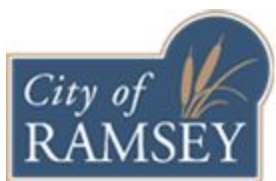


Ramsey Tree Survey Training 2018



This training manual was prepared by students at the University of Minnesota as part of the Resilient Communities Project under the unsurpassed guidance of the everwise Gary Johnson. Trees forever!

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1. Introduction

What is a Tree Survey?

Trees are an important part of any community as they provide many environmental, economic, and social benefits. In order to maximize and maintain these benefits, it is important to effectively and efficiently manage them. In order to do this, understanding what trees exist within the community is crucial. Having information on the size, type, condition, and abundance of trees allows communities to create accurate and appropriate management practices for the present and future. One way to gather information about the trees within a community is to conduct a tree inventory or tree survey. Tree inventories can be a great asset to a community as they:

- Facilitate the development of management plans
- Produce information that can be used by city officials in determining budget
- Identify trees of concern or trees susceptible to failure in severe weather
- Determine where maintenance is needed
- Provide a sense of the overall canopy health in a community
- Establish monetary value and ecosystem services of urban forest

Ramsey's Survey

For the City of Ramsey's tree survey, a stratified random sampling technique will be used, allowing for accurate estimates of tree species, diameter categories, and total trees. By participating in this tree survey you are collecting and providing your city with the means to create management plans, apply for grants, identify risks, determine benefits, and understand environmental benefits.



2. Tree Survey Volunteer Guidelines, Policies, and Procedures

Volunteer Commitment

Thank you for your willingness to volunteer your time and energy to help with this tree survey! In order to help keep data as accurate as can be, you are asked to attend both days of training. Once trained, it is expected that you and the volunteers in your team work out a time frame and time schedule to inventory your assigned sections before October 2018. Time required to complete the survey ultimately depends on the number of groups participating; the more groups, the less surveying for everyone. Additionally, in order to maintain accurate data collection practices it is recommended that surveying sessions are limited to four hours at a time.

Have fun, and remember that you are only asked to do as much as you can; any gaps or unfinished sections will be completed by other groups in the community.

Teams

At the close of the tree survey training each individual will be asked to form a team of three volunteers. Each team will then be assigned a section, and it is up to them to arrange a surveying schedule.

Remember to notify your community contact each time your group conducts a section of the survey.

Name:	Phone:	Email:
_____	_____	_____
_____	_____	_____

Survey Equipment and Materials

Each time you survey, remember to dress for the weather, wear comfortable shoes and bring:

- DBH tape
- 50' cloth measuring tape
- Data collection sheets
- Tree identification cards/guides
- Clipboard
- Pens/pencils
- Volunteer identification (card/vest/lanyard, etc.)
- Informational material for interested onlookers with project details and city contacts
- Water
- Cell Phone

Minimum Age Requirement

Participants must be 18 years or older to participate in this survey. Individuals under 18 years of age must be accompanied by parent or legal guardian.

Public vs. Private Trees

This is a survey of public trees only. Public trees include anything planted within 16' of a street.

Safety

When conducting the tree survey it is important that you remain safe, especially when working in busy areas of the community. Remember to stick with your team when in the field, looking out for one another as you survey.

You may choose to perform the survey in various types of weather. Make sure to wear proper attire for your comfort and safety. Never perform surveying if there is lightning anywhere in view.

Perform the survey only during daylight hours.

Interactions with the Public

Please remember to carry your volunteer identification every time your team goes out to survey. Additionally, make sure you have contact information for your city's contact: **Chris Anderson, 763-433-9817.**

It is natural for residents to be curious about work being done near their homes. Some residents may see you as a source of knowledge and ask you to look at certain trees or answer tree questions. Explain to them that you are a volunteer who has received tree survey training, and if they have any questions they may contact the city or an ISA-certified arborist.

You will be collecting data on public trees, however some residents may request that no information be taken on the public tree near their property. In the event that a resident asks you to leave the area, thank them for their time, make a note on your data sheet for your contact your city contact and move on to the next tree.

