the Village should be aware of any other invasive insects and monitor for signs and symptoms on the trees in order to react quickly to prevent a large scale infestation.
- A larger number of trees classified as dead or dying are found in the newly planted size class. Further observation should be made for why trees have failed.
- Continue a street and park tree planting program to renew and diversify the tree population as older, larger trees are removed.

The following prioritized activities are recommended to be undertaken by the Village for the long term health of the tree population:

1. Reduce current risks through removal of dead/dying trees and pruning for dead, broken, weak limbs.
2. Increase overall tree population health through routine cultural practices. This includes pruning for tree health, proper mulching, adding mulch rings to prevent turf equipment damage, watering during periods of drought and fertilization if deemed necessary by a qualified arborist.
3. Reduce long term risk by diversifying tree population through carefully designed planting. Where possible use large canopy shade trees to maximize the benefits that trees provide to the Village.
4. Routinely monitor for disease and pest issues. In addition to the known diseases and insects observed during the tree inventory process, well informed staff are typically the first detectors as they will notice either an unknown insect or something different with a tree. Encourage the Village maintenance crew to make their observations known. Use a qualified professional to provide a diagnosis and recommend treatment, if warranted.
5. It is recommended to review and update the street tree inventory data approximately every seven to ten years. Implementing this inventory update protocol will result in more accurate and reliable information from which maintenance and policy decisions can be made.

While the activities outlined above are prioritized, it is recommended that all activities should occur in a holistic fashion, and this will be dependent on your budget allocations.

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Perry

Replacement Value of Public Trees

8/8/2019

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42	Total	Standard Error	% of Total
Norway maple	0	1,294	21,713	220,198	1,053,882	1,325,432	457,145	86,347	48,242	3,214,252	(±0)	49.10
Honeylocust	0	0	0	41,002	230,280	365,716	57,013	25,141	0	719,152	(±0)	10.98
Crimson king maple	0	7,331	20,356	149,166	143,711	56,162	0	0	0	376,726	(±0)	5.75
Sugar maple	382	0	0	7,363	18,595	83,324	120,681	101,344	32,334	364,023	(±0)	5.56
Littleleaf linden	0	0	0	4,649	90,380	134,011	86,729	0	0	315,768	(±0)	4.82
Silver maple	0	374	2,974	24,543	4,649	45,449	98,739	86,866	48,502	312,095	(±0)	4.77
Northern red oak	0	0	0	0	22,465	111,286	54,076	71,609	40,028	299,464	(±0)	4.57
Norway spruce	0	0	1,723	41,840	99,418	89,340	0	0	0	232,321	(±0)	3.55
Red maple	422	11,373	28,586	46,778	40,541	0	0	0	0	127,700	(±0)	1.95
Callery pear	1,912	7,481	28,747	61,357	0	0	0	0	0	99,496	(±0)	1.52
Black walnut	0	0	1,357	3,552	0	11,232	48,980	0	0	65,121	(±0)	0.99
Green ash	0	0	2,714	17,758	20,530	0	0	21,587	0	62,589	(±0)	0.96
White oak	0	0	0	0	0	18,548	27,038	0	0	45,586	(±0)	0.70
Apple	2,236	1,839	26,179	8,200	0	0	0	0	0	38,455	(±0)	0.59
American basswood	0	0	0	0	0	0	0	0	32,075	32,075	(±0)	0.49
Bitternut hickory	0	0	0	7,103	0	0	0	21,587	0	28,690	(±0)	0.44
Northern white cedar	0	0	0	4,649	9,038	14,890	0	0	0	28,577	(±0)	0.44
Tulip tree	0	0	0	0	7,941	0	19,004	0	0	26,945	(±0)	0.41
Horsechestnut	0	0	0	2,454	0	7,575	0	0	16,167	26,196	(±0)	0.40
Eastern white pine	0	0	0	4,100	15,881	0	0	0	0	19,982	(±0)	0.31
Northern hackberry	0	0	1,174	12,012	0	0	0	0	0	13,186	(±0)	0.20
Birch	574	0	0	0	4,649	7,575	0	0	0	12,797	(±0)	0.20
Hedge maple	245	488	0	9,298	0	0	0	0	0	10,031	(±0)	0.15
Eastern cottonwood	0	0	0	1,357	2,454	3,917	0	0	0	7,729	(±0)	0.12
Pine	0	0	0	7,363	0	0	0	0	0	7,363	(±0)	0.11
Blue spruce	0	1,294	5,428	0	0	0	0	0	0	6,722	(±0)	0.10
Elm	0	6,037	0	0	0	0	0	0	0	6,037	(±0)	0.09
Japanese zelkova	0	5,687	0	0	0	0	0	0	0	5,687	(±0)	0.09
Yew	0	0	0	4,649	0	0	0	0	0	4,649	(±0)	0.07
Black cherry	0	0	0	0	4,649	0	0	0	0	4,649	(±0)	0.07
Ash	0	0	0	0	4,649	0	0	0	0	4,649	(±0)	0.07
Cockspur hawthorn	0	1,294	2,714	0	0	0	0	0	0	4,008	(±0)	0.06
Black locust	0	0	0	3,552	0	0	0	0	0	3,552	(±0)	0.05
Sargent cherry	1,569	0	1,357	0	0	0	0	0	0	2,926	(±0)	0.04
Austrian pine	0	0	0	2,714	0	0	0	0	0	2,714	(±0)	0.04
Eastern redbud	574	0	1,983	0	0	0	0	0	0	2,556	(±0)	0.04

