USDA FOREST SERVICE

Northeast Center for Urban & Community Forestry

VOLUNTEER TRAINING MANUAL

"Count trees because trees coun

April 21, 1998

Dear Inventory Participant:

Welcome to the 1998 Inventory of (Name of City) Street Trees. We look forward to your participation in this exciting and important project. With your helpful assistance, a complete survey of every street tree in (Name of Neighborhood or City) will be completed and the information will be used to implement more effective and efficient community forest management strategies. We look forward to working with you to achieve this exciting and important goal.

This volunteer training manual is designed to assist you in developing skills that are necessary to accu - rately complete the street tree inventory, while serving as a reference source for valuable information on the identification of tree species, the assessment of a tree's condition and how to map the location of a tree growing along a public roadway. It is meant to provide the basis of the hands on training sessions that will be part of your training as a Volunteer Inventory Specialist. The format of the manual is designed so that you can add your own notes and information as necessary, so that it becomes a truly valuable resource that you can keep after the inventory is completed.

We hope that you will gain valuable experience, gain useful skills and develop an enhanced recognition of the importance of the community forest in (Name of City). Additionally, we hope that you will gain a better understanding of your critical role as a volunteer and a steward of (Name of City)'s street trees and urban ecosystem. It is people like you who make (Name of City) an even better place in which to work and live.

On behalf of everyone working on this project I would like to thank you for your effort in helping make The 1998 Inventory of (Name of City)'s Street Trees a success.

Sincerely,

(Mayor, Park Commissioner, Tree Warden, etc.)

TABLE OF CONTENTS

This Volunteer Training Manual was developed by the Northeast Center for Urban & Community Forestry at UMass/Amherst, in cooperation with the USDA Forest Service, Northeastern Area, the states of New York and the New England region and the University of Massachusetts for distribution and use by communities throughout the Northeast.

For more information contact the Center at:

PHONE:
413/545-3755;

E-MAIL:
urbantree@forwild.umass.edu

WWW ADDRESS:
www.umass.edu/urbantree/

CREDITS & ACKNOWLEDGEMENTS

PROJECT COOPERATORS

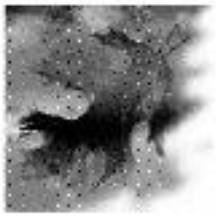
- USDA Forest Service, Northeastern Area
- Northeast Center for Urban & Community Forestry
- The State Foresters of ME, VT, NH, RI, CT, MA, and NY
- Maine Forest Service
- Vermont Dept. of Forests, Parks & Recreation
- NH Dept. of Resources & Economic Development
- Rhode Island Dept. of Environmental Management
- Connecticut Dept. of Environmental Protection
- Massachusetts Dept. of Environmental Management
- NY State Department of Environmental Conservation
- Arnold Arboretum of Harvard University

MANUAL DEVELOPMENT TEAM

- **Project Coordinator & Editor**
  David V. Bloniarz,
  Northeast Center for Urban & Community Forestry
- **Project Liaison**
  Gail Michaels,
  USDA Forest Service
- **Project Director**
  H. Dennis P. Ryan,
  University of Massachusetts/Amherst
- **Project Contributors**
  Russell Parker,
  University of Massachusetts
  Sean Pinkham,
  University of Massachusetts
  Kendall Uzar,
  University of Massachusetts
  Karen Doherty,
  University of Massachusetts
  Erin McKenna,
  City of Stamford, CT
  Fred Borman,
  CT Department of Environmental Protection
  Bruce Payton,
  RI Department of Environmental Management
  Sharon Ossenbruggen,
  USDA Forest Service
  Amy Snyder,
  USDA Forest Service
  Chris Strand,
  Arnold Arboretum of Harvard University
  Corey Dahlstedt,
  University of Massachusetts

(YOUR COMMUNITY'S) PROJECT TEAM

BACKGROUND INFORMATION



STREET TREE INVENTORIES

There are a number of reasons for completing a street tree inventory. An inventory provides an accurate profile of the species and the ages of the trees which make up the community forest. The first reason for making this profile is that it can be used to formulate an effective management plan for tree care. The second reason is that an adequate budget is critical if a community is to preserve its street trees, and a tree inventory provides information with which to create defensible budget requests that are accurate and well thought out. Using the information gathered in an inventory, a management plan can be developed that will identify what maintenace work is needed for each tree, how many people are needed to do the work, how long it will take them, and what equipment and materials they will need. This can lead to savings through more efficient scheduling of time and crews. The management plan sets priorities and can therefore provide a systematic approach for the care of all the trees in the inventory.

A third reason to perform a tree inventory is that it enables a community to achieve the desirable goal of creating and preserving a healthy green infrastructure. Tree inventories detail the monetary and aesthetic values of all the trees belonging to the community. The existence and the appearance of the forest depend upon a well-developed system of timely maintenance. Such a system also identifies problems in trees, anticipates and prevents the damage and costly repairs caused by potentially hazardous trees, and helps to avoid the visual impact of a large-scale loss. In addition, a tree inventory will identify and enable protection of trees that are of large size and/or historical value. This knowledge

can ensure that special care will be taken not only to preserve these specimens but also to educate the community about their unique value.

A fourth advantage to having a quality street tree inventory in place is that it is much easier for a variety of people to access information about the trees. The existence of comprehensively recorded data facilitates the reporting of tree problems to government administrative officials. It ensures continuation of information even though personnel may change. Finally, factual data can easily be shared among municipal departments, allowing for coordination of efforts when there is work scheduled that will affect any of the community's trees.

The type of inventory we will be conducting is called a Continuous Complete Inventory. In a Complete Inventory, every tree is inventoried and associated with a specific location such as a house address, block, or telephone pole numbers. Although this type of inventory is time consuming and expensive, it is also the most accurate. "Continuous" means that the inventory will be constantly updated and changed, depending upon what happens to the individual trees and what work is completed or planned to be completed on certain trees.

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

All of the information gathered by the tree inventory volunteers will be placed in a "geographic information system" or GIS. A GIS is a computer system comprised of electronic hardware and software. The significant advantage of a GIS is that it contains all the information necessary for the various municipal departments to manage the infrastructure and natural systems.

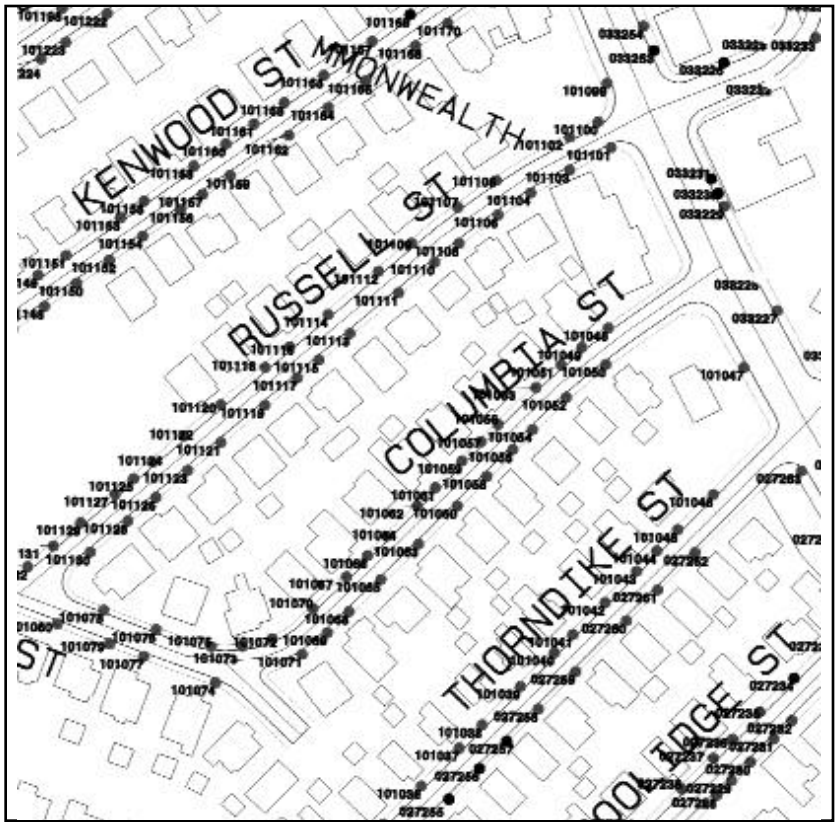
A GIS can be defined as:

> ***computer system capable of holding and using data describing places on the earth's surface.***

GIS possesses the characteristics of other types of computer software such as spreadsheets, databases, statistical packages, and computer assisted drafting programs (CAD). However, it is much more powerful than these types of software, because a GIS enables the user to link an attribute with its geographical location on the planet's surface. For example, a spreadsheet can be used to count the number of sugar maple trees located on the city's streets. A GIS allows the user to analyze the information spatially and determine not only how many sugar maples there are on the streets, but also how they are distributed across the town or city, such as by neighborhood, planning area, census tract, or road type. This information can be displayed either in spreadsheets or in maps or both. The GIS can also link different data sets (called layers) to make an analysis more powerful. For example, a data set about the utilities could be linked with a data set about trees to determine where conflicts between electrical wires and trees are likely to exist.

When the inventory data is processed, each tree record will be in a database and will be related to its real world location in the city. The city will actually be able to determine an individual tree's latitude and longitude on the planet's surface. As trees are planted and maintenance work is performed, the database will be updated and the information kept current.

Divisions of municipal departments, such as forestry and engineering, will utilize numbers and maps from the GIS tree inventory to prepare tree planting and maintenance programs.



SAMPLE GIS OUTPUT

The map (show below left) shows the typical printout of a GIS database. This database shows street tree locations and unique identication numbers. Also note the center line of the roadway, edge of paved sur - faces, limit of public right of way, and building footprints.

LOGISTICS

Volunteer Commitment

Volunteers are asked to participate in the training program and to contribute as much time as possible to the tree inventory. The expectation is that volunteers will work about six hours on one day to complete the inventory. If this is too long, we only ask that you do as much as you can. Any gaps in the inventory will be filled by other groups at a later date. We are hoping that the number of gaps will be minimal.

Teams

Each volunteer will be assigned to a team of three members. Each team will inventory an assigned area covering between 2.5 and 3 miles of streets. It is likely that the team will be able to complete its assignment in one day.

Equipment and Materials

Each team will be given a set of maps, pens, a tree diameter tape, a tree identification guide, and data sheets with clipboard.

What to Wear and Bring

It is vital that you wear appropriate and comfortable footwear, because you will be walking and on your feet for a considerable amount of time. In addition, we suggest that you bring the following items:

- Clipboard
- Knapsack
- Lunch and Snacks
- Water
- Hat
- Rain gear
- Tree Identification Field Guides, if you have your own
- Cellular telephone, if you have one

SAFETY

PLEASE BE AWARE FOR YOUR PERSONAL SAFETY DURING THE INVENTORY. Keep in mind that cars will be going by. If some trees are in a location that does not seem safe, such as a traffic island in the middle of a busy street, then do not hesitate to skip those trees. Please be sure to note on the maps the areas that you had to omit.

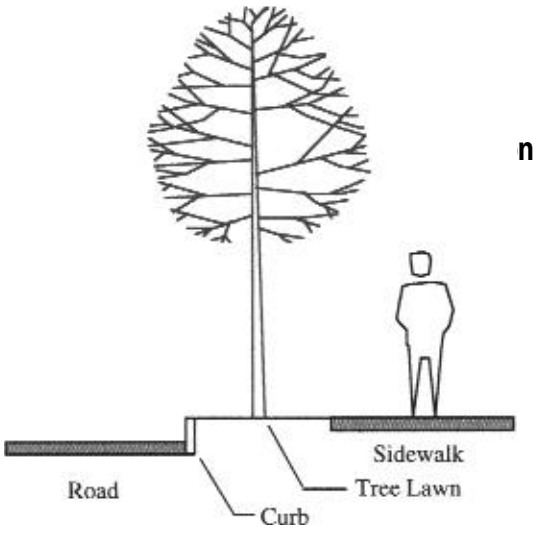
Inventory Days and Times

Each volunteer will be assigned a location to meet to begin the inventory. Please try to arrive on time.

WHAT IS A STREET TREE?

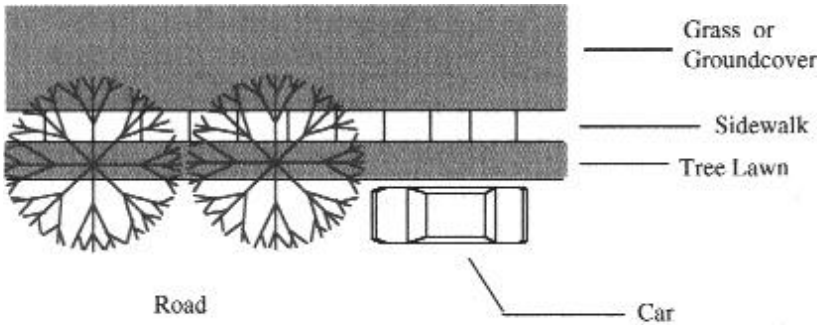
A street tree is one that is located within the right-of-way or layout of a public road. Usually the laws of the individual state grant authority to the local municipalities for the street trees and public shade trees within their geographical area. Inventory volunteers should follow the guidelines below to determine whether a particular tree should be counted. A street tree will be located relative to a public street in one of the following ways:

