

Bay Village Tree Inventory Executive Summary | 2020



Submitted by:
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Bay Village Tree Inventory Executive Summary

INTRODUCTION

The 2019 Cuyahoga County Healthy Urban Tree Canopy Grant Program supports the 2019 Cuyahoga County Climate Change Action Plan through active efforts to grow and maintain a healthy urban tree canopy in Cuyahoga County. The grant is jointly administered by the Cuyahoga County Planning Commission and the Cuyahoga Soil & Water Conservation District under the auspices of the Cuyahoga County Department of Sustainability. The 2019 grant awards will fund both planning projects and implementation projects.

In the fall of 2019 the city of Bay Village, OH was awarded a grant as a part of the Healthy Urban Tree Canopy Program. City managers desired an accurate and current tree inventory of city maintained trees in an effort to grow and maintain a healthy urban tree canopy. The information obtained through the tree inventory will aid city managers in the future planning and implementation of projects supporting a healthy urban tree canopy. This executive summary is intended to provide city managers with a synopsis of the inventory findings and recommendations. A more detailed account of the inventory data and specific recommendations are available to city managers within the Arborscope inventory management software program.

Who's Who

Those who conducted the inventory and prepared this document are members of the Bartlett Inventory Solutions team. They are also employees of Bartlett Tree Experts. The Bartlett Inventory Solutions team is overseen by Technical Advisors out of the Bartlett Tree Research Laboratories in Charlotte, North Carolina. The advisors are primarily charged with client support, coordination, quality control, and documentation of inventories and the related data. Extensively trained Regional Inventory Arborists from local Bartlett Tree Experts offices are the primary data collectors and authors of the management plans. Readers may interpret the terms "Bartlett Tree Experts," "Bartlett," "the Inventory Team," "the team," "we," and "our" as the Bartlett company and those who conducted the inventory. In addition to the primary author(s) listed on the cover page, Team Member(s) involved in this project included:

Technical Advisor

Kevin Weber, Bartlett Consulting

Registered Consulting Arborist #636, ISA Board Certified Master Arborist #PD-2030B,
ISA Tree Risk Assessment Qualified

Data Collection

Eric Hinzman, Division Inventory Arborist

ISA Board Certified Master Arborist #OH-6027B, ISA Tree Risk Assessment Qualified

Tim Armstrong, Division Inventory Arborist

ISA Board Certified Master Arborist #NE-7132B, ISA Tree Risk Assessment Qualified

Paul Tribuna, Regional Inventory Arborist

ISA Certified Arborist #NE-0833A, ISA Tree Risk Assessment Qualified

Subject Trees

In this document, the term "subject trees" refers (depending on context) to some or all of the 3,306 trees included in the inventory.

Definitions & Bolded Terms

Some definitions or specifications are detailed within a given section to explain how readers should interpret certain terms or classifications. We have also appended a Glossary for other terms that appear throughout the document. The first reference to each of these terms appears in **bold** for the reader's convenience.

EXECUTIVE SUMMARY

In December 2019 and January 2020, the Bartlett Inventory Solutions (BIS) Team from Bartlett Tree Experts conducted an inventory of city maintained trees in Bay Village, Ohio. We identified 3,306 trees which included 92 species. The attributes that we collected include tree latitude and longitude, size, age and condition class, and a visual assessment of tree structure, health, and **vigor**.

We conducted the attribute collection using a sub-meter accuracy Global Positioning Satellite Receiver (GPSr) device with an error-in-location potential of not greater than three meters. Our recommendations for the subject trees are based on the number of desired management cycles. All tree work activities will comply with current American National Standards Institute (ANSI) Z133.1 requirements for safety.

Tree Risk Assessments and Mitigation

Perform the recommended tree risk mitigation activities for the 239 trees (7%) which we found defects or concerns that prompted the need to use the International Society of Arboriculture's (ISA) risk matrices in the field. Risk mitigation activities will comply with current ANSI A300 standard practices. Please see the Tree Risk Assessments, Limitations & Glossary section for more information. (Refer to Arborscope)

Level 3 Advanced Assessment

Provide *Level 3 Advanced assessments* for 18 trees (1%) to evaluate the impact of wood decay that shows potential for failure. (Refer to Arborscope)

Root Collar Excavations

Perform **root collar** excavations to 574 trees (17%) to lower risk of damaging conditions such as **girdling roots**, basal cankers, masking of root decay and lower-stem decay, and predisposing trees to various insect and disease pests.(Refer to Arborscope)

Pruning

Prune 2,716 trees (82%) for safety, health, structure, and appearance. Pruning will comply with current ANSI A300 standard practices for pruning. (Refer to Arborscope)

Structural Support

There are structural support system recommendations for 71 trees (2%) to reduce risk of branch or whole tree failure. All structural support systems will comply with current ANSI A300 standard practices for supplemental support systems. (Refer to Arborscope)

Removals

Remove 232 trees (7%) due to condition or because of their location in relation to other trees to try and prevent competition or damage to infrastructure. (Refer to Arborscope)

Planting Sites

We identified 2539 future planting sites within public right of ways in Bay Village. (Refer to Arborscope)

BACKGROUND

In November 2019, the city of Bay Village, OH retained Bartlett Tree Experts to perform an inventory of city maintained trees. Team members Eric Hinzman, Tim Armstrong, and Paul Tribuna visited the site on December 1-14, and January 6-11 to conduct the inventory.

The inventory included:

- identifying trees and assigning a Tree ID number (Tree ID numbers ranging from 1 to 3306);
- identifying the trees' condition, health, and vigor;
- recommending risk evaluations and removals of appropriate trees;
- recommending tree care, and structural support systems to promote tree safety, health, appearance, and longevity;
- mapping the trees using GPSr hardware and Geographic Information System (GIS) software, and Bartlett Tree Experts' ArborScope™ web-based management system, and;
- identifying 2539 potential future planting sites

The methods and procedures we used to make the above determinations and recommendations are detailed in the following sections.

DATA COLLECTION & TREE INSPECTION METHODOLOGY

In conducting the inventory, we used specialized equipment and software and followed specific procedures to determine tree characteristics, risk evaluations, and recommendations. The following explanation will assist the reader in interpreting the findings of this management plan.