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42	Total	Standard Error	% of Total
White ash	0	0	0	2,454	0	0	0	0	0	2,454	(±0)	0.04
Higan cherry	2,103	0	0	0	0	0	0	0	0	2,103	(±0)	0.03
Cornelian cherry	1,583	0	0	0	0	0	0	0	0	1,583	(±0)	0.02
Japanese maple	245	977	0	0	0	0	0	0	0	1,222	(±0)	0.02
Japanese tree lilac	941	0	0	0	0	0	0	0	0	941	(±0)	0.01
Balsam fir	676	0	0	0	0	0	0	0	0	676	(±0)	0.01
Tree of heaven	0	0	625	0	0	0	0	0	0	625	(±0)	0.01
London planetree	491	0	0	0	0	0	0	0	0	491	(±0)	0.01
Amur maple	0	488	0	0	0	0	0	0	0	488	(±0)	0.01
Douglas fir	0	431	0	0	0	0	0	0	0	431	(±0)	0.01
Ginkgo	422	0	0	0	0	0	0	0	0	422	(±0)	0.01
American mountain ash	382	0	0	0	0	0	0	0	0	382	(±0)	0.01
Pin oak	382	0	0	0	0	0	0	0	0	382	(±0)	0.01
Chinese magnolia; Sauce	280	0	0	0	0	0	0	0	0	280	(±0)	0.00
Citywide Total	15,419	46,388	147,628	688,111	1,773,711	2,274,457	969,404	414,480	217,348	6,546,945	(±0)	100.00