If you find yourself interacting with a disagreeable resident, you may explain that you are a trained volunteer authorized by the city to collect information about public trees. If there is a substantial fuss, discontinue surveying that particular tree and contact your city contact, Chris Anderson at 763-433-9817. You will be provided with a replacement tree to survey.

If at any time you feel uncomfortable or threatened, leave the area immediately and call 9-1-1 if you are in immediate danger.

Important Contacts

Chris Anderson, City planner and Community Development (canderson@cityoframsey.com)

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3. Surveying Trees

Typical Trees in Ramsey

In a rapid tree survey performed by the DNR in 2010, the top ten genera were identified (Figure 1). Why complete another tree survey now? A lot can happen in eight years! Along with the growth and development of cities comes drastic change to the urban canopy.

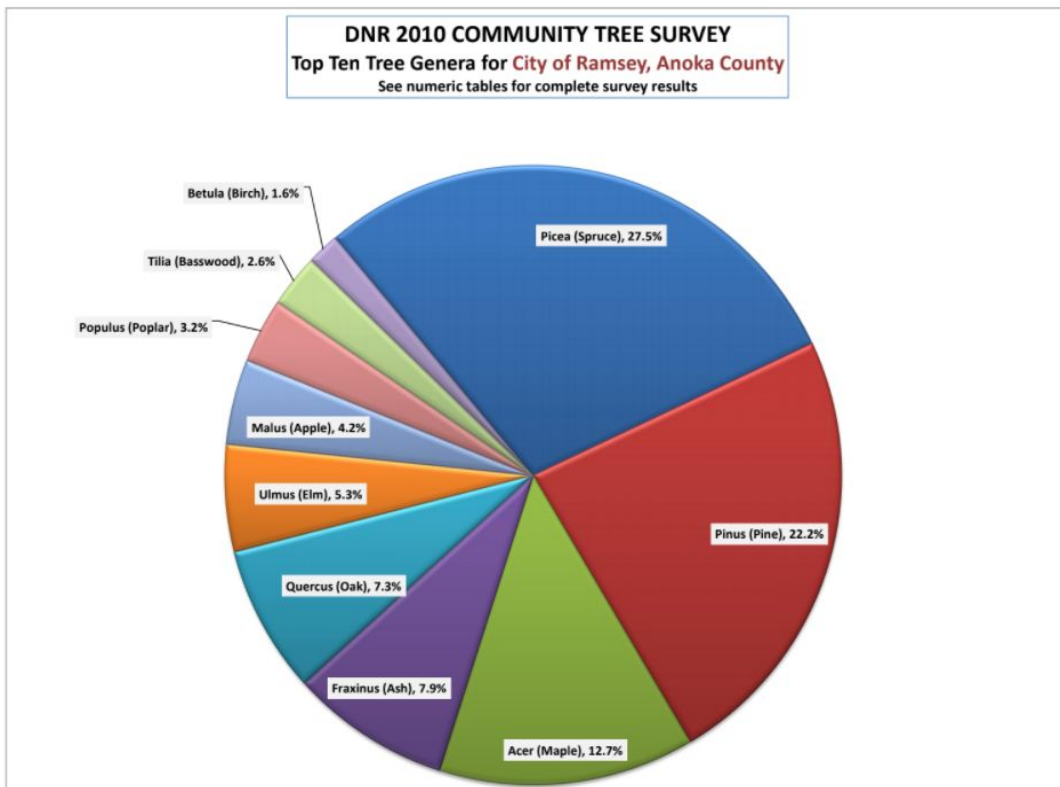


Figure 1 - 2010 DNR Rapid Survey of Ramsey, MN

Tree Identification

Classification

You may recall from a biology class that each unique plant, animal, and fungus on earth has been given a scientific name, or binomial (at least, those that have been discovered so far!). This scientific, or binomial, name includes one word for the genus and one word for the species (e.g. sugar maple = *Acer saccharum*). The genus classification (such as *Acer*) includes any number of individual species that share common characteristics. The species classification (such as *saccharum*) is unique to individuals that can freely reproduce with each other, and are distinct from other related species.