Data Collection Equipment & Attribute Data

The Inventory Team used Trimble® Geo GPSr hardware units, TerraSync® and GPS Pathfinder® Office GIS software, and Bartlett Tree Experts' ArborScope™ web-based management system to inventory the trees. The attribute data we collected on site are listed below.

- botanical name and regional common name according to local ISA Chapter Tree Species List
- tree location based on GPS coordinate system
- tree ID number
- diameter at breast height (**DBH**)
- canopy radius
- age class
- height class
- condition class

- root zone infringement, based on **dripline** and estimated **grayscale** (e.g., sidewalks) impact on root zone
- infrastructure interaction (between trees and grayscale that may cause an undesirable condition)
- documented *Level 2 Basic assessment* for tree risk where defects or concerns were observed that prompted the need to use the ISA risk matrices in the field resulting in an *overall tree risk rating*
- Tree & Shrub Work phase (based on number of desired management cycles)
- pruning category
- need for and inspection of existing structural support systems
- need for *Level 3 Advanced assessment* for tree risk
- tree removals
- noted defects/observations

Specifications/Definitions

Age Class

New Planting	Tree not yet established
Young	Established tree but not in the landscape for many years
Semi-mature	Established tree but has not yet reached full growth potential
Mature	Tree within its full growth potential
Over-mature	Tree that is declining or beginning to decline due to its age

Height Class

Small	Less than 15 feet
Medium	15 to 40 feet
Large	Greater than 40 feet

Condition Class

Dead	
Poor	Most of the canopy displays dieback and undesirable leaf color, inappropriate leaf size or inadequate new growth. Tree or parts of tree are in the process of failure.
Fair	Parts of canopy display undesirable leaf color, inappropriate leaf size, and inadequate new growth. Parts of the tree are likely to fail.
Good	Tree health and condition are acceptable.

Tree & Shrub Work Phase

Tree & Shrub Work phase takes into consideration tree species, condition, location, age, and proximity to infrastructure. We intend for this rating system to assist decision makers in prioritizing risk mitigation, tree pruning, cabling and bracing, and tree lightning protection recommendations. *Trees with an ASAP and an overall tree risk rating of extreme or high (see definitions in the next section) should be addressed immediately.* Prioritization does not take into account any budgetary or financial considerations.

Phase 1, 2, 3, 4, and 5 are all based on observations by the inventory arborist according to the manager's goals. The following additional information clarifies each priority:

- ASAP** Trees with recommendations that should be addressed As Soon As Possible.
- Phase 1** Typically addressed in the first management cycle. Trees located in high-use sites, have a high aesthetic value, have an elevated *overall tree risk rating*, and/or parts that are currently in conflict with infrastructure.
- Phase 2** Typically addressed in the second management cycle. Trees with moderate aesthetic value, don't have an elevated *overall tree risk rating*, and/or parts that are anticipated to be in conflict with infrastructure.
- Phase 3** Typically addressed in the third management cycle. Tree parts that are anticipated to be in conflict with infrastructure and/or recommendations based on anticipated growth.
- Phase 4** Typically addressed in the fourth management cycle. Recommendations are for future consideration and anticipated growth.
- Phase 5** Typically addressed in the fifth management cycle. Recommendations are for future consideration and anticipated growth.

Pruning Category

All trees identified in this inventory that have tree care recommendations are listed within a specific pruning category. Trees within each pruning category can be prioritized by the specific goals of the manager. It is recommended that specific goals be discussed prior to any pruning.

- Risk Mitigation** This goal requires pruning of any tree where risk mitigation should take precedence over other pruning goals. Typically aims to reduce the *overall tree risk rating* by branch removal and/or branch reduction.
- Maintenance** This goal typically requires routine pruning of large/mature trees. Includes branch removal and/or branch reduction to help reduce *likelihood of failure* and/or conflict with infrastructure. Trees with this goal are typically climbed or require the use of aerial lifts and/or other specialized equipment.
- Developmental** This goal typically requires routine pruning of small/young trees. Includes structural pruning to develop a strong central stem, establish proper branch spacing, and/or develop branch structure.

- Ornamental** This goal typically requires pruning of small trees. Includes reduction and/or shearing to its desired shape, size, and/or structure.
- Specialized** Trees with this goal require a unique treatment that may include, but not limited to, targeted pruning cuts, removal of nuisance fruit/parasitic plants, and/or rejuvenation/internodal pruning.

* The listed descriptions of goals, tools, and/or techniques are not limited to these definitions. Specific individual goals and species profiles should guide the pruning recommendations.

Tree Risk Assessments, Limitations & Glossary

In accordance with industry standards, tree risk ratings are derived from a combination of three factors: the *likelihood of failure*, the *likelihood of the failed tree part impacting a target*, and the *consequences* of the target being struck. The guidelines used to classify each of these factors are presented in the *ISA's BMP for Tree Risk Assessment* and guidelines developed by the Bartlett Tree Research Laboratories. *These factors are then used to categorize tree risk as Extreme, High, Moderate or Low.* The factors used to define your risk ratings are identified in this report. An explanation of terms used in this report appears in the glossary located in the appendix. The information provided in this report is based on the conditions identified at the time of inspection. Tree conditions do change over time so reassessment is recommended annually and after major storm events.

Limitations of Tree Risk Assessments

It is important for the tree owner or manager to know and understand that all trees pose some degree of risk from failure or other conditions. The information and recommendations within this report have been derived from the level of tree risk assessment identified in this report, using the information and practices outlined in the *International Society of Arboriculture's Best Management Practices for Tree Risk Assessment*, as well as the information available at the time of the inspection. However, the *overall tree risk rating*, the mitigation recommendations, or any other conclusions do not preclude the possibility of failure from undetected conditions, weather events, or other acts of man or nature. Trees can unpredictably fail even if no defects or other conditions are present. It is the responsibility of the tree owner or manager to schedule repeat or *Advanced assessments*, determine actions, and implement follow up recommendations, monitoring and/or mitigation.