Perry

Complete Population of Public Trees

8/8/2019

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42	Total Standard Error
Broadleaf Deciduous Large (BDL)										
Norway maple	0	3	16	62	154	118	28	4	2	387 (±0)
Crimson king maple	0	17	15	42	21	5	0	0	0	100 (±0)
Honeylocust	0	0	0	10	29	28	3	1	0	71 (±0)
Sugar maple	2	0	0	3	4	11	11	7	2	40 (±0)
Silver maple	0	1	3	10	1	6	9	6	3	39 (±0)
Elm	0	14	0	0	0	0	0	0	0	14 (±0)
Northern red oak	0	0	0	0	2	6	2	2	1	13 (±0)
Green ash	0	0	2	5	3	0	0	1	0	11 (±0)
Japanese zelkova	0	11	0	0	0	0	0	0	0	11 (±0)
Black walnut	0	0	1	1	0	1	3	0	0	6 (±0)
Northern hackberry	0	0	1	4	0	0	0	0	0	5 (±0)
London planetree	4	0	0	0	0	0	0	0	0	4 (±0)
Ginkgo	4	0	0	0	0	0	0	0	0	4 (±0)
Horsechestnut	0	0	0	1	0	1	0	0	1	3 (±0)
Eastern cottonwood	0	0	0	1	1	1	0	0	0	3 (±0)
Bitternut hickory	0	0	0	2	0	0	0	1	0	3 (±0)
White oak	0	0	0	0	0	1	1	0	0	2 (±0)
Pin oak	2	0	0	0	0	0	0	0	0	2 (±0)
Tulip tree	0	0	0	0	1	0	1	0	0	2 (±0)
American basswood	0	0	0	0	0	0	0	0	1	1 (±0)
Ash	0	0	0	0	1	0	0	0	0	1 (±0)
White ash	0	0	0	1	0	0	0	0	0	1 (±0)
Black cherry	0	0	0	0	1	0	0	0	0	1 (±0)
Tree of heaven	0	0	1	0	0	0	0	0	0	1 (±0)
Black locust	0	0	0	1	0	0	0	0	0	1 (±0)
Total	**12**	**46**	**39**	**143**	**218**	**178**	**58**	**22**	**10**	**726 (±0)**
Broadleaf Deciduous Medium (BDM)										
Red maple	4	22	15	9	4	0	0	0	0	54 (±0)
Littleleaf linden	0	0	0	1	10	9	4	0	0	24 (±0)
Hedge maple	2	1	0	2	0	0	0	0	0	5 (±0)
Birch	3	0	0	0	1	1	0	0	0	5 (±0)
Total	**9**	**23**	**15**	**12**	**15**	**10**	**4**	**0**	**0**	**88 (±0)**
Broadleaf Deciduous Small (BDS)										
Callery pear	10	20	29	25	0	0	0	0	0	84 (±0)
Apple	16	4	17	2	0	0	0	0	0	39 (±0)
Cornelian cherry	15	0	0	0	0	0	0	0	0	15 (±0)
Sargent cherry	10	0	1	0	0	0	0	0	0	11 (±0)
Higan cherry	11	0	0	0	0	0	0	0	0	11 (±0)
Japanese tree lilac	6	0	0	0	0	0	0	0	0	6 (±0)
Cockspur hawthorn	0	3	2	0	0	0	0	0	0	5 (±0)
Eastern redbud	3	0	2	0	0	0	0	0	0	5 (±0)
Japanese maple	2	2	0	0	0	0	0	0	0	4 (±0)
American mountain ash	2	0	0	0	0	0	0	0	0	2 (±0)
Chinese magnolia; Saucer m	2	0	0	0	0	0	0	0	0	2 (±0)
Amur maple	0	1	0	0	0	0	0	0	0	1 (±0)
Total	**77**	**30**	**51**	**27**	**0**	**0**	**0**	**0**	**0**	**185 (±0)**
Conifer Evergreen Large (CEL)										
Norway spruce	0	0	1	9	11	6	0	0	0	27 (±0)
Blue spruce	0	3	4	0	0	0	0	0	0	7 (±0)
Eastern white pine	0	0	0	1	2	0	0	0	0	3 (±0)
Balsam fir	3	0	0	0	0	0	0	0	0	3 (±0)
Pine	0	0	0	3	0	0	0	0	0	3 (±0)
Austrian pine	0	0	0	2	0	0	0	0	0	2 (±0)
Douglas fir	0	1	0	0	0	0	0	0	0	1 (±0)
Total	**3**	**4**	**5**	**15**	**13**	**6**	**0**	**0**	**0**	**46 (±0)**
Conifer Evergreen Medium (CEM)										
Northern white cedar	0	0	0	1	1	1	0	0	0	3 (±0)
Total	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**3 (±0)**

Complete Population of Public Trees

8/8/2019

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	> 42	Total Standard Error
Conifer Evergreen Small (CES)										
Yew	0	0	0	1	0	0	0	0	0	1 (±0)
Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1 (±0)**
Grand Total	**101**	**103**	**110**	**199**	**247**	**195**	**62**	**22**	**10**	**1,049 (±0)**

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Total Annual Benefits of Public Trees by Species ($)