1. The tree is located between the curb and the sidewalk.

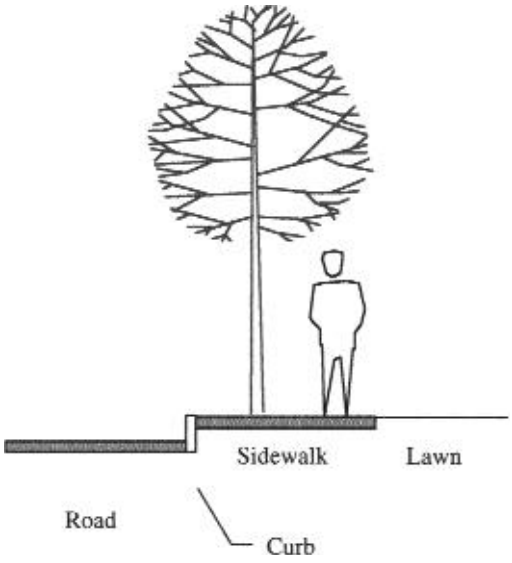


n View

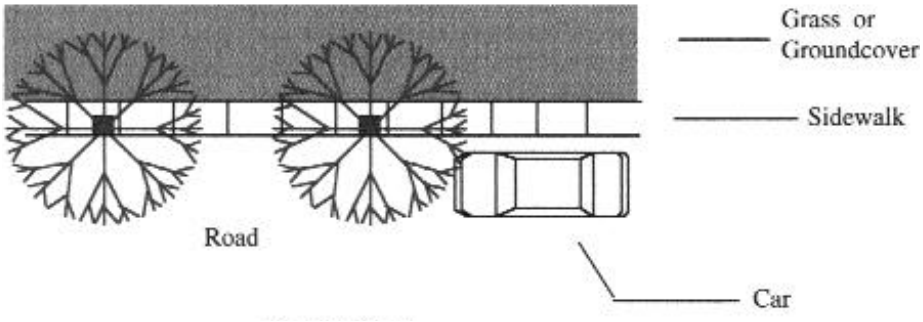
Plan View



2. The tree is located within the sidewalk corridor (usually in a tree pit or well.)

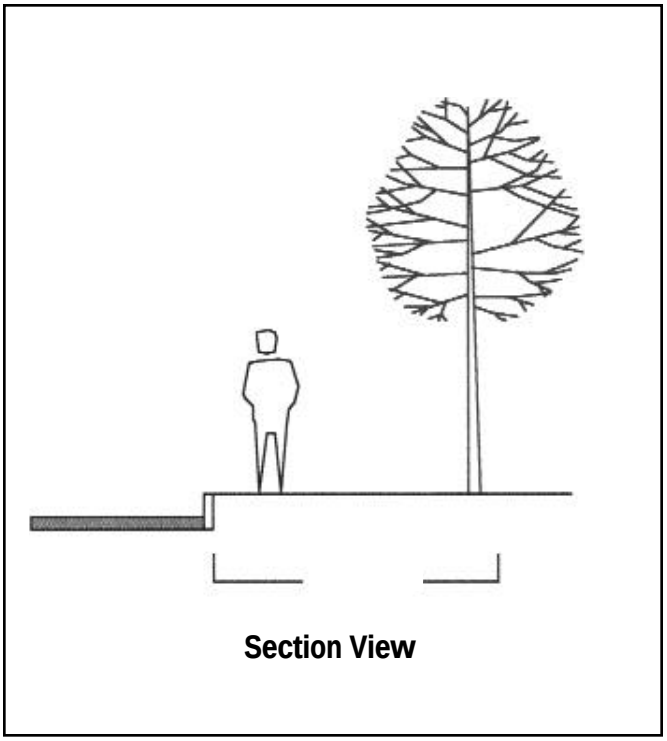


Section View



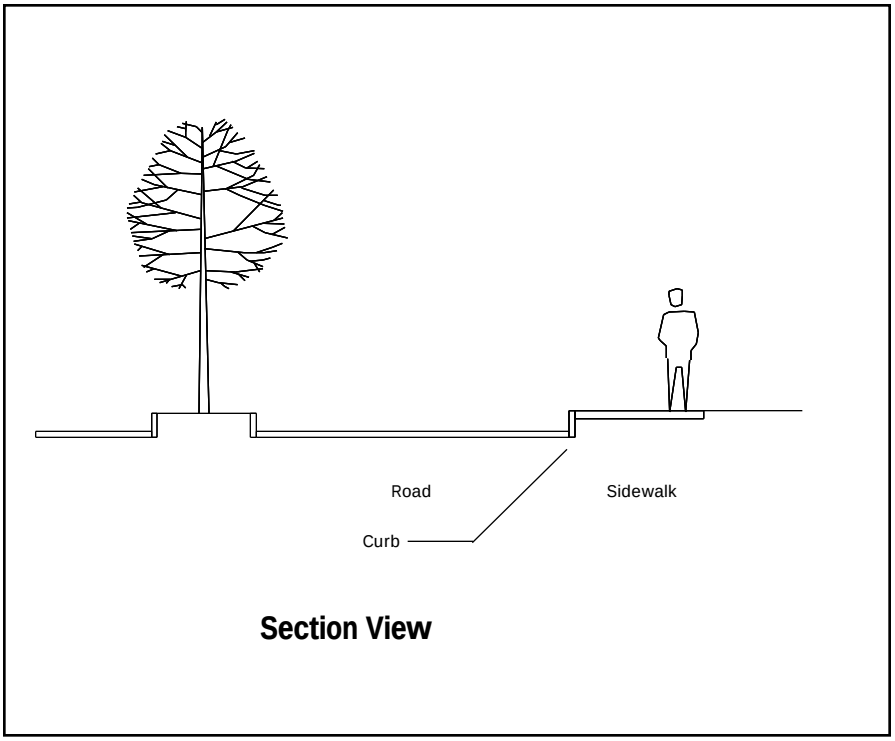
Plan View

3. The tree is located within _____ feet of a curb or pave - ment edge on streets that do not have sidewalks.



Section View

4. The tree is located on a traffic island or median strip.



Section View

If the tree does not fall in one of the previous categories, it is not a street tree.

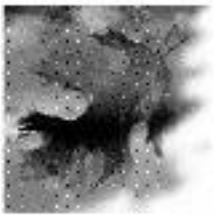
The following are not street trees:

1. A tree located between the sidewalk and house or building.
2. A tree located on the front yard of a property, unless it is within _____ feet of a road without a sidewalk.

A tree might appear to be a street tree because it arches over the street. While that tree is a valuable component of the community forest, it will not be counted in the inventory, unless it also meets one of the four definitions of a street tree given previously. Such special cases may possibly be inventoried at a future time.

Street trees are the focus of the maintenance efforts of the public Forestry Division. For example, street trees have to be pruned to keep branches from interfering with traffic and utility lines. Trees may be planted on private property to benefit the public, but these trees become the responsibility of the property owner to maintain.

TREE CHARACTERISTICS



MEASURING DBH (DIAMETER AT BREAST HEIGHT)

Overview

DBH stands for Diameter at Breast Height. It is a method of measuring tree trunk diameter at a standard level and is used by foresters and arborists to determine the approximate size and age of a tree. The DBH method can also be used to measure the tree's growth rate, by monitoring and recording increases in the trunk diameter. Recording the DBH of a tree is probably the easiest method used to establish its size.

Procedure

The steps detailed below are given as guidelines for volunteers, to help them develop a systematic and quick method to take an accurate DBH measuments for each tree surveyed. Volunteers are asked to practice the following procedures and to use them to establish a method that works smoothly for them.

DETERMINING DBH

1. Measure 4.5 feet from the ground and determine where this point is on each volunteer.
2. Using the DBH tape, measure the tree trunk diameter at breast height. (Breast height is defined as 4.5 feet above ground level.)
3. DBH must be taken on the up-hill side of the tree if a slope is present.
4. The height of the measurement may be varied up or down if an odd growth or interrupting object interferes

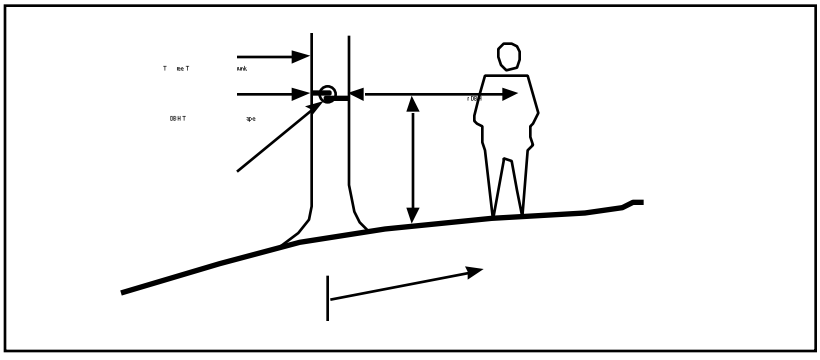
with taking an accurate measurement. Examples of interrupting objects are a street sign and a tree limb.

4. There are 2 sides to the DBH measuring tape:

A. The first side measures distances in feet and tenths of a foot (not in inches). This side is used to measure where 4.5 feet is located on the measurer's body, in order to have a standard DBH measurement for all people measuring.

B. The other side looks like the first side, except that the numbers are further apart. This side has been converted to measure diameter. This is the side which will be read to determine DBH.

5. Wrap the DBH measuring tape completely around the tree (as though putting on a belt) until zero on the tape reaches the tape again. Read the number where zero meets the tape. That is the DBH of that particular tree.

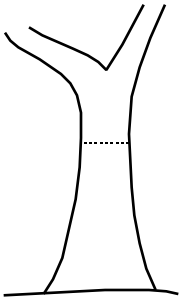


Shown is an example of the measurement procedure for reading DBH

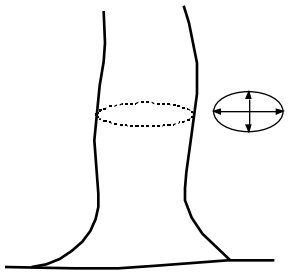
UNUSUAL SITUATIONS AND PROBLEMS MEASURING DBH

Overvies

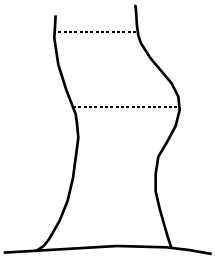
All trees are not the same shape, and because of this characteristic you may run into some problems measuring DBH. To get accurate DBH measurements you must ajust the position of the measurement. Below is a description of the common problems you might face when\ measuring DBH.



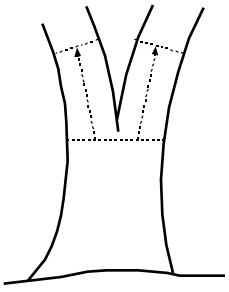
Measuring a tree that has a large root flare



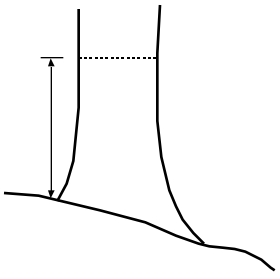
Measuring a tree that is not round



Measuring a tree with an abnormal growth



Measuring a tree with two leaders



Measuring a tree on a slope

DETERMINING THE CONDITION OF THE TREES

Overview

When conducting a street tree inventory, the volunteers are asked to record the overall condition of the tree. It is important to determine the condition of each tree as accurately as possible, since that description will be used in planning the management steps that need to be taken towards that individual specimen.

Procedure

Volunteers will observe each tree and make a determination of the condition of the tree. It is important to use the specific guidelines below, in order to keep the criteria uniform throughout the inventory. This will ensure that each team's ratings of tree condition will be consistent with those of other volunteer teams.

The tree's condition is noted by marking the appropriate space on the Tree Inventory Data Sheet. Each space corresponds to one of the following five defined categories. Volunteers are asked to become familiar with these terms and be able to label the condition of each tree using one of them.

Condition Classes

GOOD: Healthy and vigorous tree. No apparent signs of insect, disease, or mechanical injury. Little or no corrective work required. Form is repre - sentative of species.

FAIR: Average condition and vigor for area, but may be in need of some corrective prun - ing or repair. May lack desir - able form characteristic of species. May show minor insect injury, disease, or physi - ological problem.

POOR: General state of decline. May show severe mechanical, insect, or disease damage, but is not dead. May require repair, renovation, or removal.

DEAD: Dead from disease or other causes.

CONSULT: Tree requires further evaluation by Tree Warden or Certified Arborist.

PROBLEM TREE AWARENESS

Overview

When trees are growing in populated areas, they have the potential to cause damage to people or property. A problem tree is defined as one that is structurally weakened so that all or part of it is likely to fall. Because of the possibility of public liability, it is important that such trees not be overlooked.

A tree's structural support is most vulnerable during high winds, snow, and ice storms. Trees often fail during storm conditions because of weakness caused by disease, insect infestation, or structural defects. If such problems were noted ahead of time, preventive maintenance could avert such a disaster.

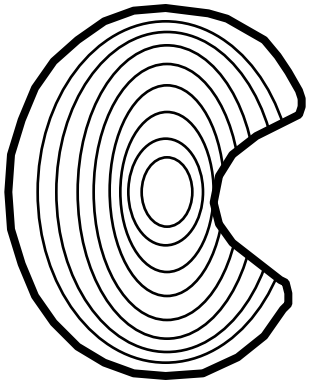
There are many cases where a tree can appear healthy even though most of its supporting wood is dead. The only part of any tree trunk that is actively growing and living is the cambium, the layer directly under the bark. If internal decay is present, it weakens and destroys the inner wood, with the result that most of the tree's structural support is lost.

Detection of Living Trees Which Pose Potential Problems

Most tree failures could be prevented if efforts were focused on early detection. Inventory volunteers are asked to look for signs of overall tree health as part of their assessment of a tree's condition. There are six things to look for when assigning a description of condition, in order to help determine if a tree needs further evaluation: 1) cavities, wounds, and internal decay in the trunk or large branches; 2) cankers; 3) root failure; 4) weak forks in the trunk and/or large branches; 5) canopy density; and 6) balance. Each is discussed below in further detail.

1. Cavities, Wounds, and Internal Decay

Shade trees in populated areas are constantly being wounded. These wounds are mainly caused by construction, automobiles, bicycles, lawnmowers, snow-plows, and vandals. Most wounds are small and close quickly, but some are quite severe and require attention in order to close properly. Such wounds, if they are not treated properly, can lead to heavy decay and result in a weakened tree.

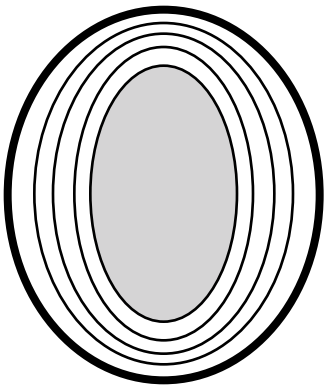


Cross-Section of Trunk (External Decay)

Decay is caused by interactions between the tree, fungi, and bacteria. When a tree is in poor health and low vigor and there is a wound somewhere in the tree, microorganisms enter easily and columns of decay often result. Although the tree has decay, the cambial layer is still alive and the tree does not die.

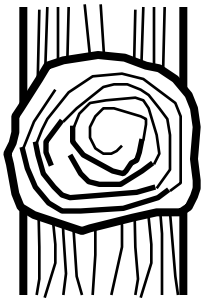
External symptoms which may indicate the presence of internal decay include:

- Large dead or dying branches throughout the crown.
- Large and deep vertical cracks on the trunk or large branches.
- Large areas of exposed wood on the trunk; indicates older wounds hat have not closed.
- Branch wounds that remain open.
- Mushrooms or conks (shelf-like growths of fungi) on the trunk.
- Carpenter ants along with evidence of decayed wood in or around the tree.



Cross-Section of Trunk (Internal Decay)

Canker



2. Cankers

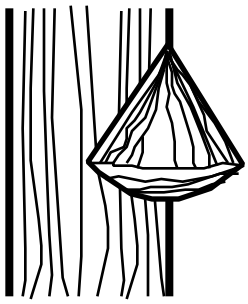
Cankers develop from microorganisms and appear as localized dead areas on the outside bark. Cankers kill the cambium, the growing layer inside the bark, so that the tree cannot close the wound. A healthy tree can bend and sway with the wind without breaking, but a tree infested with these large dead areas of bark does not have much flexibility and can break at the canker face.