Bartlett Tree Experts can make no warranty or guarantee whatsoever regarding the safety of any tree, trees, or parts of trees, regardless of the level of tree risk assessment provided, the risk rating, or the residual risk rating after mitigation. The information in this report should not be considered as making safety, legal, architectural, engineering, landscape architectural, land surveying advice or other professional advice. This information is solely for the use of the tree owner and manager to assist in the decision making process regarding the management of their tree or trees. Tree risk assessments are simply tools which should be used in conjunction with the owner or tree manager's knowledge, other information and observations related to the specific tree or trees discussed, and sound decision making.

Glossary

Tree risk assessment has a unique set of terms with specific meanings. Definitions of all specific terms may be found in the *International Society of Arboriculture's Best Management Practice for Tree Risk Assessment*. Definitions of some of these terms used in this report are as follows:

The *likelihood of failure* may be categorized as imminent meaning that failure has started or could occur at any time; probable meaning that failure may be expected under normal weather conditions within the next 3 years; possible meaning that failure could occur, but is unlikely under normal weather conditions during that time frame; and improbable meaning that failure is not likely under normal weather conditions, and may not occur in severe weather conditions during that time frame.

The *likelihood of the failed tree part impacting a target* may be categorized as high meaning that a failed tree or tree part will most likely impact a target; medium meaning the failed tree or tree part could impact the target, but is not expected to do so; low meaning that the failed tree or tree part is not likely to impact a target; and very low meaning that the chance of a failed tree or tree part impacting the target is remote.

The *likelihood of failure and impact* is defined by the Likelihood Matrix below.

LIKELIHOOD OF FAILURE AND IMPACT

Likelihood of Failure	Likelihood of Impacting Target			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

The *consequences* of a known target being struck may be categorized as severe meaning that impact could involve serious personal injury or death, damage to high value property, or disruption to important activities; significant meaning that the impact may involve personal injury, property damage of moderate to high value, or considerable disruption; minor meaning that impact could cause low to moderate property damage, small disruptions to traffic or a communication utility, or minor injury; and negligible meaning that impact may involve low value property damage, disruption that can be replaced or repaired, and do not involve personal injury.

Targets are people, property, or activities that could be injured, damaged or disrupted by a tree failure.

Levels of assessment 1) *Limited visual assessments* are conducted to identify obvious defects. 2) *Basic assessments* are visual inspections done by walking around the tree looking at the site, buttress roots, trunk and branches. It may include the use of simple tools to gain information about the tree or defects. 3) *Advanced assessments* are performed to provide detailed information about specific tree parts, defects, targets of site conditions. Drilling to detect decay is an advanced assessment technique.

Tree Risk Ratings are terms used to communicate the level of risk rating. They are defined in the Risk Matrix below as a combination of Likelihood and Consequences:

ISA RISK MATRIX

Likelihood of Failure & Impact	Consequences of the Tree Failure			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Overall tree risk rating is the highest individual risk identified for the tree. The *residual risk* is the level of risk the tree should pose after the recommended mitigation.

Bartlett Tree Experts can inventory trees that have ropes courses, zip lines, swings, tree houses, or any other life support system attached for several different attributes; however, Bartlett Tree Experts is unable to provide tree risk assessment information on such trees, nor is Bartlett Tree Experts able to determine whether the correct hardware has been used, the systems are attached to the trees correctly, or whether the trees can withstand the additional forces that are placed on the tree or trees from such systems or structures. Bartlett Tree Experts does not recommend that any hardware or structures, other than those recommended by and installed by qualified arborists to aid the tree in structural support or protections from lightning, be installed in or attached to any tree(s). Bartlett Tree Experts recommends removing, or discontinuing the use of, any such system or recreational structure until the Client hires or consults with an engineer/specialist that deals specifically with ropes courses, zip lines, swings, tree houses, or any other life support systems and how they attach to and impact trees to determine if the trees can handle the forces being placed on them.

In the event that Bartlett Tree Experts observes an immediate safety issue with a tree with any such device attached, such as the presence of a dead, dying, or broken limb that could fall and injure a person or damage property, Bartlett Tree Experts may make a recommendation to remove or prune such a limb or otherwise mitigate the obvious safety issue. However, the Client should not infer that following such a recommendation and mitigating the immediate safety issue makes the tree in question safe for the use of the attached device or feature.

STAND DYNAMICS RESULTS



STAND DYNAMICS RESULTS

In reviewing the results and recommendations, the reader will find useful the specifications and definitions detailed in the preceding methodology above. We used the following categories to organize the stand dynamics results, which are displayed in tables:

- **Subject Trees Summarized According to:**
 - Tree Species Identified
 - Condition Class
 - Age Class
 - Tree Size per DBH
 - Estimated Tree Asset Value
 - Tree Location Value

Stand Dynamics

Tree Species Identified

Our inventory revealed 92 species of trees, as detailed in the following table:

TREE SPECIES IDENTIFIED

Genus	Species	Common Name	Count	% Distribution Total
<i>Acer</i>	<i>buergeranum</i>	Maple-Trident	6	< 1%
	<i>campestre</i>	Maple-Hedge	108	3%
	<i>ginnala</i>	Maple-Amur	113	3%
	<i>griseum</i>	Maple-Paperbark	66	2%
	<i>negundo</i>	Boxelder	1	< 1%
	<i>palmatum</i>	Maple-Japanese	5	< 1%
	<i>platanoides</i>	Maple-Norway	49	1%
	<i>pseudoplatanus</i>	Maple-Sycamore	4	< 1%
	<i>rubrum</i>	Maple-Red	309	9%
	<i>saccharinum</i>	Maple-Silver	84	3%
	<i>saccharum</i>	Maple-Sugar	50	2%
	<i>x freemanii</i>	Maple-Freeman's	55	2%
<i>Acer Total</i>			850	26%
<i>Aesculus</i>	<i>glabra</i>	Buckeye-Ohio	12	< 1%
	<i>hippocastanum</i>	Horsechestnut-Common	1	< 1%
	sp.	Buckeye/Horsechestnut	3	< 1%
<i>Aesculus Total</i>			16	< 1%
<i>Alnus</i>	<i>glutinosa</i>	Alder-Common	4	< 1%
<i>Amelanchier</i>	<i>arborea</i>	Serviceberry-Downy	2	< 1%
	sp.	Serviceberry	102	3%
<i>Amelanchier Total</i>			104	3%
<i>Betula</i>	<i>nigra</i>	Birch-River	16	< 1%
<i>Carpinus</i>	<i>caroliniana</i>	Hornbeam-American	12	< 1%
<i>Carya</i>	<i>glabra</i>	Hickory-Pignut	3	< 1%
	<i>ovata</i>	Hickory-Shagbark	5	< 1%
<i>Carya Total</i>			8	< 1%
<i>Catalpa</i>	<i>speciosa</i>	Catalpa-Northern	8	< 1%
<i>Celtis</i>	<i>laevigata</i>	Hackberry-Southern	1	< 1%
	<i>occidentalis</i>	Hackberry	2	< 1%
<i>Celtis Total</i>			3	< 1%
<i>Cercidiphyllum</i>	<i>japonicum</i>	Katsuratree	1	< 1%
<i>Cercis</i>	<i>canadensis</i>	Redbud-Eastern	10	< 1%
<i>Chamaecyparis</i>	<i>pisifera</i>	Falsecypress-Sawara	1	< 1%
<i>Cladrastis</i>	<i>kentukea</i>	Yellowwood	50	2%
<i>Cornus</i>	<i>florida</i>	Dogwood-Flowering	9	< 1%