Most trees in this survey will be identified down to the genus level for simplicity. However, there are some trees for which there is value in identifying the species because different species within a genus may be at risk for certain pests or diseases. For example, you will differentiate between the white oak group and the red oak group due to the high risk of oak wilt associated with the red oak group, and the risk of bur oak blight on bur oak, which is in the white oak group.

Identification

The following trees should be identified down to the species level:

Family	Genus	Species	Common Name	Identify to...
Betulaceae	Betula	nigra	river birch	species
Betulaceae	Betula	papyrifera	paper birch	species
Fagaceae	Quercus	alba	white oak	white oak group
Fagaceae	Quercus	bicolor	swamp white oak	white oak group
Fagaceae	Quercus	macrocarpa	bur oak	species
Fagaceae	Quercus	palustris	pin oak	red oak group
Fagaceae	Quercus	rubra	northern red oak	red group
Juglandaceae	Juglans	nigra	black walnut	species
Pinaceae	Picea	glauca	white spruce	species
Pinaceae	Picea	pungens	Colorado blue spruce	species
Pinaceae	Picea	abies	Norway spruce	species
Pinaceae	Pinus	strobus	eastern white pine	species
Pinaceae	Pinus	resinosa	red pine	species
Pinaceae	Pinus	sylvestris	Scots pine	species
Salicaceae	Populus	grandidentata	bigtooth aspen	"aspen"
Salicaceae	Populus	tremuloides	trembling/quaking aspen	"aspen"
Salicaceae	Populus	deltoides	eastern cottonwood	species
Sapindaceae	Acer	negundo	boxelder	species
Sapindaceae	Acer	rubrum	red maple	species
Sapindaceae	Acer	ginnala	Amur maple	species
Sapindaceae	Acer	platanoides	Norway maple	species
Sapindaceae	Acer	saccharum	sugar maple	species
Sapindaceae	Acer	saccharinum	silver maple	species
Ulmaceae	Ulmus	americana	American elm	species
Ulmaceae	Ulmus	pumila	Siberian elm	species
Ulmaceae	Ulmus	rubra	slippery elm/red elm	species
Ulmaceae	Ulmus	thomasii	rock elm	species

For information on identification, please reference the [Minnesota Trees](#) booklet and TreeID Cards provided in the training.

Determining Age-Class

In order to assess the age-class of a tree, the diameter at breast height (DBH) and the crown width can be utilized. These measurements help in the identification of the age and the growth of a tree.

Measuring Diameter at Breast Height (DBH)

Diameter at breast height is a standardized point on a trunk, 4.5 feet from the base of the tree. This measurement is used to estimate age and volume of trees. To measure the DBH you can use a diameter tape (D-tape), or you can measure the circumference of a tree with a standard measuring tape and convert the measurement to diameter by dividing the circumference by pi (3.14).

Using a D-tape

- All breasts are not 4.5 feet off the ground! Determine breast height on your own body by measuring 4.5 feet up from the ground - remember where that point on your body is; it will make measurements in the field go quickly.
- When measuring a tree, wrap the D-tape completely around the tree at your breast height until the zero on the tape reaches the tape again. Record the number where the zero meets the tape again. If the tree is on a slope, take the measurement on the uphill side of the tree (Figure 2).
- Remember to read the correct side of the D-tape:
 - The right side: measures using distances that have been converted to diameter
 - The wrong side: measures in standard feet