3. Root Failure

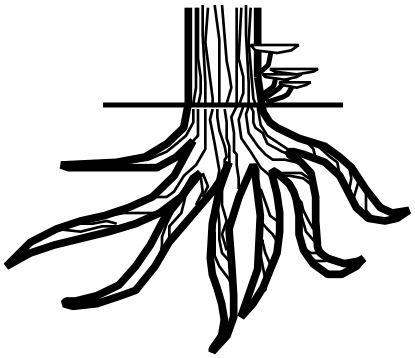
Anything that alters the root system may endanger the tree. Severing or cutting any portion of the root system will decrease a root system's ability to support the tree. This often occurs when any construction is done near trees, including work on the underground infrastructure of water, gas, electric and other utility services as well as building excavations. Planning ahead for the least disturbance of tree roots is the ideal case; even then, trees need to be watched carefully after the construction to detect any decline. Inventory volunteers should look for signs of recent construction near the tree as a clue to potential problems.

Another factor that may lead to root failure for a tree is growing on a site with a high water table or near a body of water, causing it to develop a shallow root system; a tree in this situation may be less stable that one in drier ground. Root decay is a third factor that may lead to root failure. Signs to look for which may indicate the presence of root decay are evidence of soil erosion, drought, gas leaks, fill, flooding, soil compaction, or paving over the roots. Any of these occurrences can cause decay and kill a tree's roots.

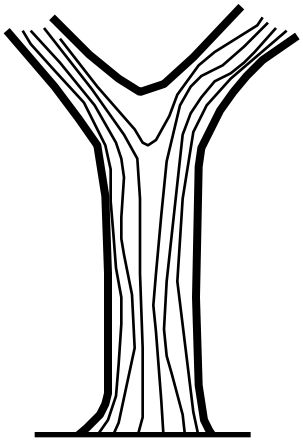
There are also root rot microorganisms which kill certain tree species before the tree has been weakened enough to fall. Many root rots will cause even living trees to fall. Trees with root rot fungi often have visible fruiting structures of the fungus (such as conks) on the lower trunk.



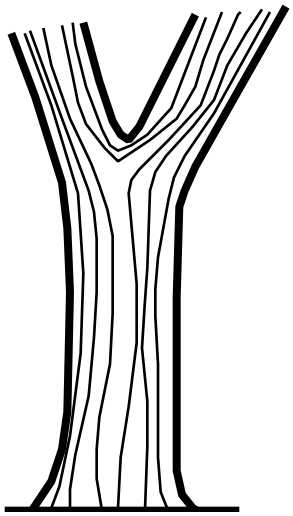
CONK



FUNGI



Healthy tree fork



Weak tree fork

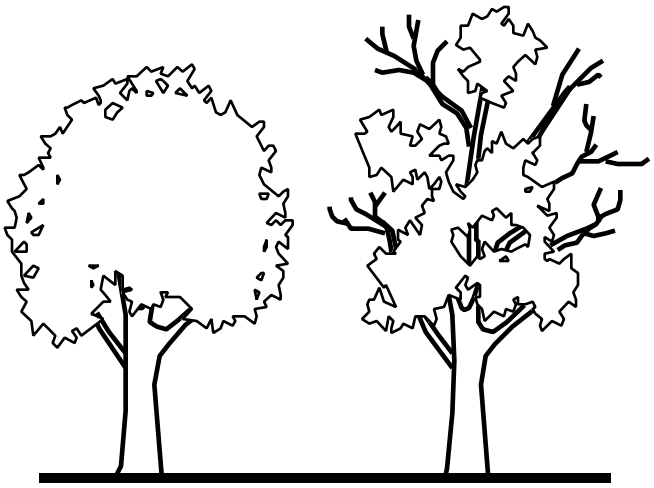
4. Weak Forks

Trees in landscaped situations often grow a broad crown, which can result in the development of large weak branches. When a branch fork forms, there is likely to be a 45-90 degree angle between the trunk and the branch, depending upon the tree species or variety. If the angle is much narrower than that (less than 40 degrees) and it contains included bark, then not enough supporting wood will form on the inside of the angle. This inability to form supporting wood is due to the pressure exerted from both sides of the fork during the growth process. This makes the fork structurally weak. As the weight of the branch continues to increase, the weak fork will tend to split at this junction. The breakage which often results then causes the failure of a branch, or even a large portion of the tree's crown.

A weak fork may not split completely at first. The problem may start with a small fissure that leaves the tree open to invasion by microorganisms. The resulting decay further weakens the fork and eventually causes it to split apart.

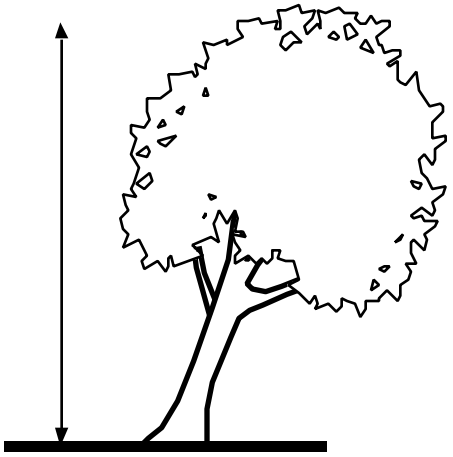
5. Canopy Density

A healthy and vigorous tree will have a full crown (healthy branching and leaf pattern) with few dead branches. The existence of dead areas in the crown may mean that the tree is under stress and could be in decline. It is important to examine the branches and leaves of the tree overall to look for dead or declining sections, possible indications of underlying problems.



6. Balance

Leaning or lopsided trees may present more of a problem than those growing vertically. If a tree has always been growing off center, it is generally considered stable. Any sudden lean usually indicates weakening or breakage of support roots and should be cause for immediate attention.



Tools used by arborists to check for internal decay.

Mallet

This method is harmless to the tree but relies on different dounds as the tree is struck.

Increment borer

A small core of the tree, about 1/4" thisk, is removed and examined. This causes sime woundind.

Drill and bit

An electric drill and 1/8" bit can reveal rot through changes in drilling speed and ease, as well as conditions of the wood chips extracted.

Shigometer

This instrument uses a pulsed electrical current to measure the resistance of the wood, and thereby the presence of decay. Drilling is necessary.

Problem Tree Species

There are some species of trees whose inherent characteristics may pose potential problems. The following are common species encountered as street trees, and the characteristic(s) which may cause them to present problems. This information is offered to help volunteers assess tree condition by knowing to look for specific problems when they encounter one of these species.

Common Name	Botanical Name	Problem
Silver Maple	Acer saccharinum	Weak wood; branches prone to breakage
Box Elder	Acer negundo	Weak wood
Poplar	Populus spp.	Weak wood and weak forks
Callery Pear	Prunus calleryana	Weak forks
Bradford Pear		'Bradford'
Willows	Salix spp.	Weak wood
Siberian Elm	Ulmus pumila	Weak wood

Procedure

In the course of the inventory, volunteers will be asked to identify any street trees that are of questionable condition. It is important that volunteers: 1) recognize a tree which may possibly affect the safety of people or property and 2) identify its condition by marking "consult" for that tree number on the Tree Inventory Data Sheet and 3) record that tree on the List of Trees Requiring Consulting. As noted in the section on "Determining the Condition of Trees," the condition "consult" means that the tree should be further evaluated by a Tree Warden or Certified Arborist.

STREET TREE INVENTORY LIST OF TREES REQUIRING CONSULTING

This sheet is to be used to record trees whose overall health should be further evaluated. A tree needs further evaluation if it exhibits any of the six following conditions: 1) cavities, wounds, or internal decay in the trunk or large branches; 2) cankers; 3) signs of possible root system interruption; 4) weak forks in the trunk and/or large branches; 5) sparse canopy or partial dieback; and 6) leaning or lopsidedness. Each of these conditions is discussed in detail in the section, "Problem Tree Awareness."

DATE: _____

MAP#: _____

INVENTORY TEAM MEMBERS: **1** _____

2 _____

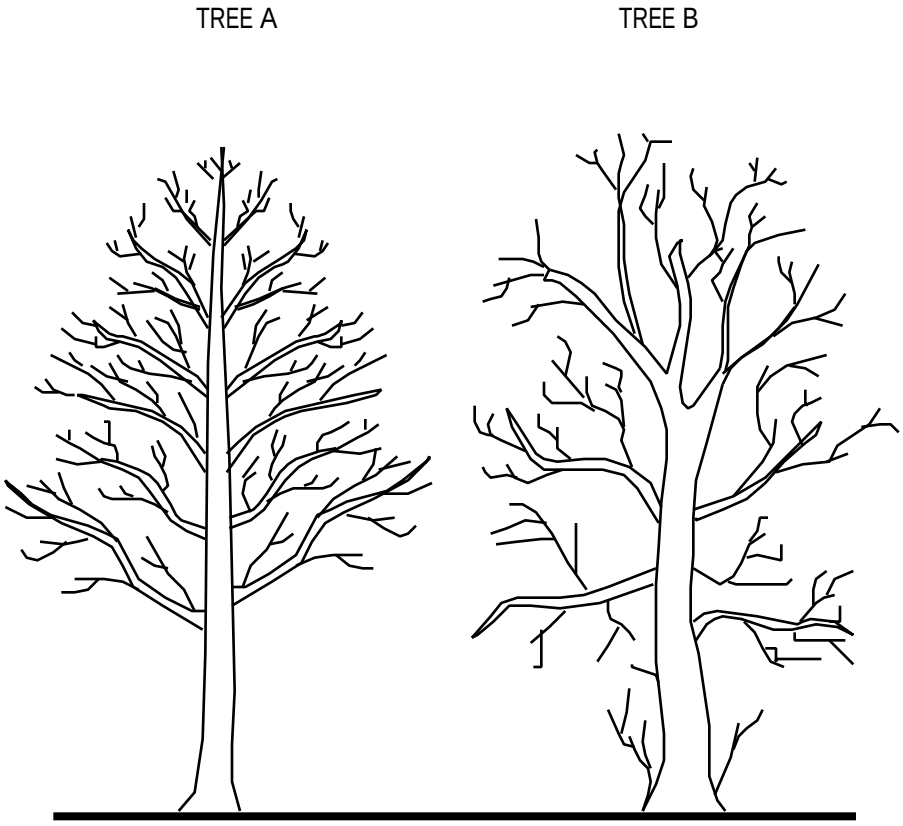
3 _____

TREE I.D.#	DESCRIPTION OF PROBLEM CONDITION

PRUNING CLASSES

Overview

Pruning is probably the most noticeable and important of all tree maintenance practices. Thoughtful pruning produces a tree that is structurally sound and better able to withstand the conditions found in populated areas. Trees in the community forest are pruned primarily to preserve their health, maintain their good appearance, and ensure public safety. A regular system of assigning pruning maintenance for individual trees is an important component of a balanced community forest management program.



The diagram to the left illustrates the beneficial effects of pruning. The trees are identical species and each is fifteen years old. Tree A has been pruned, while Tree B has been left to grow and deteriorate as it would naturally. Tree A shows the positive results of pruning; it is taller, has a better defined crown, has no visible dead wood, and is much less likely to create problems.

USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Pruning a tree helps to maintain its vigor, lessens its susceptibility to disease and insect infestations, allows it to reach its full potential, and ensures a longer life. There are three main reasons for pruning public trees:

Reasons for Pruning

Pruning for Health Broken, dead, or diseased branches are pruned out in order to prevent pathogenic organisms from penetrating into adjacent parts of the tree and to reduce their spread to other trees. Live branches are pruned out in order to permit penetration of sunlight and circulation of air through the canopy. Proper pruning of the tree crown also reduces wind resistance and helps prevent breakage.

Pruning for Appearance Selective pruning can maintain or restore the characteristics of the crown which are typical for the species. Such shaping of the crown is also used when it is desirable to keep a normally large-growing shade or ornamental tree within restricted boundaries often found in populated areas.

Pruning for Safety Dead, split, and broken branches are ideally pruned before they cause damage to people and property. Danger from falling limbs is always greatest where there are more targets, along community streets and in public parks.

Low-hanging live branches are also removed, pruned out to a height of between eight and eighteen feet from the ground in order not to interfere with pedestrian and vehicular traffic. Branches that obscure clear vision of warning signs, traffic signals, or other traffic must also be removed.

Trees are pruned to prevent interference of branches with energized electrical lines. Branches which touch lines can interrupt service, and wind-thrown limbs can knock down electrical and telephone lines.

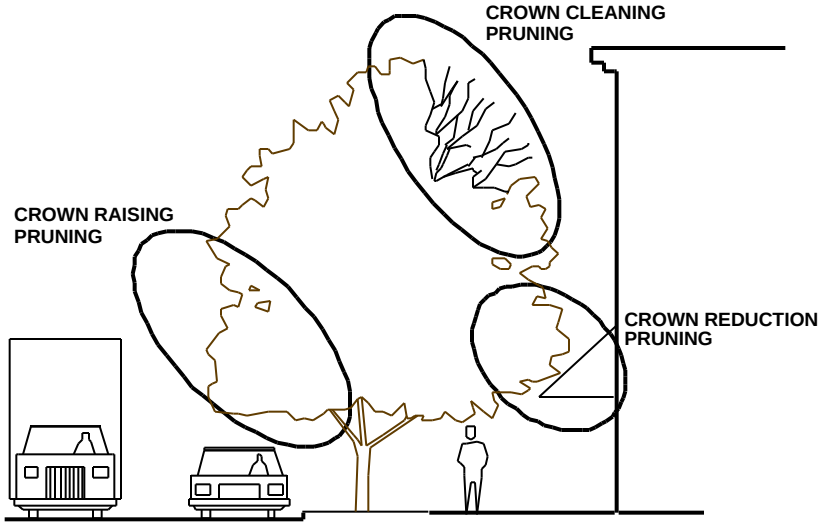
Procedure: The Pruning Classes

Crown Cleaning: The pruning shall consist of the removal of dead, diseased, obstructing, split and/or broken branches that are 2 inches in diameter or greater. In addition, limbs susceptible to failure from dense or heavy foliar masses should be thinned.

Crown Raising: Pruning by crown raising removes the lower limbs of the street tree, in order to provide clearance for pedestrian and vehicular traffic. Limbs above sidewalks shall be no lower than 8 feet,. Limbs above the road shall be no lower than 18 feet.

Crown Reduction: Pruning by crown reduction includes reducing the overall mass by thinning out the top and sides or just removing individual limbs of the tree. Reduction pruning is commonly associated with pruning away from buildings, structures, or overhead utility wires.

The following drawing illustrates a typical situation where each of the above pruning techniques might be employed.



There are three descriptions which will be used to identify and record the pruning needs for the trees being surveyed in the inventory. This classification of pruning recommendations is based on the ANSI Standard A300 (c1995).

The three descriptions are Crown Cleaning, Crown Raising, and Crown Reduction. Volunteers are asked to become familiar with these pruning descriptions and use them to answer the question regarding pruning needs on the Tree Inventory Data Sheet.