Genus	Species	Common Name	Count	% Distribution Total
	<i>kousa</i>	Dogwood-Kousa	5	< 1%
Cornus Total			14	< 1%
<i>Corylus</i>	<i>avellana</i>	Hazelnut-European	1	< 1%
<i>Crataegus</i>	sp.	Hawthorn	203	6%
<i>Euonymus</i>	sp.	Euonymus	1	< 1%
<i>Fagus</i>	<i>sylvatica</i>	Beech-European	2	< 1%
<i>Fraxinus</i>	<i>pennsylvanica</i>	Ash-Green	1	< 1%
<i>Ginkgo</i>	<i>biloba</i>	Ginkgo	34	1%
<i>Gleditsia</i>	<i>triacanthos</i> var. <i>inermis</i>	Honeylocust-Thornless Common	116	4%
<i>Gymnocladus</i>	<i>dioicus</i>	Coffeetree-Kentucky	9	< 1%
<i>Hamamelis</i>	<i>virginiana</i>	Witchhazel	1	< 1%
<i>Juglans</i>	<i>nigra</i>	Walnut-Black	5	< 1%
<i>Juniperus</i>	<i>virginiana</i>	Redcedar-Eastern	1	< 1%
<i>Liquidambar</i>	<i>styraciflua</i>	Sweetgum-Common	19	1%
<i>Liriodendron</i>	<i>tulipifera</i>	Tuliptree	17	1%
<i>Magnolia</i>	sp.	Magnolia	7	< 1%
<i>Malus</i>	sp.	Crabapple	501	15%
<i>Morus</i>	<i>rubra</i>	Mulberry-Red	2	< 1%
<i>Nyssa</i>	<i>sylvatica</i>	Tupelo-Black	35	1%
<i>Ostrya</i>	<i>virginiana</i>	Hophornbeam-American	7	< 1%
<i>Picea</i>	<i>abies</i>	Spruce-Norway	60	2%
	<i>pungens</i>	Spruce-Colorado Blue	7	< 1%
Picea Total			67	2%
<i>Pinus</i>	<i>nigra</i>	Pine-Austrian	1	< 1%
	<i>strobus</i>	Pine-Eastern White	24	1%
	<i>thunbergiana</i>	Pine-Japanese Black	2	< 1%
Pinus Total			27	1%
<i>Platanus</i>	<i>occidentalis</i>	Sycamore-American	17	1%
	<i>x acerifolia</i>	Planetree-London	53	2%
Platanus Total			70	2%
<i>Populus</i>	<i>deltoides</i>	Poplar-Eastern	3	< 1%
	sp.	Poplar	1	< 1%
Populus Total			4	< 1%
<i>Prunus</i>	<i>cerasifera</i>	Plum-Purple Leaf	1	< 1%
	<i>serotina</i>	Cherry-Black	4	< 1%
	<i>serrulata</i>	Cherry-Flowering	12	< 1%
	sp.	Cherry	13	< 1%
	<i>subhirtella</i>	Cherry-Weeping	1	< 1%
Prunus Total			31	1%
<i>Pyrus</i>	<i>calleryana</i>	Pear-Callery	103	3%
<i>Quercus</i>	<i>acutissima</i>	Oak-Sawtooth	67	2%
	<i>alba</i>	Oak-White	85	3%
	<i>bicolor</i>	Oak-Swamp White	63	2%
	<i>coccinea</i>	Oak-Scarlet	1	< 1%