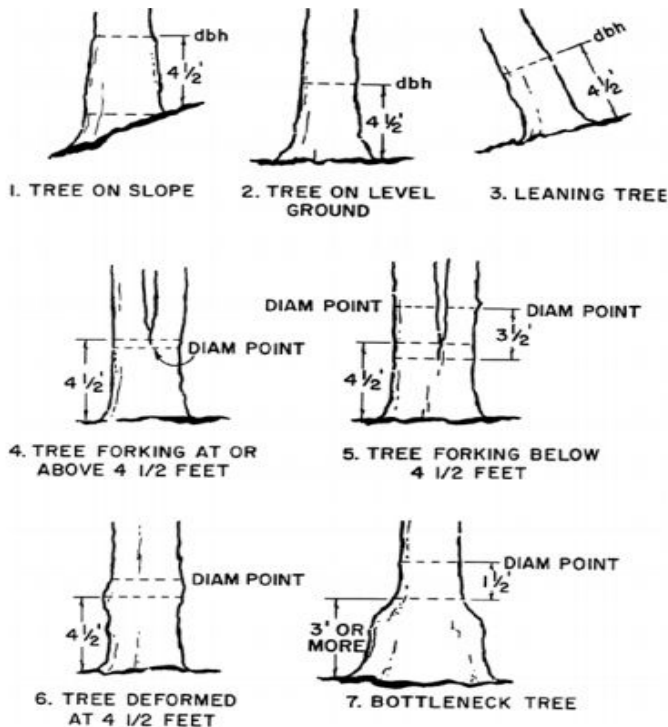
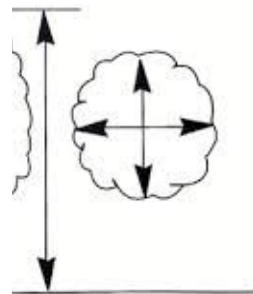


Figure 2 - Measuring DBH

Measuring Crown Width

The crown width of a tree refers to the average diameter of a tree's crown. You can approximate a tree's crown width by using a standard measuring tape. To measure crown width (Figure 3):

- One group member will stand at the edge of the canopy with one end of the tape measure
- A second member walks with the opposite end of the tape measure to the tree's trunk. They then turn 90 degrees with the tape hugging the stem around the corner and continue that path to the edge of the canopy.
 - Record this distance to the nearest foot.



Average Crown Spread **Figure 3 - Measuring Crown Width**

Condition Rating

When assessing the condition of a tree, each team member present should evaluate the tree independently. Once everyone has had a chance to determine their ratings, the team should discuss how each person rated the tree. If condition ratings vary dramatically between team members, take time to discuss and resolve the differences.

For each tree surveyed, two separate condition ratings will be determined, one for the crown and one for the stem. **Numeric values for the crown and stem ratings are not lumped together or averaged.** Each rating is determined by using a zero-to-four point scale. Every tree begins with four points, and receives **reductions in quarter point increments** as the crown and as the stem are evaluated. Foliage (leaves) is not evaluated in this rating system.

Rating the Crown Condition

Stag Heading

Stagheading is a condition where an entire main branch is dead, from the tip of the branch all the way back to the main stem of another major branch (Figure 4). **Up to 1 point** may be deducted, based on the size of the dead branch and the percentage of crown affected. Larger branches that affect more of the crown will receive deductions near 1, whereas smaller dead branches that make up only a small portion of the crown will receive minor deductions.



Figure 4 - Stag Heading (Source: Gary Johnson)

Tip dieback

Tip dieback is a condition where there is significant death at the tips of the branches (Figure 5). If a tree exhibits die back, **up to 0.5 point** can be deducted from the rating. This deduction usually is typically given to trees that exhibit dieback in the entire crown of the tree.



Figure 5 - Tip Dieback

Source: (<http://www.treecology-mn.com/wp-content/uploads/2012/03/construction-die-back.jpg>)

Symmetry

This condition factor address symmetry of the crown; each tree is assessed in comparison to a perfectly symmetrical crown (Figure 6). **Up to 1 point** can be deducted if a portion, or portions, of the crown is missing.

- 50% crown missing: **-1.0**
- 25% crown missing: **-0.5**
- Less than 25% crown missing: **-0.25**



Figure 6 - Symmetry

(Source: https://www.tottenhamtrees.org/uploads/5/6/9/4/56947305/1360982_6_orig.jpg)

Live crown ratio (LCR)

The live crown ratio is the total potential crown of a tree. It is the ratio of the height of the crown to the total height of the tree (Figure 7 and 8). The crown begins where the first main branch on the tree is located and rises to the top of the tree. Note: The crown does not begin at the foliage but at the first main branch.