8/8/2019

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
Norway maple	32,000	1,141	6,077	7,675	8,620	55,513	(N/A)	47.1
Crimson king maple	5,374	154	960	1,033	1,271	8,792	(N/A)	7.5
Callery pear	2,707	90	543	635	1,748	5,723	(N/A)	4.9
Honeylocust	8,215	146	1,568	2,102	900	12,931	(N/A)	11.0
Red maple	1,689	32	273	392	645	3,031	(N/A)	2.6
Sugar maple	3,858	105	698	1,356	876	6,894	(N/A)	5.9
Silver maple	3,801	85	745	1,192	455	6,278	(N/A)	5.3
Apple	636	11	101	95	133	975	(N/A)	0.8
Norway spruce	1,648	29	323	482	116	2,598	(N/A)	2.2
Littleleaf linden	1,823	25	310	379	71	2,608	(N/A)	2.2
Cornelian cherry	52	1	7	6	30	96	(N/A)	0.1
Elm	167	4	26	39	209	445	(N/A)	0.4
Northern red oak	1,672	49	324	508	233	2,786	(N/A)	2.4
Green ash	880	19	164	202	154	1,419	(N/A)	1.2
Sargent cherry	60	1	9	7	24	101	(N/A)	0.1
Japanese zelkova	361	5	41	30	165	603	(N/A)	0.5
Higan cherry	38	1	5	4	22	71	(N/A)	0.1
Blue spruce	111	2	19	35	44	211	(N/A)	0.2
Black walnut	629	13	132	210	135	1,120	(N/A)	1.0
Japanese tree lilac	21	0	3	2	12	38	(N/A)	0.0
Northern hackberry	383	8	65	72	121	649	(N/A)	0.6
Hedge maple	135	3	23	23	33	218	(N/A)	0.2
Birch	188	4	35	49	58	333	(N/A)	0.3
Eastern redbud	61	1	9	8	13	92	(N/A)	0.1
Cockspur hawthorn	90	2	14	11	14	131	(N/A)	0.1
London planetree	7	0	1	1	24	33	(N/A)	0.0
Japanese maple	26	1	4	4	10	45	(N/A)	0.0
Ginkgo	3	0	0	0	6	10	(N/A)	0.0
Northern white cedar	183	5	47	40	20	295	(N/A)	0.3
Eastern cottonwood	292	6	57	79	80	515	(N/A)	0.4
Horsechestnut	212	5	37	62	32	349	(N/A)	0.3
Bitternut hickory	299	6	58	82	50	495	(N/A)	0.4
Balsam fir	2	0	0	1	17	21	(N/A)	0.0
Eastern white pine	188	3	37	55	16	300	(N/A)	0.3
Pine	147	3	28	40	19	237	(N/A)	0.2
Pin oak	13	0	2	2	16	34	(N/A)	0.0
American mountain ash	7	0	1	1	4	13	(N/A)	0.0
Tulip tree	223	5	48	76	49	400	(N/A)	0.3
Austrian pine	98	2	19	27	12	158	(N/A)	0.1
Chinese magnolia; Sauc	7	0	1	1	4	13	(N/A)	0.0
White oak	236	9	48	76	51	420	(N/A)	0.4
Tree of heaven	58	1	8	8	20	95	(N/A)	0.1
Ash	95	2	18	22	15	153	(N/A)	0.1
Amur maple	12	0	2	2	4	19	(N/A)	0.0
Black cherry	48	2	8	9	5	71	(N/A)	0.1
White ash	74	1	13	14	13	116	(N/A)	0.1
Black locust	81	2	14	16	25	139	(N/A)	0.1
Yew	32	1	6	14	8	60	(N/A)	0.1

Total Annual Benefits of Public Trees by Species ($)

8/8/2019

Species	Energy	CO_2	Air Quality	Stormwater	Aesthetic/Other	Total ($)	Standard Error	% of Total $
American basswood	112	1	22	40	0	176	(N/A)	0.1
Douglas fir	7	0	1	3	6	17	(N/A)	0.0
Citywide Total	69,063	1,988	12,956	17,222	16,609	117,840	(N/A)	100.0