Determining Impervious Materials

Overview

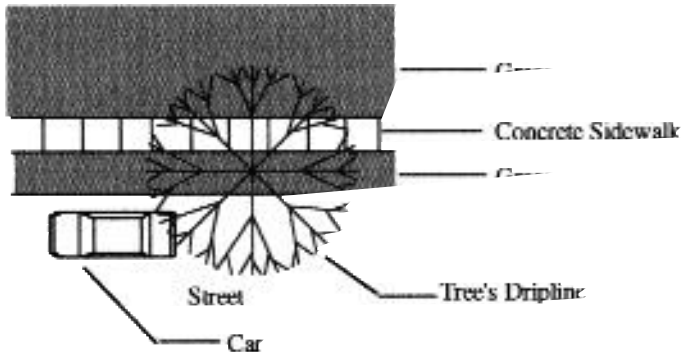
An impervious material is a substance such as concrete or asphalt that does not readily allow air and water to penetrate into the soil below. The presence of an impervious material close to a tree can be an indicator of potential problems, because trees get most of their air and water from the soil. Knowing the percentage of impervious material helps to determine the current growing conditions and to predict future health.

Procedure

To determine the amount of impervious material, simply look at the ground located below and within the drip line of the tree's canopy. Estimate the percentage of ground surface that is impervious and enter the information as described under % Impervious on the Tree Inventory Data Sheet.

Because it appears that most of the ground cover within the drip line is impervious concrete or asphalt, a 4 (67-100% impervious) will be assigned to this particular tree.

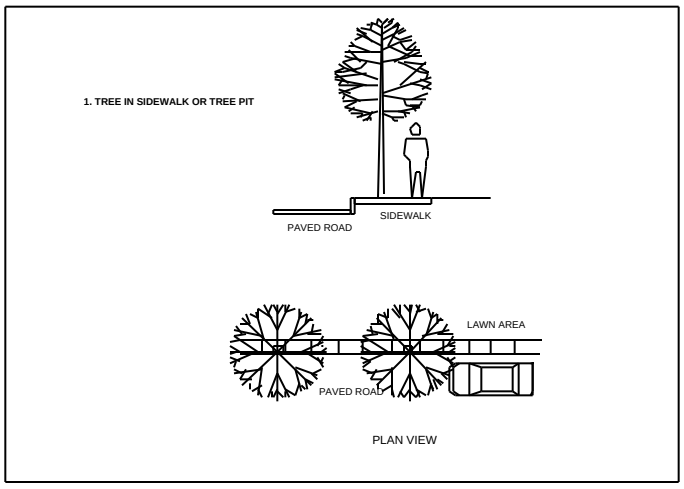
1 = none (or all is pervious material such as grass)
2 = 1-33% impervious
3 = 34-66% impervious
4 = 67-100% impervious

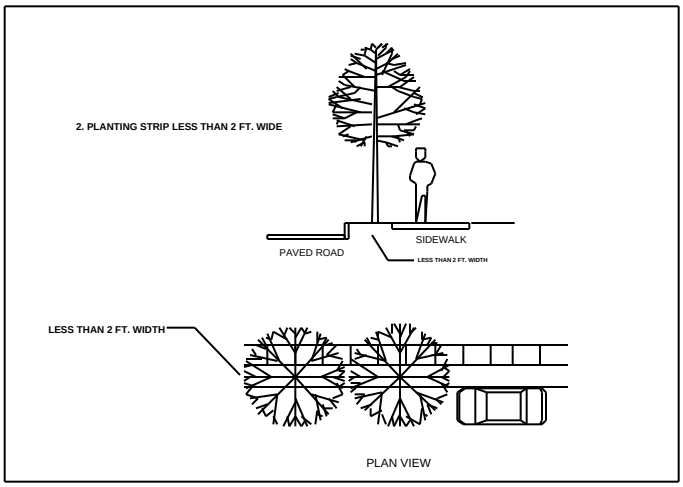


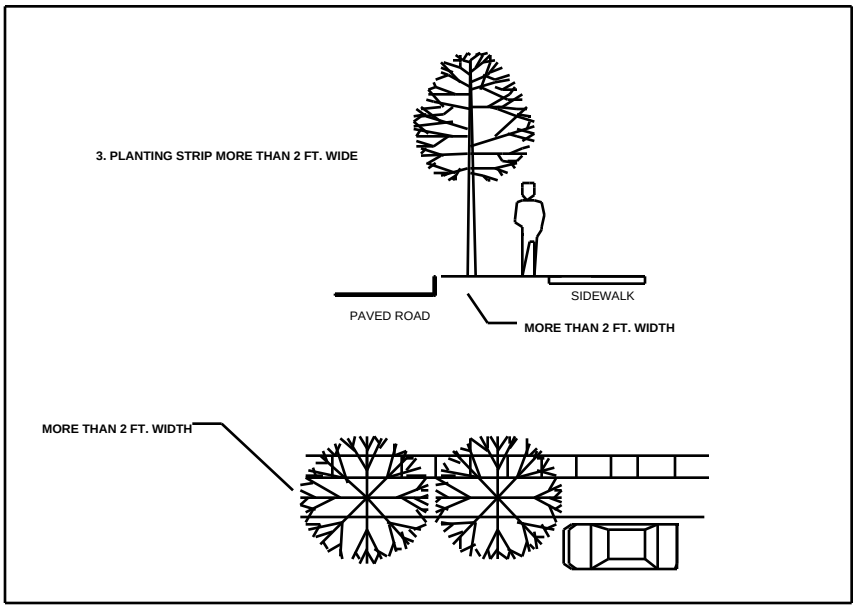
DETERMINING A TREE'S PLANTING LOCATION

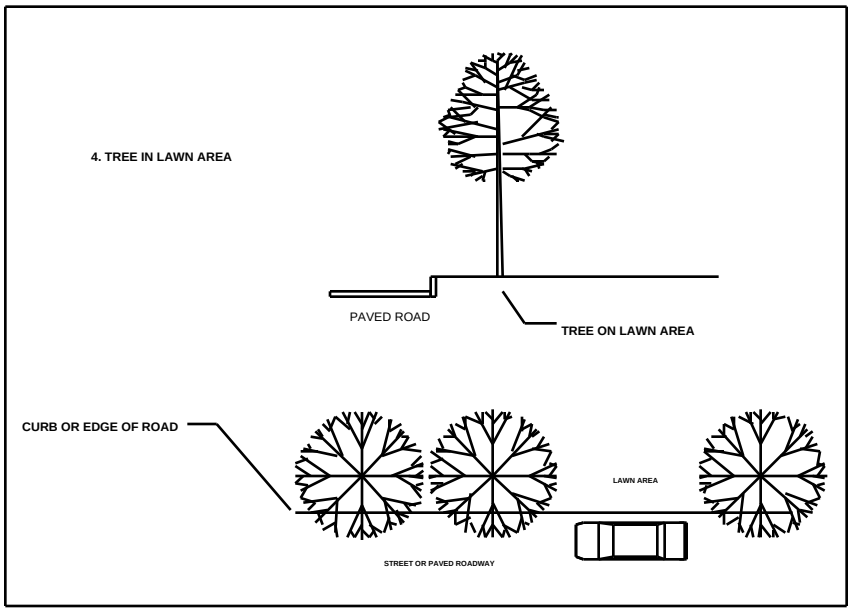
Overview

The following illustrations show the types of planting conditions that a tree is likely to be found growing. The size of the rooting space is critical to the growth of tree roots, thereby affecting the overall growth of the entire tree. Generally, the larger the rooting space, the more healthy the tree will ultimately become.






3. PLANTING STRIP MORE THAN 2 FT. WIDE
SIDEWALK
PAVED ROAD
MORE THAN 2 FT. WIDTH
MORE THAN 2 FT. WIDTH


4. TREE IN LAWN AREA
PAVED ROAD
TREE ON LAWN AREA
CURB OR EDGE OF ROAD
LAWN AREA
STREET OR PAVED ROADWAY

READING THE SPECIES CODE SHEET

Procedure

The Species Code Sheet has four columns which consist of Botanical Names, Common Names, and Codes. As mentioned above, the two letter codes are derived from the Botanical Names. For example, Acer platanoides (Norway Maple) will be recorded as AP. (There are some cases where the code initials do not match the botanical name exactly, a necessary adjustment to avoid duplicate codes.)

The codes are listed both on the left and on the right, in order that they may be read with ease in reference to either the common or the botanical name.

Troubleshooting Problems with Tree Identification

If a volunteer team is not able to identify a tree, then ?? should be noted in the space where the species code is recorded on the Tree Inventory Data Sheet. This tree will be then identified by one of the support staff.

lunteer team is able to identify a tree and it is not listed on either of the Species Code Lists, then the team should record that tree on the Uncoded Trees List. Directions for using it are found at the top of the Uncoded Trees List form.

Background

The following pages list the trees most commonly found along urban streets of New England and New York State. The list is arranged alphabeti - cally by species. The codes are related to the first letters of the plant genus and species (Botanical Name).

SPECIES CODES FOR COMMONLY FOUND STREET TREES

(Page 1 of 2 - Primary List)

Code	Botanical Name	Common Name	Code
AG	Acer ginnala	Amur Maple	AG
AP	Acer platanoides	Norway Maple	AP
AR	Acer rubrum	Red (Swamp) Maple	AR
AS	Acer saccharinum	Silver Maple	AS
AM	Acer saccharum	Sugar Maple	AM
AH	Aesculus hippocastanum	Horsechestnut	AH
CS	Catalpa speciosa	Northern Catalpa	CS
CF	Cornus florida	Flowering Dogwood	CF
FA	Fraxinus americana	White Ash	FA
FP	Fraxinus pennsylvanica	Green Ash	FP
GB	Ginkgo biloba	Ginkgo	GB
GT	Gleditsia triacanthos	Honeylocust	GT
LS	Liquidambar styraciflua	Sweetgum	LS
MA	Malus x spp.	Flowering Crabapple	MA
PS	Pinus strobus	Eastern White Pine	PS
PX	Platanus x acerifolia	London Planetree	PX
PF	Prunus spp.	Flowering Cherry	PF
PC	Pyrus calleryana 'Bradford'	Callery Pear	PC
QA	Quercus alba	White Oak	QA
QP	Quercus palustris	Pin Oak	QP
QR	Quercus rubra	Red Oak	QR
SA	Sorbus aucuparia	European Mountainash	SA
TL	Tilia cordata	Littleleaf Linden	TL
TS	Tsuga canadensis	Canadian Hemlock	TS
UA	Ulmus americana	American Elm	UA
ZS	Zelkova serrata	Japanese Zelkova	ZS

SPECIES CODES FOR COMMONLY FOUND STREET TREES

(Page 2 of 2 - Secondary List)

Code	Botanical Name	Common Name	Code
AC	Acer campestre	Hedge Maple	AC
AA	Ailanthus altissima	Tree of Heaven	AA
BA	Betula alleghaniensis	Yellow Birch	BA
BP	Betula papyrifera	Paper Birch	BP
BG	Betula populifolia	Grey Birch	BG
CJ	Cercidiphyllum japonicum	Katsuratree	CJ
CO	Celtis occidentalis	Hackberry	CO
CL	Cladrastis kentukea (lutea)	Yellowwood	CL
CK	Cornus kousa	Kousa Dogwood	CK
CR	Crataegus laevigata	English Hawthorn	CR
FG	Fagus grandifolia	American Beech	FG
FS	Fagus sylvatica (includes 'Cuprea'	European Beech Copper Beech)	FS
LT	Liriodendron tulipifera	Tuliptree	LT
OA	Oxydendrum arboreum	Sourwood	OA
PO	Platanus occidentalis	Sycamore	PO
PA	Picea abies	Norway Spruce	PA
PG	Picea glauca	White Spruce	PG
PP	Picea pungens	Colorado Blue Spruce	PP
PR	Pinus resinosa	Red Pine	PR
PN	Pinus nigra	Austrian Pine	PN
QV	Quercus velutina	Black Oak	QV
SB	Salix babylonica	Weeping Willow	SB
SR	Syringa reticulata	Japanese Tree Lilac	SR
TD	Taxodium distichum	Baldcypress	TD
TO	Thuja occidentalis	American Arborvitae	TO
TA	Tilia americana	American Linden or Basswood	TA
UL	Ulmus parvifolia	Lacebark Elm	UL
US	Ulmus pumila	Siberian Elm	US

USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

STREET TREE INVENTORY
UNCODED TREES LIST

This sheet is to be used to record a tree that 1) has been identified and 2) is not listed on the Primary or Secondary Species Code Lists. In the spaces below, record the identification number of the tree surveyed, the species, and the code that you have assigned the tree. (This code should be the same one you have used to record the tree on the Tree Inventory Data Sheet.)

DATE; _____

MAP # _____

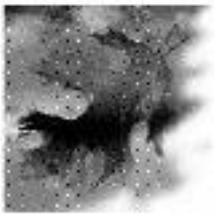
INVENTORY TEAM MEMBERS: 1. _____

2. _____

3 _____

TREE I.D.#	TREE SPECIES	CODE YOU ASSIGNED

TREE IDENTIFICATION



The following page contains a key to common street trees. This key will allow you to identify the genus of the plant you are looking at based on its leaves. Once you have identified the genus of the plant flip to the tree descriptions (arranged alphabetically), that follow the key. By comparing the descriptions, leaf drawings, and tree silhouettes you should be able to identify the tree.

USING A KEY TO IDENTIFY COMMON STREET TREES

The key is arranged in couplets (each couplet begins with the same number). In order to work your way thorough the key you should read the pair of statements in the couplet and determine which one applies to the plant you are studying. The statements are written so that if one is true the other must be false. At the end of each statement you are told the genus of the plant or are directed to another couplet.

The following terms will help you navigate through the key:

Alternate -leaves occurring singly along of stem (cf. opposite)
Compound -each leaf blade is divided into two or more discrete segments.
Double toothed each large tooth on the edge of a leaf bearing a smaller tooth.
Entire - edge margin of leaf lacks teeth or lobes.
Genus -the first word in a two-word scientific name.
Lanceolate -much longer than wide.
Opposite -two leaves inserted at the same place on a stem.
Ovate egg shaped in outline.
Palmate -branching from a point.
Pinnate -branching from an axis.
Simple - each leaf blade a single segment (cf. compound)
Serrate -edge margin of leaf has teeth.
Serrulate -edge margin of leaf has minute teeth.