Measuring LCR

- Stand far from the tree and hold a tape measure out in front of you.
- Take the first measurement by lining up the top of the tree with the beginning of the measuring tape (at the 0) and measure the distance to the base of the tree. Record the number (N) at the tape where the base of the tree is located. This is the total height of the tree you will use to determine the LCR.
- Take the second measurement by lining up the top of the tree with the beginning of the measuring tape (at the 0) and measure the distance to the first main branch on the tree (n).
- Using the two measurements you've recorded, use the formula n/N to produce the percentage of LCR; divide the second measurement by the first measurement to get the live crown percentage.

LCR Standards

- Deciduous trees: LCR \geq 60% (as a general rule, **deciduous trees with less than 25% LCR should lose 2 points, with 33% LCR would lose 1 point, and with 50% LCR could lose up to 0.5 point**)
- Conifers: LCR \geq 75%

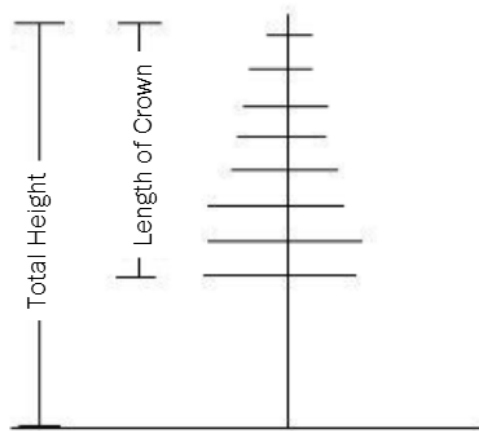


Figure 7 - LCR

(Source: <https://openoregon.pressbooks.pub/forestmeasurements/chapter/5-4-live-crown-ratio/>)



Figure 8: LCR (Source: Gary Johnson)

Rating the Stem Condition

Cambium loss

Cambium loss can be caused by pruning wounds, accidental damage, vandalism, and winter injury (Figure 9 and 10).

- **Up to 3 points can be deducted if 50% or more of the stem's circumference is girdled; a tree that is 25% girdled would lose about 1.5 points.**
- Vertical cambium loss is not counted, only add up circumferential loss.
- Girdling refers to the removal or loss of bark and phloem from around the circumference of a branch or trunk.



Figure 9 - Cambium Loss (Source: Lydia Voth)



Figure 10 - Cambium Loss

(Source:

https://dallasnews.imgix.net/1499099950-6_22_17_Good_pruning_cut_from_3_angles.jpg?auto=format%2Cenhance&crop=faces%2Centropy&fit=crop&q=40&or=0&w=1024&h=543)

Exposed or decayed wood

Exposed wood requires a **deduction of 0.25 point minimum** and more if it shows obvious signs of decay (i.e. “punky” or soft rots). Judge decayed wood deduction by significance, location, and amount (Figure 11).



Figure 11: Exposed/Decayed Wood

Source:<https://maxpull-tlu716lqiu.stackpathdns.com/wp-content/uploads/2010/09/tree-with-hole-400x533.png>

Sprouts/suckers (up to 0.5 pt deduction)

Sprouts, or water sprouts, are fast growing excess shoots that grow out of the main stem of the tree. Suckers are sprouts that develop at the base of the tree stem or off of the tree’s root system (Figure 12). If **any** sprouts or suckers are present deduct a **minimum of 0.25 point**. If sprouts or suckers are excessive, deduct **0.5 point**.



Figure 12 - Sprouts

(Source:https://extension.umd.edu/sites/default/files/_images/programs/hgic/Trees_Shrubs/EnvironmentalProblems/Water_sprouts_MG_Handbook.jpg)

Stem cracks

Stem cracks can form as a result of wounding or rapid temperature changes, exposing wood to disease and decay (Figure 13). Depending on the severity of the crack, **up to 2 points can be deducted**. Severity increases if there are multiple cracks, cracks with sap oozing out, and/or if there are indications of decay.