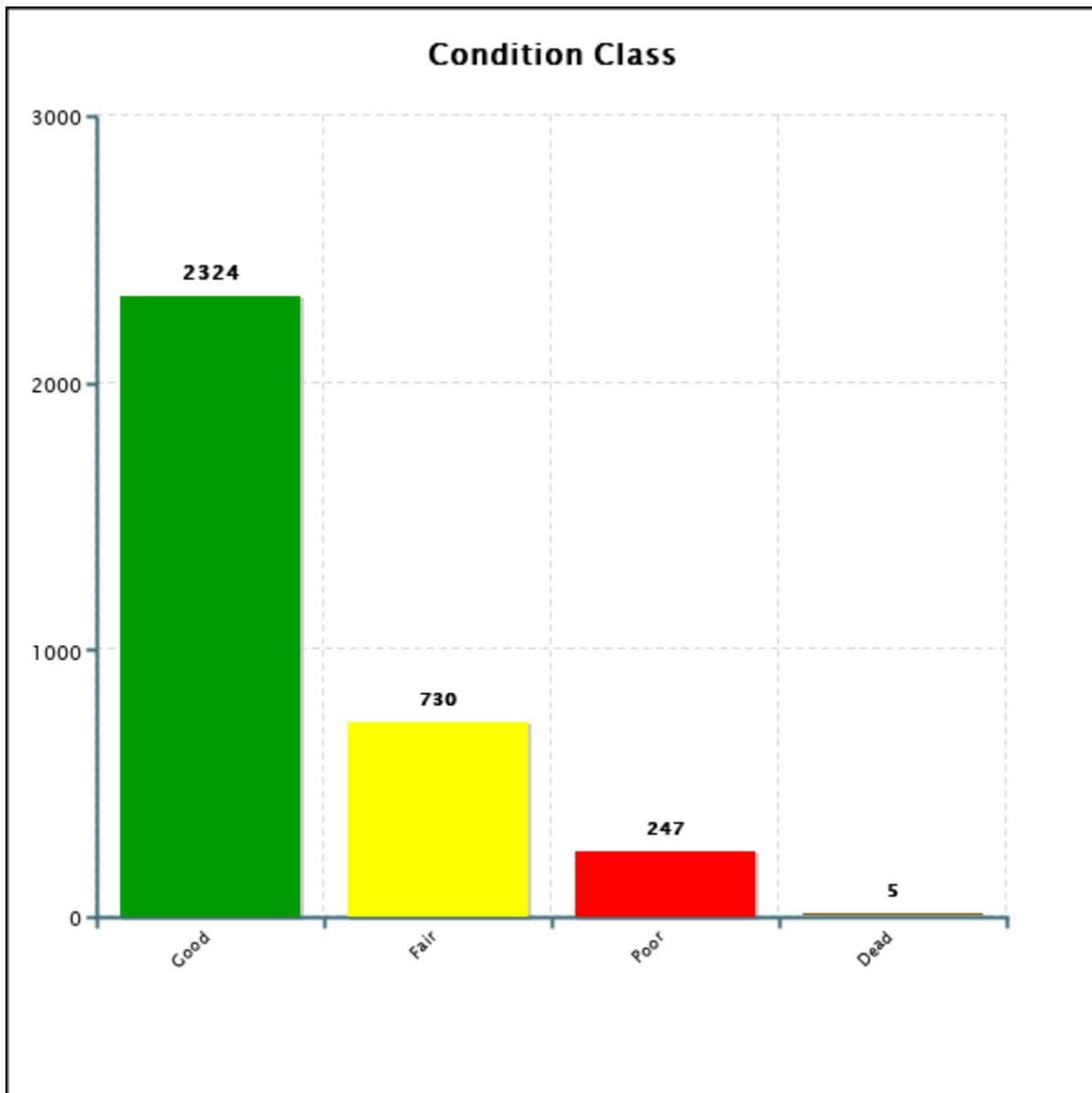
Genus	Species	Common Name	Count	% Distribution Total
	<i>imbricaria</i>	Oak-Shingle	2	< 1%
	<i>macrocarpa</i>	Oak-Bur	32	1%
	<i>palustris</i>	Oak-Pin	49	1%
	<i>phellos</i>	Oak-Willow	5	< 1%
	<i>robur</i>	Oak-English	3	< 1%
	<i>rubra</i>	Oak-Northern Red	138	4%
	<i>shumardii</i>	Oak-Shumard	1	< 1%
	<i>velutina</i>	Oak-Black	1	< 1%
Quercus Total			447	14%
Robinia	<i>pseudoacacia</i>	Locust-Black	12	< 1%
Salix	sp.	Willow	1	< 1%
Sassafras	<i>albidum</i>	Sassafras-Common	1	< 1%
Sophora	<i>japonica</i>	Pagodatree-Japanese	28	1%
Stewartia	sp.	Stewartia	4	< 1%
Syringa	<i>reticulata</i>	Lilac-Japanese Tree	40	1%
Tilia	<i>americana</i>	Linden-American	52	2%
	<i>cordata</i>	Linden-Littleleaf	215	7%
	<i>tomentosa</i>	Linden-Silver	40	1%
Tilia Total			307	9%
Ulmus	<i>americana</i>	Elm-American	15	< 1%
	<i>parvifolia</i>	Elm-Lacebark	8	< 1%
	<i>pumila</i>	Elm-Siberian	12	< 1%
	<i>rubra</i>	Elm-Slippery	2	< 1%
	sp.	Elm	33	1%
Ulmus Total			70	2%
Viburnum	sp.	Viburnum	17	1%
Zelkova	<i>serrata</i>	Zelkova-Japanese	18	1%
Grand Total			3306	100%

Condition Class

The breakdown of tree condition follows:

CONDITION CLASS BREAKDOWN

Condition Class	Quantity	% of Total
Good	2324	70%
Fair	730	22%
Poor	247	7%
Dead	5	< 1%