THE SPECIES KEY

1. Leaves opposite. 2
1. Leaves alternate. 4

2. Leaves simple. 3
2. Leaves compound. **FRAXINUS**

3. Leaves pinnately veined. **CATALPA**
3. Leaves palmately veined. **ACER**

4. Leaves compound. 5
4. Leaves simple. 6

5. Leaflets lanceolate; more than 20 leaflets per leaf. **GLEDITSIA**
5. Leaflets ovate; less than 20 leaflets per leaf. **ROBINIA**

6. Leaves lobed. 7
6. Leaves not lobed. 8

7. Leaves palmately veined. **PLATANUS**
7. Leaves pinnately veined. **QUERCUS**

8. Leaves pinnately veined. 9
8. Leaves palmately veined. 12

9. Leaf stalk is more than 1/2 as long as leaf blade, often as long as the blade of longer. **PYRUS**
9. Leaf stalk is less than 1/2 as long as leaf blade. 10

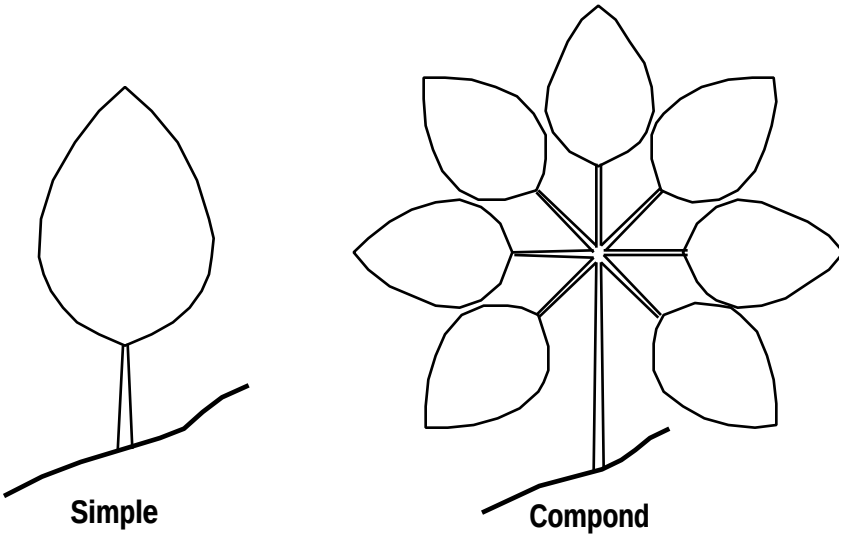
10. Leaves double toothed along margin. **ULMUS**
10. Leaves single toothed along margin or entire. 11

11. Veins are straight and parallel, seldom branched. **ZELKOVA**
11. Veins somewhat curving and branched. **MALUS**

12. Leaf is broader than long. **TILIA**
12. Leaf is narrower than its length 13

13. Leaf unequal in size at base and uneven at base. **CELTIS**
13. Leaf equal in size at base and even at base. **MORUS**

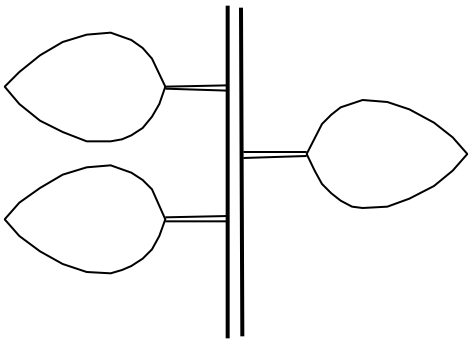
LEAF TYPE



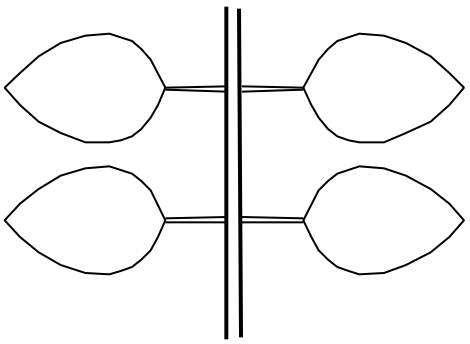
Simple

Compond

LEAF ARRANGEMENT

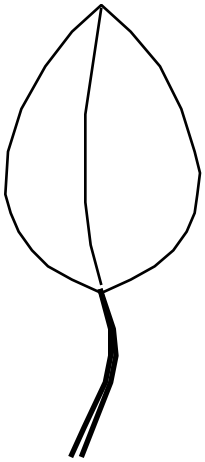


Alternate

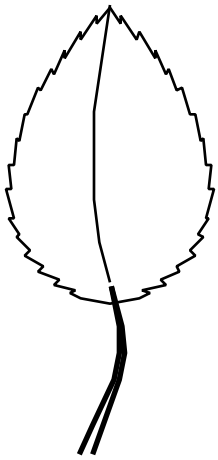


Opposite

LEAF MARGIN

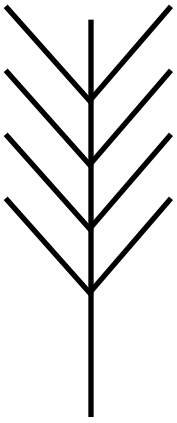


Entire

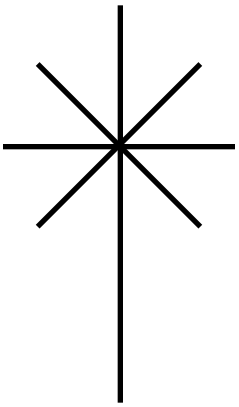


Serrate

VEIN PATTERN



Pinnate



Palmate

TREE IDENTIFICATION PLATES

The following pages present descriptions and illustrations of features of trees most commonly found along the streets of New England and New York State. There is a brief description of each tree as well as drawings of leaves, twigs, and fruit. Also included are silhouettes of the overall shapes of many of the trees.

Volunteers are urged to use these pages as an identification reference as they complete the tree survey. Other field guides or tree identification manuals may prove useful as well.

The pages are designed so that the notebook may be used in the open position with the text on the left sheet corresponding to the drawings on the right. Volunteers may add their own additional notes as they become more familiar with the tree identification process and the individual species.

Acer ginnala
Amur Maple

Leaves: Opposite, simple, 1-1/2 to 3" long, 3-lobed, middle lobe is much longer than the two lateral lobes, doubly serrate,dark green and lujstrous above, light green beneath, petiole 1/2"to 1-3/4" long.

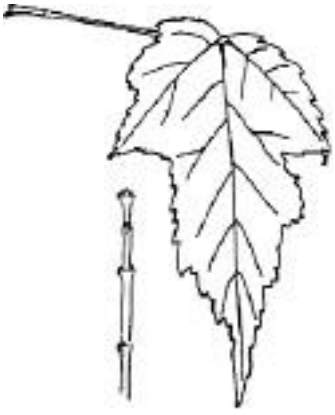
Size: 15 to 18', possibly to 25' in height, spread equal to or exceeding height, especially multi-stemmed specimens.

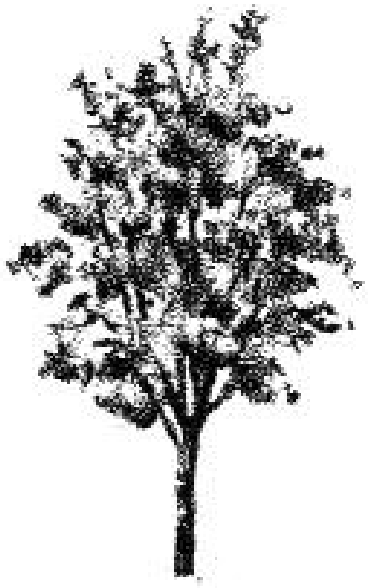
Habit: Multi-stemmed large shrub or small tree often of rounded outline; shape is variable and can be successfully tailored to specific landscape requirements by pruning.

Bark: Grayish brown on older branches; smooth with darker striations like serviceberry.

Flowers: Yellowish-white, fragrant as the leaves unfold in April to May, borne in small (1 to 1-1/2"diameter) panicles.

Fruit: Samara, 3/4" to 1" long, wings nearly parallel, red to brown; red color most vibrant in June-July; fuits ripen September October.





Acer platanoides
Norway Maple

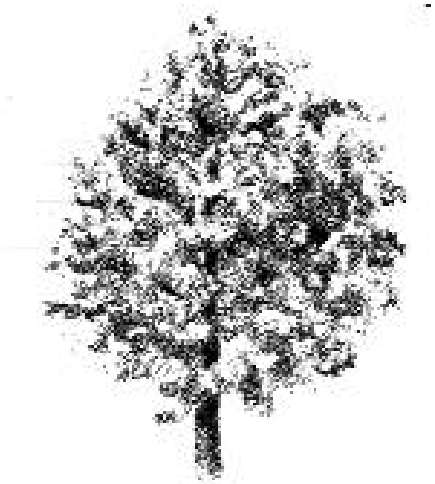
Leaves: Opposite, simple, 4 to 7" across, 5-lobed, lobes sharply pointed (acuminate), remotely dentate, lustrous dark green above, lustrous beneath often with hairs in axils of vein; milky sap is visible when petiole is removed from stem, petiole 3 to 4" long

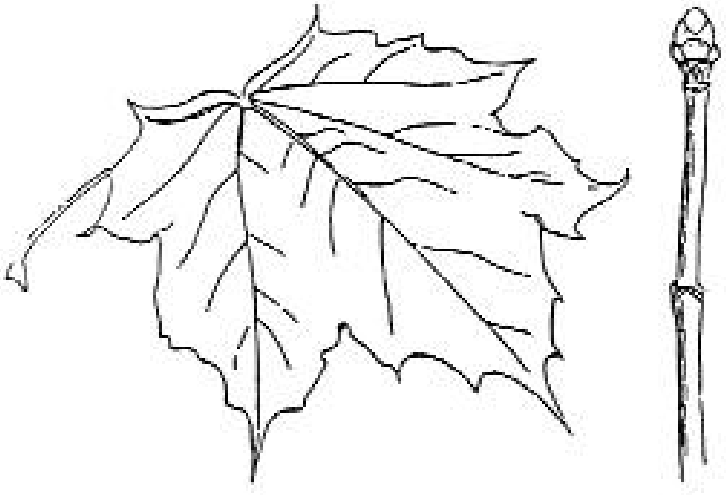
Size: 40 to 50' in height occasionally over 90', usually spread is 2/3 or equal to height.

Habit: Rounded, symmetrical crown, usually with very dense foliage and shallow root system which limit successful turf culture.

Bark: Grayish black with ridges and shallow furrows that form a rather interesting textural effect.

Fruit: Samara, maturing in September-October; samaras wide spreading, each 1 1/2 to 2" long.





Acer rubrum
Red Maple

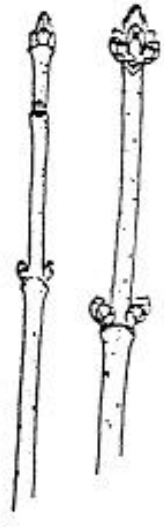
Leaves: Opposite, simple, 2 to 4" long and wide, 3 although often 5 lobed, triangular ovate lobes and sinuses are irregularly toothed (in silver Maple the sinuses are entire), medium to dark green above, greyish beneath with hairy veins, new growth and petioles often red; petiole 2 to 4" long.

Size: 40 to 60' in height, but occasionally reaches 100 to 120' in the wild; spread less than or equal to height

Habit: In youth often pyramidal or elliptical, developing ascending branches which result in an ovoid or rounding crown.

Bark: Young-smooth, light gray; old-dark gray and rough, scaly and/or furrowed.

Fruit: Samara, often but not always reddish maturing to brown; on slender drooping pedicels 2 to 3" long, wings 3/4" long, 1/4" wide, spreading at a narrow to about a 60-degree angle.



Acer saccharinum
Silver Maple

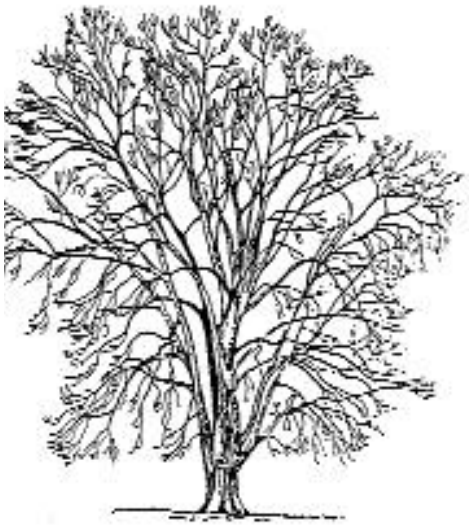
Leaves: Opposite, simple, 3 to 6" across, 5-lobed, with deeply and doubly acuminate lobes, the middle often 3-lobed, bright green above silvery white beneath and pubescent when young; petiole 3 to 5" long.

Size: 50 to 70' in height and can grow 100 to 120'; spread is usually about 2/3 of the height.

Habit: Upright with strong spreading branches forming an oval to rounded crown with pendulous branchlets which turn up at the ends.

Bark: On young branches (1" or more) color is an interesting gray or gray brown and can be mistaken for the bark of Acer rubrum; however, the color is usually darker (or with a tinge of red) compared to that of Acer rubrum.

Fruit: Samara, not ornamentally important, wings spreading at an 80 to 90 degree angle, 1 1/3 to 2 1/3" long, matures in late May-June, one of the largest fruited maples.



Acer saccharum
Sugar Maple

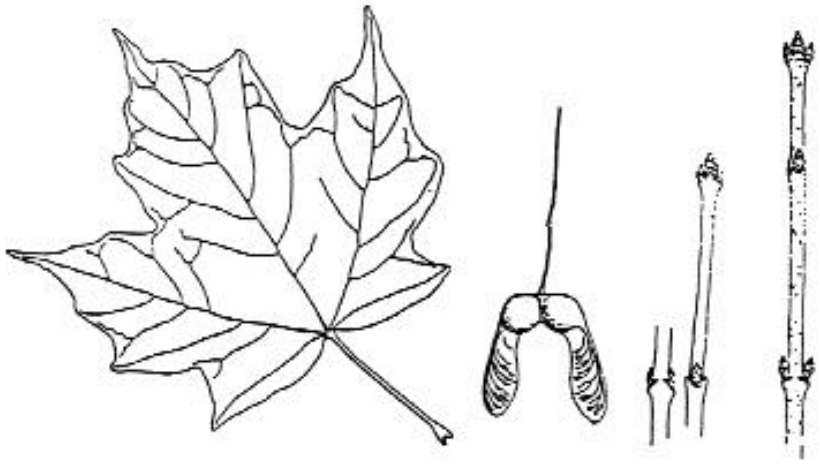
Leaves: Opposite. simple 3 to 6" long and across, 3 to 5 lobed, cordate, acuminate, slightly coarsely toothed with narrow and deep sinuses.

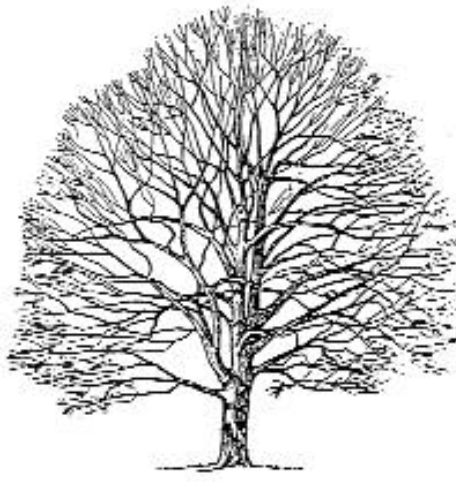
Size: A landscape size of 60 to 75' is often attained; potential to 100 to 120' in height; the spread is variable but usually 2/3 of the height although some specimens show a rounded character.

Habit: Upright-oval to rounded; usually quite dense in foliage.

Bark: Young trees develop a smooth, gray-brown bark; with age the bark becomes deeply furrowed with long irregular thick plates or ridges, sometimes quite scaly; bark is tremendously variable on this species.

Fruit: Samara, glabrous, 1 to 1 3/4' long, somewhat horseshoe-shaped with nearly parallel or slightly divergent wings, maturing September-October.





USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Aesculus hippocastanum
Horsechestnut

Leaves: Opposite, palmately compound, 7 leaflets, sometimes 5, each leaflet obovate,4 to 10" long, 2 to 5" wide, doubly serrate, petiole 3 to 5" long.

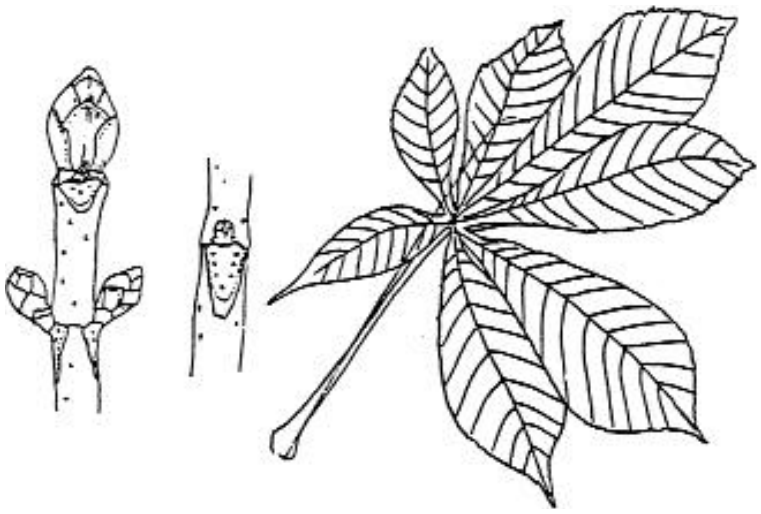
Size: 50 to 75' in height, will usually develop a 40 to 70' spread, can grow to 100' or larger.

Habit: Upright-oval to rounded in outline, making a very striking specimen especially as the new leaves emerge.

Bark: Dark gray to brown, on old trunks becoming platy, exfoliating, and exposing orangish brown inner bark.

Flowers: White, borne in early to mid May: very showy wide terminal panicles 5 to 12" long and 2 to 5" wide.

Fruit: Light brown, 2 to 2-1/4" diameter spiny capsule containing one, sometimes two seeds; matures in September-October.



Catalpa speciosa
Northern Catalpa

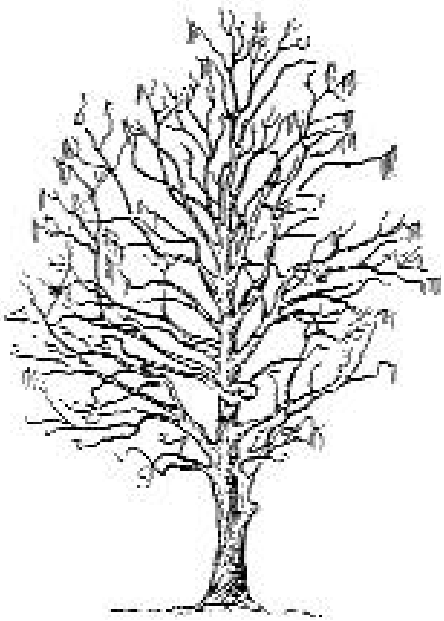
Leaves: Whorled or opposite, simple, ovate to ovate-oblong, 6-12” long, 3 to 8” wide, long acuminate, truncate to cordate, entire, medium green and glabrous above, densely pubescent beneath, scentless; petiole 4 to 6” long.

Size: 40 to 60’ in height with a spread of 20 to 40’ but sometimes reaching 100’ or more in the wild.

Habit: Tree with a narrow, open, irregular, oval crown; can be quite striking in winter with bold rugged outline.

Bark: Greyish brown on old trunks usually exhibiting a ridged and furrowed character although some trees exhibit a thick, scaly bark.

Fruit: Capsule, green changing to brown, pendulous, 8 to 20” long, about 1/2” wide, persisting through winter, contains numerous fringed seeds.



USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Cornus florida
Flowering Dogwood

Leaves: Opposite, simple, oval or ovate, 3 to 6" long, 1-1/2 to 3" wide, sides become concave before tapering to a point; entire; rounded at base; 6 to 7 pairs of veins; petiole 1/4" ti 3/4" long.

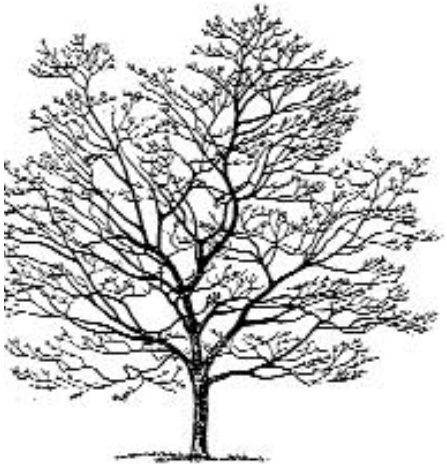
Size: 20', sometimes reaching 30' with a spread equal to or greater than the height.

Habit: Small, low-branched tree with spreading horizontal lines, layered effect, usually with a flat-topped crown and often wider than high at maturity; unique.

Bark: Broken into small squarish and rectangular blocks, the entire effect reminiscent of an alligator's back.

Flowers: White or pink, 4 bracts (petals) which are obovate, about 2" long; occur in April or May before leaves.

Fruit: 1/3" long, glossy red drupe (berry-like), ovoid, ripen in September to October.



Fraxinus americana
White Ash

Leaves: Opposite, pinnately compound, 8 to 15" long, 5 to 9 leaflets, usually 7, stalked, leaflets 2 to 6" long, 1 to 3" wide, ovate to ovate-lanceolate rounded or tapered at base, pointed at tip, usually entire, dark green.

Size: 50 to 80' in height with a spread of similar proportions, can grow to 120'.

Habit: In youth weakly pyramidal to upright oval, and in old age develop ing an open and rather round topped crown; unique in maintaining a central leader in youth with an even distribution of branches.

Bark: Ashy-gray to gray-brown, furrowed into close diamond-shaped areas separated by narrow interlacing ridges; on very old trees, slightly scaly along the ridges.

Fruit: Samara, a single-winged key, pale brown, 1 to 2" long, in clusters

USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Fraxinus pennsylvanica
Green Ash

Leaves: Opposite, pinnalely compound, up to 12" long, 5 to 9 leaflets, 2" to 5" long, 1" to 2" wide, ovate to oblong-lanceolate, acuminate, broad-cuneate, crenate serrate or entire, lustrous medium to dark green and essentially glabrous above, pubescent beneath.

Size: 50 to 60' in height by about 1/2 that in spread, although can grow to over 80'.

Habit: Softly pyramidal when young, developing an upright, spreading habit at maturity with 3 to 5 main branches and many coarse, twiggy branchlets which bend down and then up at the ends; the crown is extremely irregular and the overall habits somewhat difficult to describe; sometimes rather unsightly.

Bark: Similar to While Ash.

Fruit: Samara, 1 to 2" long, 1/4" or less wide, wing extending halfway or more down the cylindrical body.

Gingko biloba
Gingko

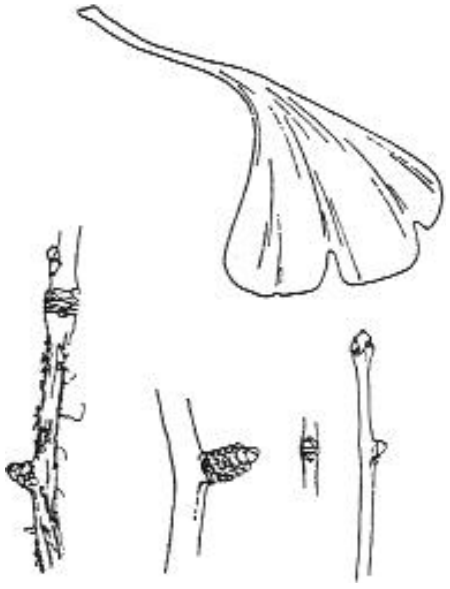
Leaves: **A**lternate, simple, in clusters of 3 to 5 on spurs or alternate on long shoots, fan shaped, dichotomously veined, moreor less incised or divided at the broad summit, 2 to 3" long, 2 to 3" wide, bright green, petiole 1-1/2 to 3-1/2" long.

Size: 50 to 80' in height with a tremendously variable spread range from 30 to 40' toultimately wider than high at maturity; the species can grow to 100' or more.

Habit: Usually pyramidal in outline when young; in old age often becoming wide spreading with large, massive, picturesque branches.

Bark: Usually gray-brown ridges with darker furrows.

Fruit: On female trees only, tan to orangish in color, plum-like in shape, 1 to 1-1/2" long; extremely messy and malodorous.



USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Gleditsia triacanthos
Honeylocust

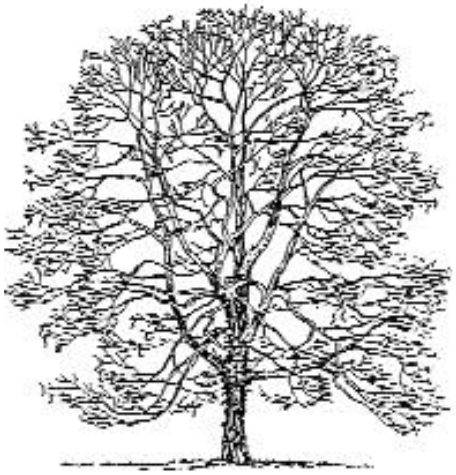
Leaves: Alternate, pinnalely or bipinnately compound, 6 to 8" long, rachis pubescent all around, grooved, pinnate leaves with 20 to 30 oblong-lanceolate leaflets, 1/3 to 1 1/2" long, 3/16 to 5/8" wide, remotely crenate-serrulate, pubescent on midribs beneath; bipinnate leaves with 8 to 14 pinnae, the leaflets 1/3 to 1" long, glossy bright green; base of petiole swollen and enclosing bud.

Size: Tremendously variable in the cultivated types but usually in the range of 30 to 70' in height with a comparable spread; in the wild often grows to over 100'.

Habit: Usually a tree with a short trunk and a rather open spreading crown; light- shaded and consequently grass will grow up to the trunk; a very delicate and sophisticated silhouette which, unfortunately, has led to abuse by landscape planners.

Bark: On old trees grayish brown, broken up into long, narrow, longitudinal and superficially scaly ridges which are separated by deep furrows.

Fruit: Pod, reddish brown to brownish, strap-shaped, 7 to 8" long up to 18", about 1"wide; seeds oval, shining dark brown and hard as a bullet; entire pod often irregularly twisted.



Liquidambar styraciflua
Sweetgum

Leaves: Alternate, simple, 4 to 7-1/2" wide and about as long, 5 to 7 obes pointed and finely toothed; star-shaped leaf overall; petiole 2-1/2 to 4" long. Deep glossy green color.

Size: 60 to 75' in height with a spread 2/3's of the height.

Habit: Decidely pyramidal when young, of very neat outline; often with an oblong to rounded crown at maturity.

Bark: Grayish brown, deeply furrowed into narrow, somewhat rounded ridges.

Fruit: Syncarp of dehiscent capsules 1 to 1-1/2" diameter, persistent into winter and fall into April and beyond; can be quite messy and a maintenance liability. Good identification feature.

USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Malus x
Flowering Crabapple

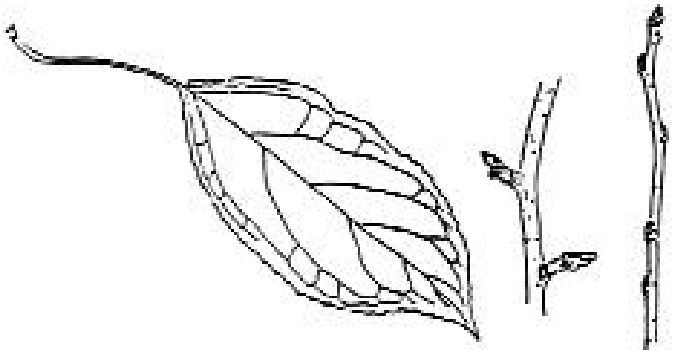
Leaves: A diversity of leaf shapes and colors. Leaves generally alternate, simple and serrate

Size: Most are between 15 and 25' in height.

Habit: Range from low mound-like plants to narrow upright or pendulous types.

Bark: On old trunks, shiny gray-brown, scaly.

Fruit: A pome with persistent or deciduous calyx; colors range from red to yellow to green. If fruit is 2" in diameter or less, it is a crabapple. If the fruit is larger than 2", then it is classified as an apple.



Pinus strobus
Eastern White Pine

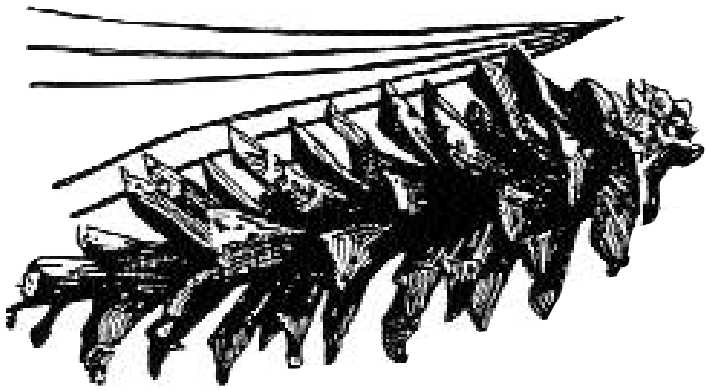
Leaves: Evergreen needles, in bundles of 5, bluish-green, 2 to 5” long, white stomatic lines on the two inner surfaces, soft texture overall.

Size: 50 to 80’ in height by 20 to 40’ in psread; can grow to 150’ or more.

Habit: In youth a symmetrical pyramid of soft, pleasant appearance; in middle-age and on old trees the crown is composed of several hor zontal and ascending branches, gracefully plume-like in outline and very distinctive when compared to other conifers. Needle clumps at ends of branches form small trumpet shapes.

Bark: Thin, smooth, grayish green when young, becoming darker with age; dark grayish brown on old trunks and deeply furrowed longitudinallyinto broad scaly, 1 to 2”thick ridges.

Fruit: Cones, hanging down, 6 to 8” long by 1-1/2” broad, cylindrical, often curved, resinous and light brown.



USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Platanus x acerifolia
London Planetree

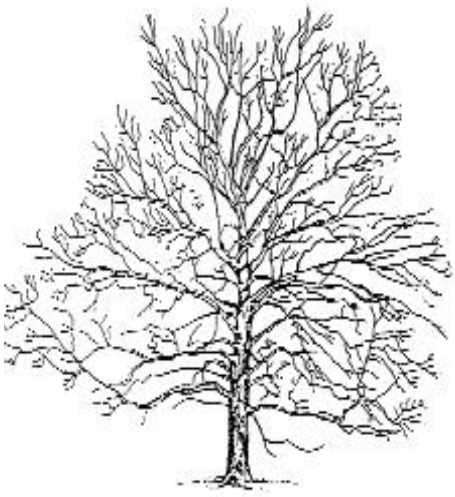
Leaves: Alternate, simple, 6 to 7" long, 8 to 10" wide, 3 to 5 lobed, with triangular-ovate or broad triangular, not or sparingly toothed lobes, with acute or rounded sinuses extending 1/3 the length of the blade, truncate to cordate at base, glabrous or nearly so at maturity, medium to dark green; petiole 2 to 4" long.