Figure 13 - Stem Crack

(Source: http://www.mggkc.org/wp-content/uploads/2012/11/frost_crack_initiation_point.jpg)

Included branch unions

Included branch unions occur when bark grows between where a branch and the stem, or where two branches, attach, causing a weak attachment (Figure 14 and 15). Depending on the number of inclusion present, and their severity, a **maximum of 0.5 point can be deducted**. Only the first main order branches can be considered when deducting points for this category. Do not consider anything further up in the crown of the tree for this stem condition rating.

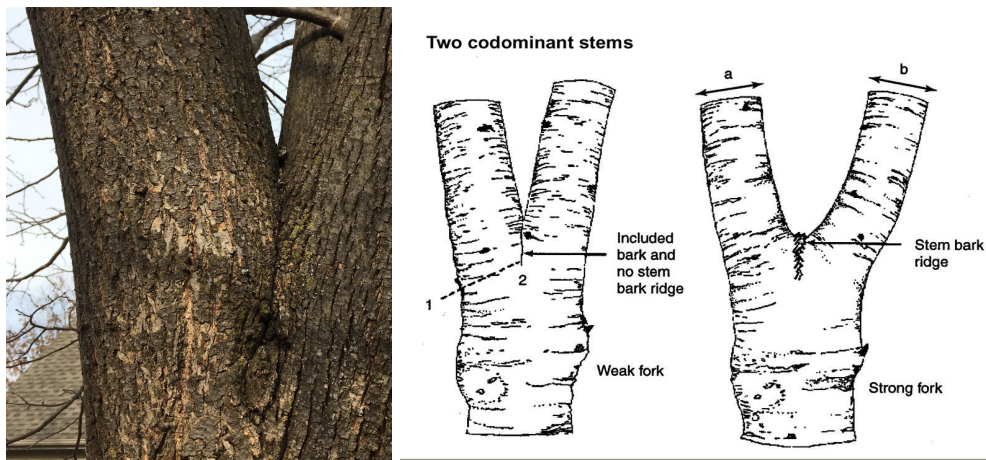


Figure 14 - Included Branch Union (Source: Lydia Voth) **Figure 15 - Included branch union examples** (Source: http://images.slideplayer.com/13/4023674/slides/slide_17.jpg)

Data Collection

Conducting the Segment Sampling

Start and end points

Each group will have a “master list” of segments to survey. Segments are denoted by starting and ending addresses. To begin surveying, travel to the starting point of a listed segment and proceed to survey each public tree from the starting address to the ending address. When all trees between the start and endpoints of a given segment are surveyed and recorded, the data sheet for that segment should be returned to Chris Anderson at Ramsey Municipal Center.

Public trees

This tree survey will include only street or boulevard trees. These trees are public trees are often situated near the road, but may be located **up to 16'** from the street. If you have any questions as to whether a tree is public or private, contact Chris Anderson.

Completing Data Sheets

Please use the guideline outlined blow when completing your survey sheets.

- **General Information:**
 - Group Member Names: Record the names of all group members present
 - Date: Record the date of the survey
 - Zone: Record the zone where the segment is located
 - Count: The number of the tree; remember no repeating numbers on a single segment
 - Segment # : The segment number as it appears on your survey map
 - Page _ of _ : Record the current page out of the total pages used for each segment.
- **Tree Information:**
 - Genus: Record the genus for each tree.
 - Species: Reference page 11 in this manual for the list of trees requiring species designation.
 - DBH (to the nearest inch): The DBH measurement taken for the tree.
 - Crown Width (to the nearest foot): The determined crown width of the tree.

For the following criteria, remember to only note the maximum deductions in each column, going in only quarter increments.

- **Crown Assessment:**
 - Stag Heading (up to 1 point): Refer to the condition rating section of the manual.
 - Tip Dieback (up to 0.5 point): Refer to the condition rating section of the manual.
 - Symmetry (up to 1 point): Refer to the condition rating section of the manual.
 - Live Crown Ratio (up to 2 points): Refer to the condition rating section of the manual.
 - Total from Canopy: The total number of points a tree canopy receives. The sum of the deductions made from the assessment are subtracted from the starting point of 4 points.