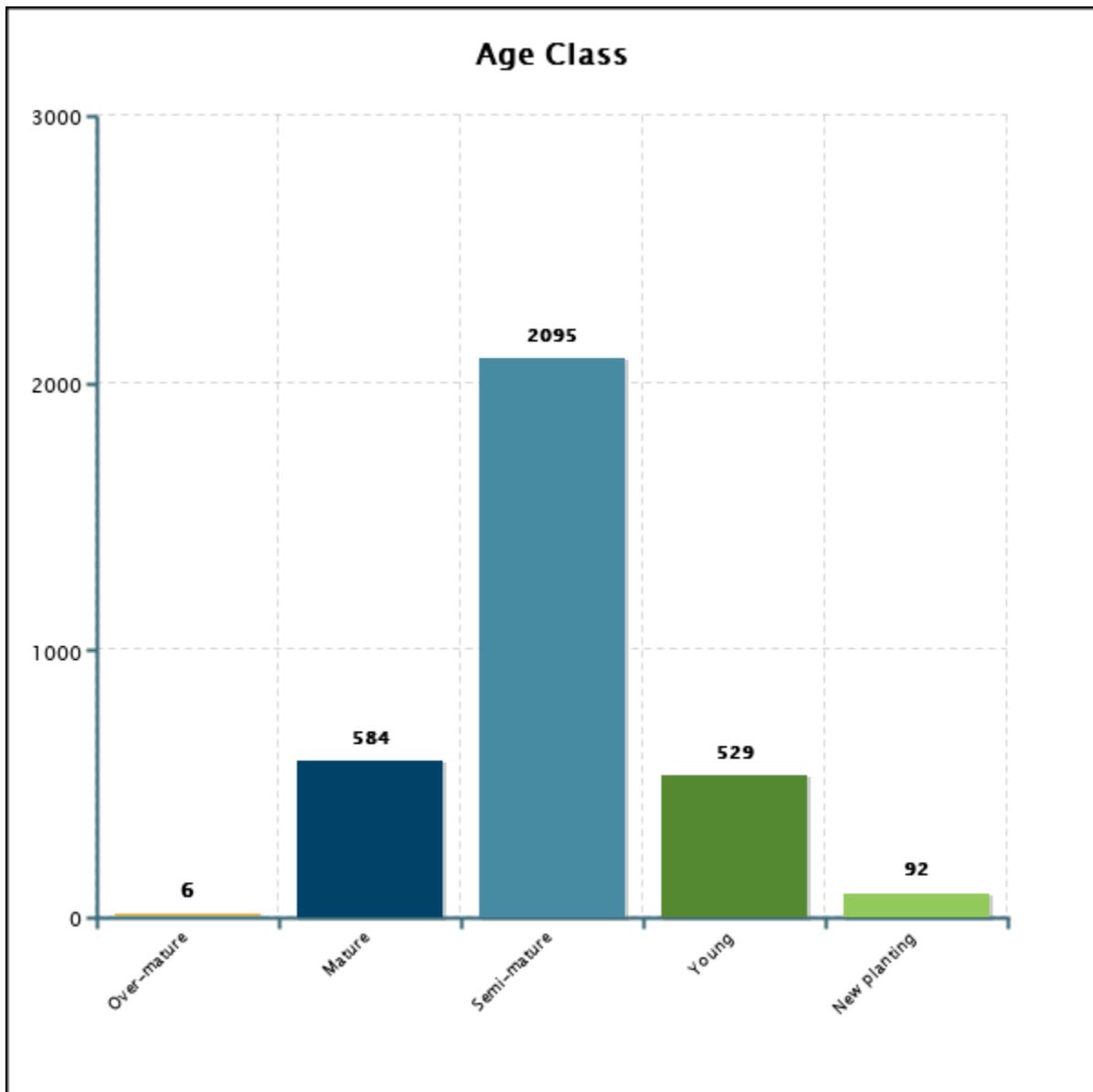


Age Class

The breakdown of tree age class follows:

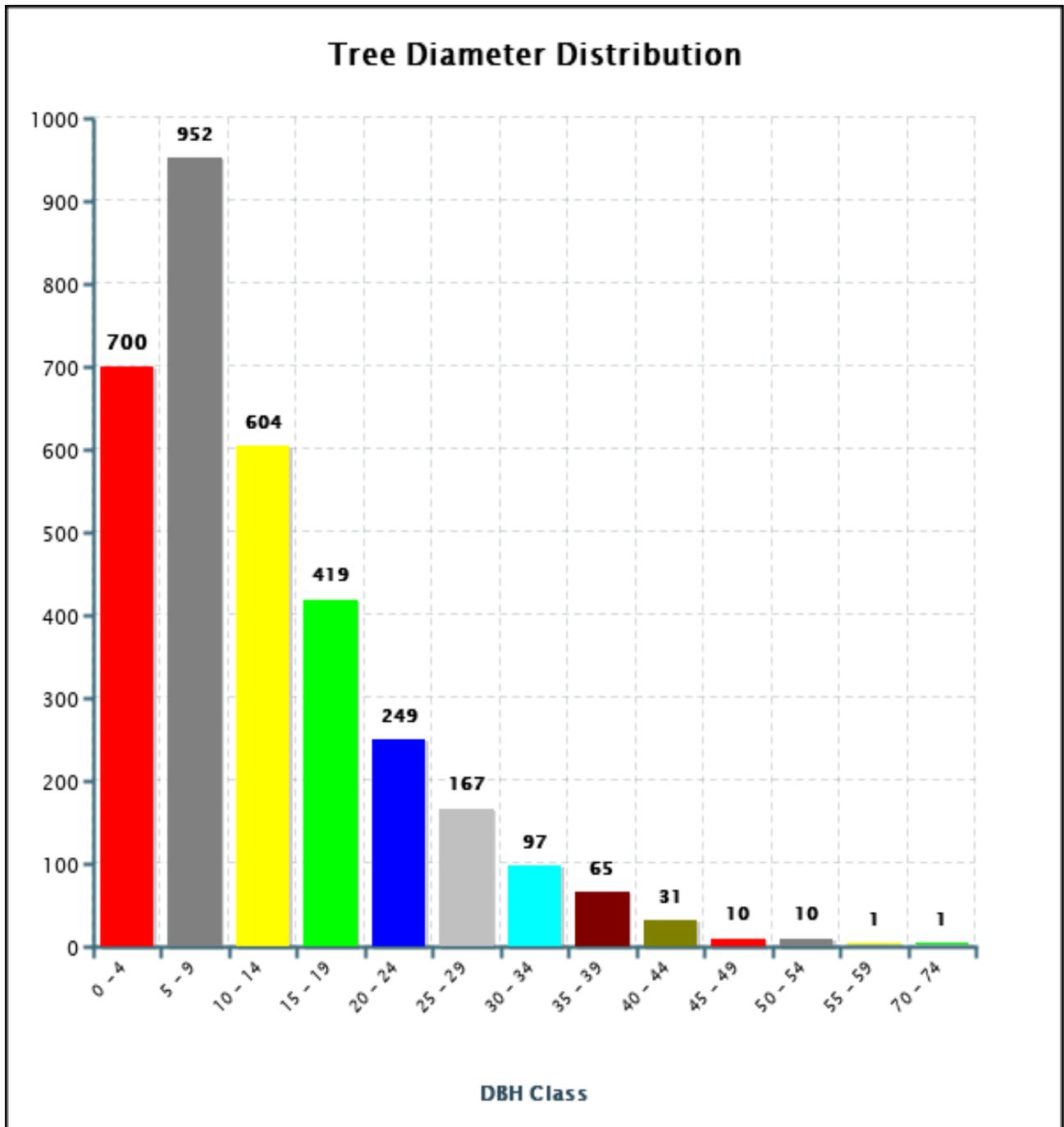
AGE CLASS BREAKDOWN

Age Class	Quantity	% of Total
Over-mature	6	< 1%
Mature	584	18%
Semi-mature	2095	63%
Young	529	16%
New planting	92	3%



Tree Size (DBH)

The following chart illustrates numbers of trees according to size per DBH:



Estimated Tree Asset Value

As part of the Bartlett inventory process, we have included an Estimated Tree Asset Value for each tree and a cumulative total for all trees inventoried. We use an average per square inch nursery price, size (DBH), species factor, condition factor, and location factor to estimate the tree asset value. This is not intended to replace a tree appraisal.