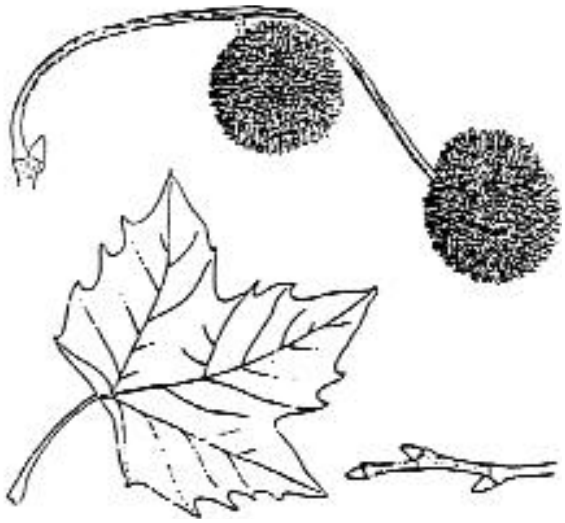
Size: 70 to 100' in height with a spread of 65 to 80' although can grow to 120' or more.

Habit: Pyramidal in youth, developing with age a large, open, wide spreading outline with massive branches; does not spread as much as P. occidentalis but nonetheless is still not acceptable for street and small area use.

Bark: Perhaphs the handsommest of all large trees for winter characteristic because of cream, olive, light brown bark; no two trees are exactly similar. Many are spectacular, and can be remembered because of noble habit and unrivaled bark.

Fruit: Syncarp (multiple fruit) of elongated, obovoid achenes, ripening in October and persisting late into winter, usually borne 2 together although 3's and singles occur.





Prunus spp.
Flowering Cherry

Leaves: Alternate, simple, ovate to obovate to ovate-lancelolate; side edges become concave before tapering to a point; serrated edges; 2 to 5" long.

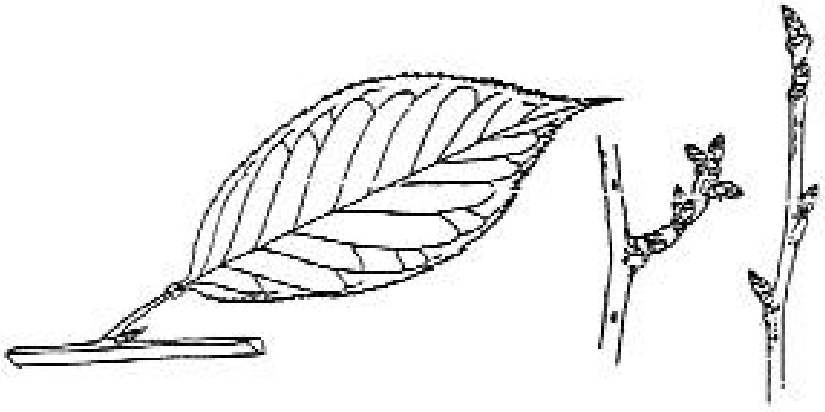
Size: Varies with species: Prunus serrulata, Japanese Flowering Cherry is 20 to 25'; Prunus sargentii, Sargent Cherry, may grow 40 to 50' in height.

Habit: Smallish ornamental trees wtih vase-shaped to rounded outlines.

Bark: Often rich polished reddish to chestnut brown, marked with extended horizontal lenticels.

Flowers: White or pink, in April or May, just as leaves are unfolding.

Fruit: Many of the cultivars are non-fruiting.



USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Pyrus calleryana
Callery Pear

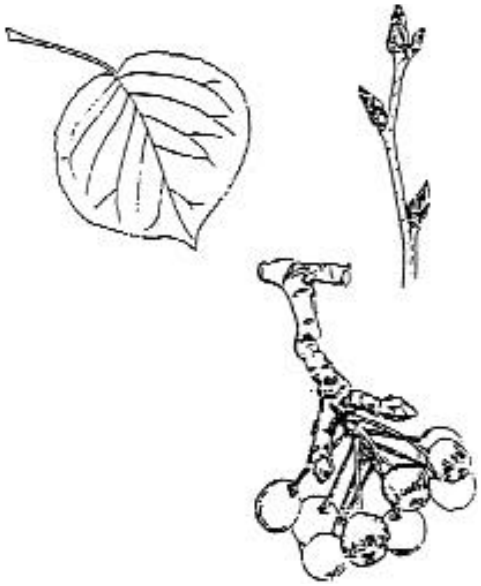
Leaves: Alternate, simple, broad-ovate to ovate, 1 1/2 to 3" long, about as wide, rarely elliptic-ovate, short acuminate, rounded, broad cuneate, subcordate or truncate at base, crenate, usually quite glabrous, leathery, lustrous dark green, petiole 1 to 11/2"long.

Size: 30 to 50' in height with a 20 - 35' spread; 20 year old trees are typically 50' high and 40' wide.

Habit: Moderately conical (pyramidal) in youth, and broadening with time.

Bark: Lustrous brown in youth, lightly ridged and furrowed and grayish brown at maturity.

Fruit: Small rounded pome, 1/2" or less across, russet-dotted, hidden by the foliage; not ornamentally effective; may be present in great quantities.



Quercus alba
White Oak

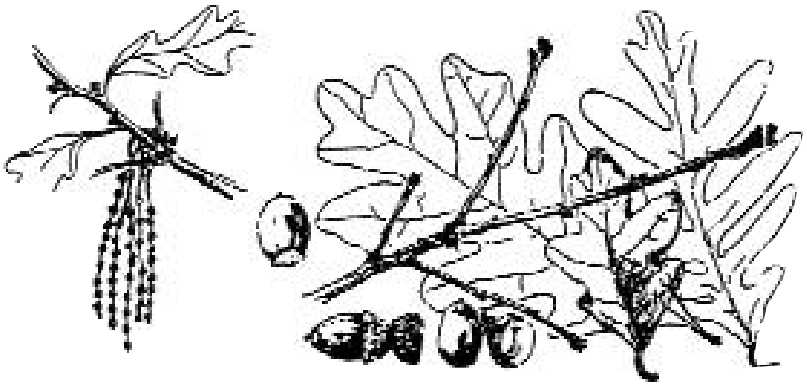
Leaves: Alternate, simple, obovate to oblong-obovate, 4 to 8-1/2" long, about one-half as wide, with 5 to 9 oblong and entire (not toothed) lobes, petiole 1/2 to 1" long. Dark green above, paler green or whitish underneath.

Size: 50 to 80' in spread; can grow well over 100' high in the wild.

Habit: Pyramidal when young; upright-rounded to broad-rounded with wide-spreading branches at maturity.

Bark: On old trunks light ashy-gray, often broken into small, vertically arranged blocks, scaly on the surface; later irregularly plated or deeply fissured.

Fruit: Acorn, 3/4" to 1" long, ovoid-oblong, enclosed for 1/4 of its length in light brown cap with raised "bumpy" scales (rather than smooth overlapping scales of Q.rubra)



Quercus palustris
Pin Oak

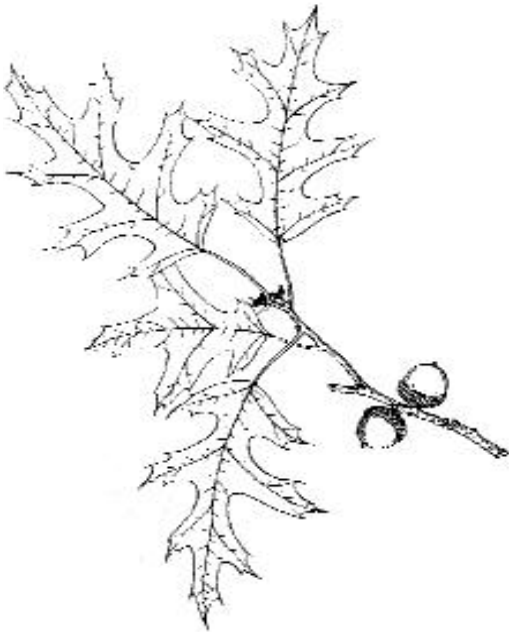
Leaves: Alternate, simple, elliptic or elliptic-oblong, 3 to 6" long, at times almost as wide, terminal lobe long acuminate, cuneate at base, sometimes truncate, 5 to 7 lobed, lustrous dark green above, lighter green beneath with axillary tufts of hair; key feature-major lobes; petiole up to 2" long, slender.

Size: 60 to 70' in height with a spread of 25 to 40' can attain a height of over 100'.

Habit: Strongly pyramidal, usually with a central leader; the lower branches pendulous, the middle horizontal, and the upper upright; in old age the tree assumes an oval-pyramidal form and loses many of the lower branches; very distinctive tree because of growth habit and widely planted as a lawn and street tree for this reason.

Bark: Grayish brown, thinnish, smooth and with age develops narrow, relatively shallow ridges and furrows.

fruit: Nut, solitary or clustered, sessile to short-stalked, 1/2" long and wide, nearly hemispherical, light brown, often striate, enclosed only at basal 1/4 to 1/3 in a saucer-like cup.



Quercus rubra
Red oak

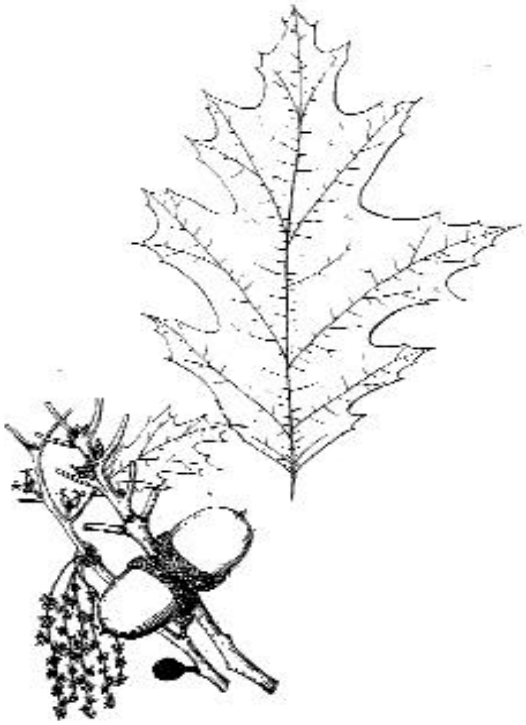
Leaves: Alternate, simple, oval or obovate, 4 1/2 to 8 1/2" long, 4 to 6" wide, 7 to 11-lobed, cuneate, sometimes rounded, lustrous dark green above, grayish or whitish or sometimes pale yellow-green beneath with axillary tufts of brownish hairs; petiole 1 to 2" long, yellowish, glabrous.

Size: 60 to 75' in height with a spread of 60 to 75', although can grow to over100' in the wild.

Habit: Rounded in youth, in old age often round-topped and symmetrical.

Bark: On old trunks brown to nearly black and broken up into wide, flat-topped gray ridges, separated by shallow fissures; on very old trees often deeply ridged and furrowed.

Fruit: Nut, solitary or paired, 3/4 to 1" long, variable in shape, but usually subglobose, enclosed at the base in a flat, thick, saucer-like cup, acorns mature and fall early, nut is medium brown with greyish streaks



Sorbus aucuparia
European Mountainash

Leaves: Alternate, pinnately compound, 5 to 9" long; 9 to 15 leaflets, each leaflet 3/4" to 2-1/2" long, oblong to oblong-lanceolate, serrated leaflet is usually entire (not serrated) in its lower third. Dull dark green color.

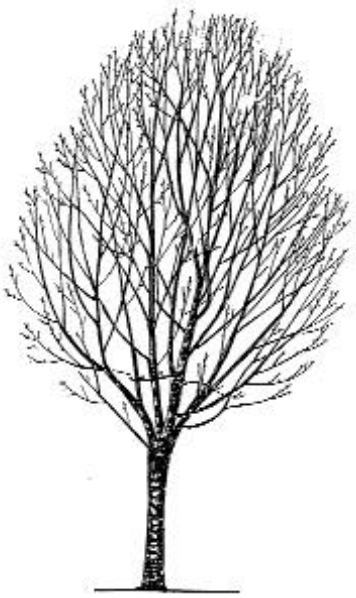
Size: 20 to 40' in height with a spread 2/3's to equal the height.

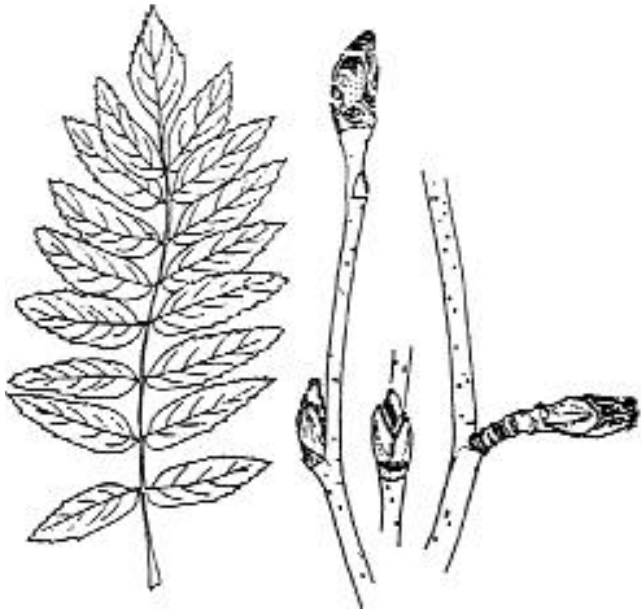
Habit: Erect and oval in youth forming an ovate or spherical, gracefully open head at maturity.

Bark; Light grayish brown, usually smooth, somewhat roughened on old trunks.

Flowers: White, 3 to 5" diameter flat-topped inflorescence, in May.

Fruit: Small, berry-like pome, 1/4" to 3/8" diameter, orange-red, in clusters; late August into September, very handsome.





Tilia cordata
Littleleaf Linden

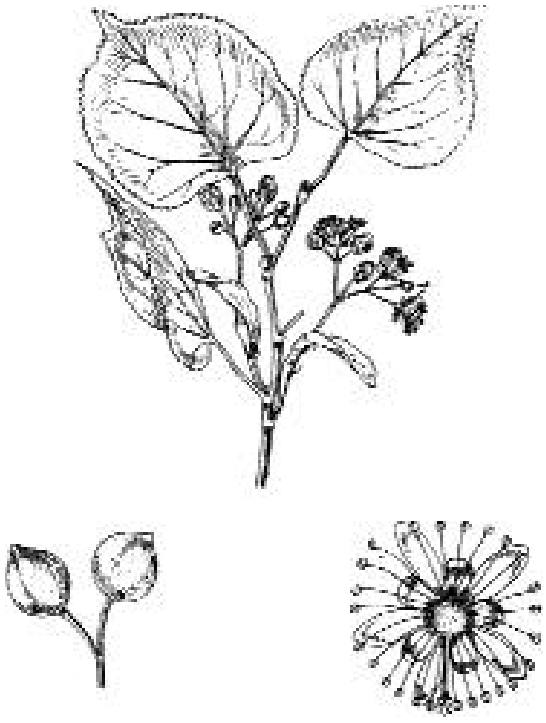
Leaves: Alternate, simple, suborbicular, 1-1/2 to 3" long, almost as wide and sometimes broader than long, abruptly acuminate, cordate, sharply and rather finely serrate, dark green and glabrous and somewhat lustrous above, glaucous or glabrescent and glabrous beneath except axillary tufts of brown hairs; petiole 3/4 to 1 1/4" long, slender, glabrous.