- **Stem Assessment:**
 - Cambium Loss (up to 3 points): Refer to the condition rating section of the manual.
 - Exposed or Decayed Wood: This is a **Minimum** deduction column. Take **at least** 0.25 point off if there is exposed/decayed wood. There is no maximum.
 - Sprout/Sucker (up to 0.5 point): Refer to the condition rating section of the manual.
 - Stem Cracks (up to 2 points): Refer to the condition rating section of the manual.
 - Included Branch Unions (up to 0.5 points): Refer to the condition rating section of the manual.
 - Total from Stem: The total number of points a tree stem receives. The sum of the deductions made from the assessment are subtracted from the starting point of 4 points.

- Comments/Notes: Record any comments or notes for a tree or segment.

Submitting Data Sheets

Completed data sheets can be submitted to Chris Anderson either in person at city hall, via email (canderson@cityoframsey.com), via fax (763-433-9848), or by mail (7550 Sunwood Drive NW, Ramsey, MN 55303). **Remember**, to submit data sheets after you complete each segment and/or surveying outing in order to ensure that the data sheets and important data are recorded and the survey kept up-to-date.

Glossary

Alternate leaves:

Leaves that are attached to the branch in an alternating pattern.

Cambium Loss:

Loss of a tree's cambium due to pruning wounds, accidental damage, vandalism, and winter injury.

Cambium:

The thin layer of living wood tissue between the bark and the inner wood of a tree.

Condition:

An assessment of a tree's specific likelihood of structural failure.

Coniferous:

A tree that has needles or scale-like leaves and cones.

Crown:

The leaves and branches of a tree, excluding the trunk/stem.

Crown symmetry:

Occurs when the general shape and condition of the crown is the same from all sides.

Decay:

See wood decay.

Deciduous:

Trees that lose their leaves in the fall.

Dentate:

A leaf that has jagged edges that point upward.

Diameter at breast height (DBH)

The diameter of the tree trunk at 4.5 feet above the ground.

Die-back:

See tip die-back.

Doubly serrate:

A leaf that contains both larger and smaller serrations on its edges.

Entire (leaf):

A leaf that has a smooth edge.

Included Bark:

Bark that grows between where a branch and the stem, or two branches, attach, causing a weak attachment.

Live Crown Ratio:

The ratio of living branches to the total tree height.

Opposite:

Leaves that are attached to the branch directly opposite to each other.

Palmately Compound Leaf:

Leaves that originate from one point; all leaflets branch out from one point

Pinnately Compound Leaf:

Leaflets form in rows along either side of the central vein.

Samara:

A type of fruit with wings found on maple and ash trees.

Serrate:

A leaf that has jagged edges pointing towards the tip of the leaf.

Simple (leaf):

Leaves that are singular; singularity attached leaves.

Species Tree Code:

The four letter code used by the U.S. Forest Service to designate trees by their genus and species.

Stag Heading:

The complete dearth and defoliation of main branches. Branches have an antler-like appearance.

Stem:

The trunk of the tree, excluding branches and leaves.

Stem Circumference:

The circular measurement around the stem of the tree.

Suckers:

Suckers are sprouts that develop at the base of the tree stem or off of the tree's root system.

Terminal Bud:

Terminal buds are the buds seen at the very tips of twigs. Note: not all species have terminal buds.

Tip Dieback:

Dieback that begins at the tip of a twig and works backward to the stem.

Tree Defects:

Any condition such as decay, cavities, included bark/weak branch attachments, cracks or cankers that occur anywhere on a tree and may cause the structural failure of part of, or the whole, tree.

Water Sprouts:

Sprouts, or water sprouts, are fast growing excess shoots that grow out of the main stem of the tree.

Whorled (leaf):

Three or more leaves that are attached to the branch opposite each other.

Winter Injury:

Injury caused by a freezing following a period of warmer weather.

Wood Decay:

Wood that is rotting or missing due to fungus or bacteria.