The following data fields are used in this formula:

Data Field	Description
Average Per Square Inch Nursery Price	Based on the average nursery prices for two common tree species and one exotic tree species within a region, then taking the average of those three as the average per square inch price for the region
Size	Based on tree DBH (4.5 feet above grade)
Species Factor	Relative species desirability based on 100% for the tree in that geographical location. In most cases, species desirability ratings, published by the International Society of Arboriculture, are used for adjustment.
Condition Factor	Rating of the tree's structure and health based on 100%
Location Factor	Average rating for the site and the tree's contribution and placement, based on 100%

$$\text{Estimated Tree Asset Value} = (\text{Average Per Square Inch Nursery Price} * \text{Size}) * \text{Species Factor} * \text{Condition Factor} * \text{Location Factor}$$

The estimated cumulative total value for all trees inventoried is **\$10,603,175.09**. The following table lists the ten trees with the highest Tree Asset Values:

TOP TEN TREES - HIGHEST ESTIMATED TREE ASSET VALUE

Tree ID	Common Name	Genus	Species	DBH	Tree Asset Value
3125	Oak-White	<i>Quercus</i>	<i>alba</i>	58	\$53,345.93
2859	Oak-White	<i>Quercus</i>	<i>alba</i>	71	\$45,261.04
1146	Oak-Pin	<i>Quercus</i>	<i>palustris</i>	52	\$42,305.00
2827	Oak-White	<i>Quercus</i>	<i>alba</i>	43	\$37,627.66
2772	Oak-Northern Red	<i>Quercus</i>	<i>rubra</i>	42	\$36,421.41
2797	Oak-Northern Red	<i>Quercus</i>	<i>rubra</i>	54	\$35,421.37
2824	Oak-White	<i>Quercus</i>	<i>alba</i>	40	\$33,949.50
2782	Oak-Northern Red	<i>Quercus</i>	<i>rubra</i>	51	\$33,260.74
958	Oak-Northern Red	<i>Quercus</i>	<i>rubra</i>	50	\$32,512.25
3070	Oak-White	<i>Quercus</i>	<i>alba</i>	50	\$32,512.25

Tree Location Value

Each tree at Bay Village was assigned a location value of good, fair, or poor. Eight hundred and sixty two trees (26%) were assigned a location value of fair or poor due to present or anticipated conflicts with infrastructure or utilities. Trees with conflicts that can easily be mitigated with a one-time raise or reduction prune were not classified as existing in a fair or poor location.

Eighty-five trees (3%) at Bay Village were assigned a location value of poor and are recommended for removal in the Tree Removal Section. These recommendations are made without consideration to tree health or the presence/absence of defects. Twenty nine trees (1%) were assigned a location value of fair and were recommended for removal due to condition, defects, and/or risk. It is recommended that the remaining 748 trees (23%) with fair, or poor location values and not recommended for removal continue to be monitored for intolerable levels of conflict with the surrounding infrastructure. If the level of conflict continues to increase and cannot be easily mitigated, a removal and replacement program should be considered for these trees. If removal and replacement is deemed appropriate, please consult with your local Bartlett Arborist Representative for information on desirable replacement plantings.

APPENDIX



ADDITIONAL RESOURCES

Bartlett publishes a variety of tree-resource documents, including technical reports, plant health care recommendations, and service brochures. The following technical reports may be pertinent to your inventory. To access these documents and view the complete Bartlett Resource Library online, please follow this URL:

<https://www.bartlett.com/resourcelist.cfm>

Girdling Roots

Maintenance Pruning Program

Tree Risk Assessments

Tree Structure Evaluation

GLOSSARY OF TERMS

air pollution removal: removal of pollutants from the air by plants through natural processes

arborist: 1. An individual engaged in the profession of arboriculture who, through experience, education and related training, possesses the competence to provide for, or supervise the management of, trees and other woody ornamentals. [ANSI A300 (Part 1, 2, 4, 5, 6)] 2. An individual engaged in the profession of arboriculture. [ANSI Z133.1-2000 Safety Requirements for Arboricultural Operations]

bracing: The installation of lag-thread screw or threaded-steel rods in limbs, leaders, or trunks to provide supplemental support. [ANSI A300 (Part 3)-2000 Support Systems]

branch: An outgrowing shoot, stem or twig that grows from the main stem or trunk. [ANSI Z60.1-2004 Nursery Stock]

buttress roots: Lateral surface roots that aid in stabilizing the tree.

cable: 1) Zinc coated strand per ASTM A-475 for dead-end grip applications. 2) Wire rope or strand for general applications. 3) Synthetic-fiber rope or synthetic-fiber webbing for general applications. [ANSI A300 (Part 3)-2000 Support Systems]

cabbling: The installation of a steel wire rope, steel strand, or synthetic-fiber system within a tree between limbs or leaders to limit movement and provide supplemental support. [ANSI A300 (Part 3)-2000 Support Systems]

canopy: collective branches and foliage of a tree or group of trees' crowns

carbon sequestration: removal of carbon from the air by plants through natural processes

carbon storage: storage of carbon removed from the air in plant tissues

cation exchange capacity (CEC): The ability of soil to absorb nutrients.

cavity: An open wound characterized by the presence of decay and resulting in a hollow.

cleaning: Selective pruning to remove one or more of the following parts: dead, diseased, and/ or broken branches (5.6.1). [ANSI A300 (Part 1)-2001 Pruning]

co-dominant branches: Equal in size and importance, usually associated with either the trunks, stems, or scaffold limbs.

conk: fruiting body or non-fruiting body of a fungus. Often associated with decay.

critical root zone (CRZ): area of soil around a tree trunk where roots are located that provide stability and uptake of water and minerals required for tree survival.

crown: 1. The leaves and branches of a tree measured from the lowest branch on the trunk to the top of the tree. [ANSI A300 (Part 1)-2001 Pruning] [ANSI A300 (Part 6)-2005 Transplanting] 2. The portion of a tree comprising the branches. [ANSI Z60.1-2004 Nursery Stock]

D.B.H. [diameter at breast height]: Measurement of trunk diameter taken at 4.5 feet (1.4 m) off the ground. [ANSI A300 (Part 6)-2005 Transplanting]

decay: The degradation of woody tissue caused by microorganisms. [ANSI A300 (Part 1)-2001 Pruning]

Geographic Information System (GIS): is any system for capturing, storing, analyzing and managing data and associated attributes which are spatially referenced to earth.

girdling root: A root that may impede proper development of other roots, trunk flare, and/or trunk. [ANSI A300 (Part 6)-2005 Transplanting]

Global Positioning System (GPS): A constellation of at least 24 Medium Earth Orbit satellites that transmit precise microwave signals, the system enables a GPS receiver to determine its location, speed, direction, and time.

Global Positioning System receiver (GPSr): A receiver that receives its input from GPS satellites to determine location, speed, direction, and time.

heading: cutting a shoot back to a bud or cutting branches back to buds, stubs, or lateral branches not large enough to assume apical dominance. Cutting an older branch or stem back to meet a structural objective

integrated pest management (IPM): A pest control strategy that uses an array of complementary methods: mechanical devices, physical devices, genetic, biological, legal, cultural management, and chemical management. These methods are done in three stages of prevention, Observation, and finally Intervention. It is an ecological approach that has its main goal is to significantly reduce or eliminate the use of pesticides.

lateral branch: A shoot or stem growing from a parent branch or stem. [ANSI A300 (Part 1)-2001 Pruning]

leader: A dominant or co-dominant, upright stem. [ANSI A300 (Part 1)-2001 Pruning]

lean: Departure from vertical of the stem, beginning at or near the base of the trunk.

limb: A large, prominent branch. [ANSI A300 (Part 1)-2001 Pruning]

lion's tailing: The removal of an excessive number of inner, lateral branches from parent branches. Lion's tailing is not an acceptable pruning practice (5.5.7). [ANSI A300 (Part 1)-2001 Pruning]

macronutrient: Nutrient required in relatively large amounts by plants, such as nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). [ANSI A300 (Part 2)-2004 Fertilization]

micronutrient: Nutrient required in relatively small amounts by plants, such as iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), and boron (B). [ANSI A300 (Part 2)-2004 Fertilization]

noise attenuation: reducing sound levels via materials, structures, plants, etc.

nutrient: Element or compound required for growth, reproduction or development of a plant. [ANSI A300 (Part 2)-2004 Fertilization]

organic matter: material derived from the growth (and death) of living organisms. The organic components of soil.

parent branch or stem: A tree trunk, limb, or prominent branch from which shoots or stems grow. [ANSI A300 (Part 1)-2001 Pruning]

pH: unit of measurement that describes the alkalinity or acidity of a solution. Measured on a scale of 0 to 14. Greater than 7 is alkaline, less than 7 is acid, and 7 is neutral (pure water).

pruning: The selective removal of plant parts to meet specific goals and objectives. [ANSI A300 (Part 1)-2001 Pruning]

qualified arborist: An individual who, by possession of a recognized degree, certification, or professional standing, or through related training and on-the-job experience, is familiar with the equipment and hazards involved in arboricultural operations and who has demonstrated ability in the performance of the special techniques involved. [ANSI Z133.1-2000 Safety Requirements for Arboricultural Operations]

raising: Selective pruning to provide vertical clearance (5.6.3). [ANSI A300 (Part 1)-2001 Pruning]

reduction: Selective pruning to decrease height and/or spread (5.6.4). [ANSI A300 (Part 1)-2001 Pruning]

risk assessment: process of evaluating what unexpected things could happen, how likely it is, and what the likely outcomes are. In tree management, the systematic process to determine the level of risk posed by a tree, tree part, or group of trees.

root collar: 1. The transition zone between the trunk and the root system. [ANSI A300

(Part 6)-2005 Transplanting] 2. See COLLAR. [ANSI Z60.1-2004 Nursery Stock]

root flare or trunk flare: The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk. [ANSI Z60.1-2004 Nursery Stock] [ANSI A300 (Part 6)-2005 Transplanting]

root zone: The volume of soil containing the roots of a plant. [ANSI A300 (Part 5)-2005 Management]

secondary nutrient: Nutrient required in moderate amounts by plants, such as calcium (Ca) and magnesium (Mg). [ANSI A300 (Part 2)-2004 Fertilization]

seam: Vertical line that appears where two edges of wound wood or callus ridge meet.

soil amendment: Any material added to soil to alter its composition and structure, such as sand, fertilizer, or organic matter. [ANSI A300 (Part 6)-2005 Transplanting]

soil pH: A measure of the acidity or alkalinity of the soil.

stormwater runoff: water (generally from rain or snow melt) that flows over the ground after storm events.

structural support system: hardware installed in tree, may be; cables, braces, or guys, to provide supplemental support.

sweep: Departure from vertical of the stem, beginning above the base of the trunk.

thinning: Selective pruning to reduce density of live branches (5.6.2). [ANSI A300 (Part 1)-2001 Pruning]

tree risk assessment: Closer inspection of visibly damaged, dead, defected, diseased, leaning or dying tree to determine management needs.

topping: The reduction of a tree's size using heading cuts that shorten limbs or branches back to a predetermined crown limit. Topping is not acceptable pruning practice. (5.5.7). [ANSI A300 (Part 1)-2001 Pruning]

tree inventory: A comprehensive list of individual trees providing descriptive information on all or a portion of the project area. [ANSI A300 (Part 5)-2005 Management during site planning, site development, and construction]

tree protection zone: A space above and belowground within which trees are to be retained and protected. [ANSI A300 (Part 5)-2005 Management during site planning, site development, and construction]

trunk: That portion of a stem or stems of a tree before branching occurs. [ANSI Z60.1-

2004 Nursery Stock]

vigor: Overall health. Capacity to grow and resist stress. [ISA Municipal Specialist Certification Study Guide 2008]

wound: An opening that is created when the bark of a living branch or stem is penetrated, cut, or removed. [ANSI A300 (Part 1)-2001 Pruning]