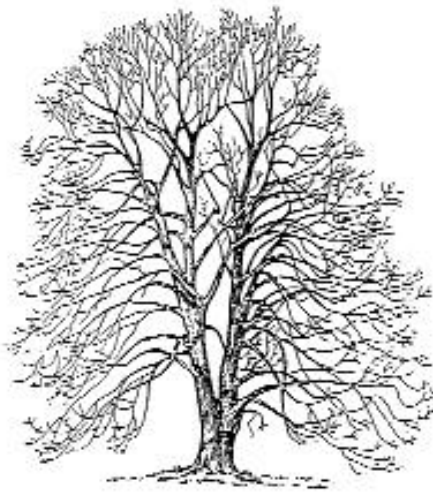
Size: 60 to 70' in height and 1/2 to 2/3's that in spread; can grow 80 to 90' high.

Habit: Pyramidal in youth; upright-oval to pyramidal-rounded and densely branched in old age.

Bark: Gray-brown, ridged and furrowed on older trunks.

Fruit: Globose nutlet, thin shelled, slightly or not ridged, covered with a gray pubescence.





USDA FOREST SERVICE
Northeast Center for Urban & Community Forestry

Tsuga canadensis
Canadian Hemlock

Leaves: Evergreen needles, almost regularly 2-ranked, linear, 1/4" to 2/3" long, lustrous dark green above with 2 whitish bands beneath.

Size: 40 to 70' in height by 25 to 35' spread; known to 100' or more.

Habit: Softly and gracefully pyramidal in youth with tapering trunk, becoming pendulously pyramidal with age; one of the most beautiful conifers.

Bark: Flaky and scaly on young trees, brown, soon with wide, flat ridges; on old trees, heavily and deeply furrowed.

Fruit: Cones, small, ovoid, 1/2 to 1" long, light to medium brown, hang like small ornaments from the branches.

Ulmus americana
American Elm

Leaves: Alternate, simple, ovate-oblong, 3 to 6” long, 1 to 3” wide, edges become concave before tapering to a point; unequal at base; doubly serrate; lateral veins crowded, straight, running out to teeth, petioles about 1/4” long.

Size; 60 to 80’with a spread of 1/2 ro 2/3’s the height; may grow larger.

Habit; Generally vase-shaped, with the trunk dividing into several erect limbs srongly arched above and terminating in numerous slender, often pendulous branchlets; the whole tree a picture of great beauty and symmetry.

Fruit: Rounded, disc-shaped samara, 1/2” long, maturing in May-June; not ornamental.

Zelkova serrata
Japanese Zelkova

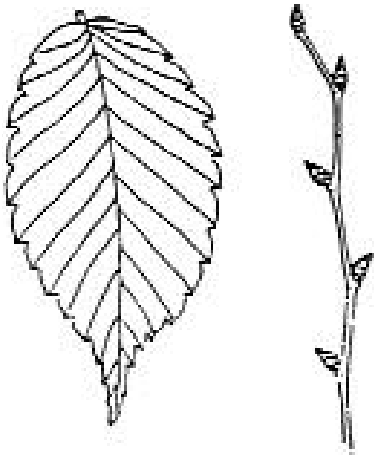
Laves: Alternate, simple, ovate to oblong-ovate, 1 1/4 to 2” long, or on shoots to 5” long, 3/4 to 2” wide, acuminate or apiculate, rounded or subcordate at base, sharply serrate with acuminate teeth, with 8 to 14 pairs of veins, dark green and somewhat rough above, glabrous or nearly so beneath; petioles 1/12 to 1/4” long.

Size: 50 to 80’ in height with an equal spread.

Habit: In youth, a low branched, vase-shaped tree; in old age maintaining a similar form with many ascending branches.

Bark: Beautiful, smooth-gray initially, finally resembling that of Chinese Elm but usually not as exfoliating.

Fruit: A small drupe, about 1/6” across, ripening in fall.



Below is a short list of recommended readings. There are many publications which discuss tree identification, maintenance, planting and planning. We have listed six of the many available. These publications cover tree inventory issues, and will assist you in acquiring accurate street tree information for the inventory.

1. ***Tree Maintenance***, 6th Edition.
   by P. P. Pirone
   New York and Oxford: Oxford University Press, 1988.

2. ***Manual of Woody Landscape Plants: Their Identity, Ornamental Characteristics, Culture, Propagation and Uses***
   by Michael A. Dirr
   Champaign, IL: Stipes Publications Company, c1975, revised 1990.

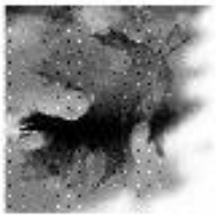
3. ***Urban Forestry: Planning and Managing Urban Greenspaces.***
   by Robert W. Miller
   Upper Saddle River, NJ: Prentice-Hall, c1988.

4. ***A Guide to Tree Identification: Trees of North America***
   by C. Frank Brockman
   New York: Golden Press and Racine, WI: Western Publishing Co., Inc.

5. ***Street Tree Factsheets***
   by Henry T. Gerhold
   © 1993 by The Pennsylvania State University

6. ***Eyewitness Handbooks - Trees***
   by Allen J. Combes
   New York: A. Dorling Kindersley, Inc., 1992.

TREE SURVEY



These references are included to help you locate the specific trees that you are surveying. The methods that you develop for interpreting the information on the Block Plans are very individual. We therefore suggest that you practice using the Block Plans so that you will be familiar with how best to use them. The following page contains a sample section of a Block Plan for you to review.

MAKING SENSE OF BLOCK PLANS

Overview

You will be provided with Block Plans which you will use to record street tree locations, and also to use as a reference for locating the exact position of the trees. The method for labeling a tree's specific location is described later in this manual.) Once you locate and record the trees on the Block Plans, it will then be possible for technicians to enter the location points into the Geographic Information System (GIS) computer program. This computerized inventory will then be available for use in the development of management strategies for trees, greenspace, and municipal infrastructure.

Block Plans

The Block Plans contain three main types of reference information: street names, address numbers, and building footprints. A building footprint is the shape and area covered by a building, and is indicated on the Block Plan as an outline (see sample shown on next page).

Typcial Information Found on Block Plans

= a catch basin [a rain water drain]

= a pole


= a street light

= a property line

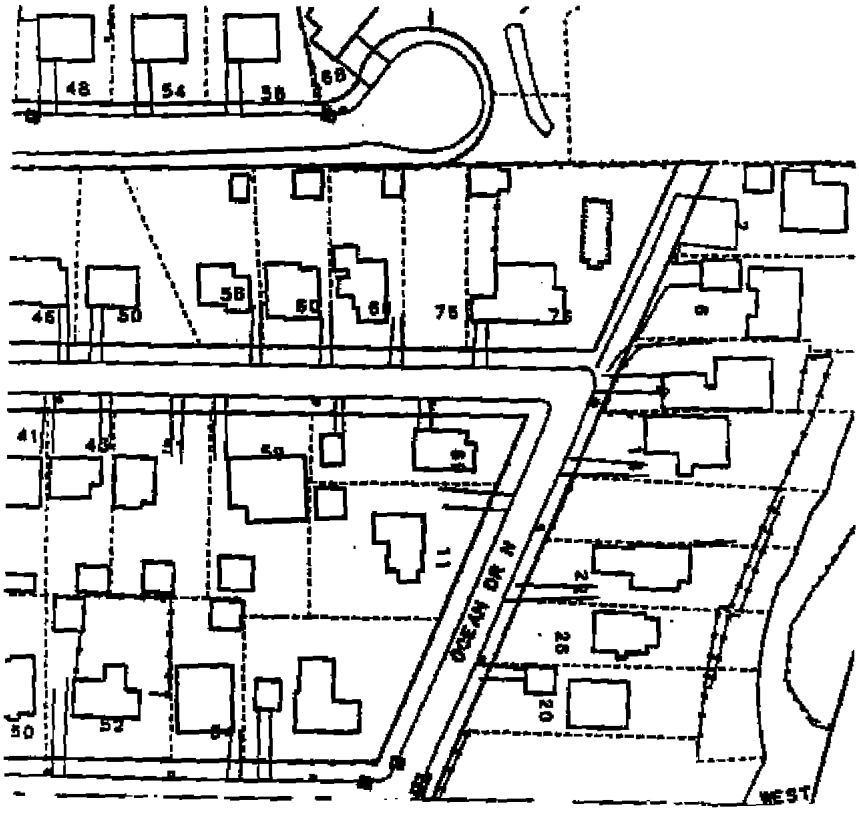
= a fence or wall

= an outline indicating a swimming pool [there are not many of these]

= an outline indicating a tennis court [there are not many of these]

SAMPLE BLOCK PLAN

Shown below is a sample Block Plan from Stamford, Connecticut. Note that the Block Plan inclides a portion of Ocean Drive North. This street is located in the northeastern section of Shippan Point, Stamford.



As noted on the previous pages, uses of other tools, such as assessors maps and engineering drawings can been used in the past to locate the tree's loca - tion for inventory purposes. After gaining a little experi - ence, you will find that the air photograph is an easier tool to use than the illustrated maps or drawings, and will provide you with the ability to more precisely locate the trees for transthe air photograph is an easier tool to use than the illustrated maps or drawings, and will provide you with the ability to more precisely locate the trees for transfer to a omputerized inventory system.

MAKING SENSE OF AIR PHOTOGRAPH

Overview

In some cases you may be using an air photograph to map the location of trees growing in your community. These air photographs an accurate and easy to use overview of areas that will be inventoried. These photographs are taken by cameras precisely mounted on an airplane and give a compete view of all build- ings, roadways, parking areas, vegetation, trees, automobiles, and all visible ele- ments of the urban landscape.

By locating the trees exact position on the air photographs, it will be possible to then add the location points to the computerized Geographic Information System (GIS) or use them for other mapping applications. The information that is seen on the air photographs, as well as the tree locations and numbers that you add, can be transferred into computerized form for use in the computerized mapping and GIS databases. These computerized inventories will then be available for use in the development of management strategies for trees, greenspace, and municipal infrastructure.

The air photographs contain a great deal of information that will be useful to you while performing the inventory. Although it may seem a little difficult to find where you are located when you first look at an air photograph, as you gain experience with the process you will become more comfortable and confident with the process. A sample air photographs is provided for your examination

SAMPLE AIR PHOTOGRAPH

Shown is a portion of a sample air photograph showing an urban area. Use this air photograph to become familiar with the shape and appearance of known objects such as buildings, automobiles and roadways. Look for trees in the photograph and see how they appear from the air.

The team numbers will be assigned in a pattern similar to the following:

Group A	*Trees 0001-3000*
Group B	*Trees 3001-6000*
Group C	*Trees 6001-9000*
Etc.	*Etc.*

NUMBERING TREES

Each tree surveyed will be given a unique number in order to locate every tree in the inventory system. Each team will be given a set of 3000 numbers for its assigned survey area. This will provide a sufficient series of numbers unique to that team, in order to prevent team numbers from conflicting or crossing over. The team will enter the tree number on the Tree Inventory Data Sheet, starting with the lowest number of its assigned number series and increasing each tree number by one as it moves from tree to tree and towards the highest number in the given series. There are two key points to remember here: 1) to enter the correct, sequential tree number accurately on the Tree Inventory Data Sheet; and 2) to check carefully that the number thus entered on the Tree Inventory Data Sheet corresponds to the number being marked on the map for that particular tree.

For example, members of Team A will record their first tree as 001 on the Tree Inventory Data Sheet. They will then record the same number on the map. From there they will progress numerically towards 3000, until they have surveyed every tree in their assigned area. Members of Team B will record their first tree as 3001 on the Tree Inventory Data Sheet, record the same number on the map, and progress numerically towards 6000, until they have surveyed their assigned area. This numbering method will be carried out by each team, in order to ensure that each tree has a unique identification number.

RECORDING THE TREE LOCATION ON THE MAP

Overview

Indicating the exact location of a tree on the map requires that volunteers perform several steps that will ensure the accuracy of the information. If a precise determination is made of where the tree is growing as it relates to buildings and other landmarks around it, then it is possible to indicate this specific location on a map. The transfer of the real world location to the map presents a significant chance for error to occur. It is very important that care be taken when performing this step of the inventory.

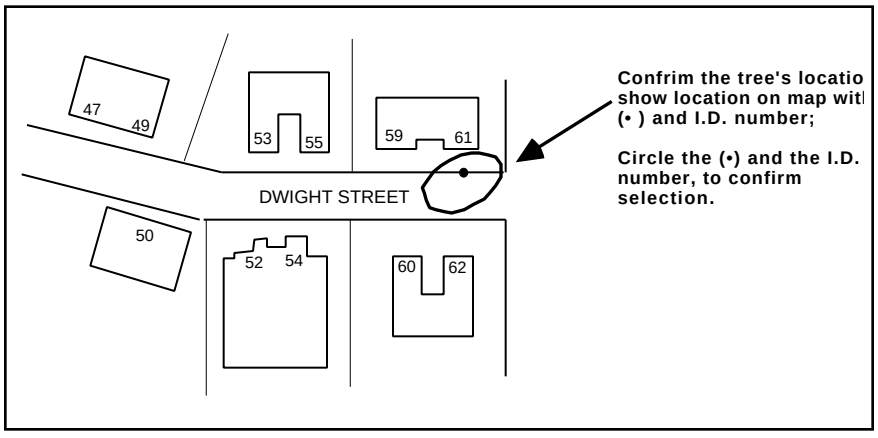
The information recorded about each tree on its Tree Inventory Data Sheet will be taken from there and linked to the specific tree identified on the map. The most important components of the inventory are therefore 1) accuracy in finding where the tree is located in the real world and 2) transferring this information to the map. Volunteers are asked to pay special attention to the procedures outlined so that valid information is not only gathered, but also entered in the correct place.

Procedure

Although locating a specific tree and transfering the information to a map may seem logical and simple, some volunteers may find it difficult to develop a method that will ensure uniform, accurate mapping of the tree locations. The methods used to identify tree locations on the maps may vary depending upon the type of map being used for recording, but the general techniques will be similar.

The following steps should be taken to transfer the locations of the trees to the maps being used for the inventory:

1. Record the names of the team members and the date on the map.
2. Using the master map found with the team's set of maps, locate the area of neighborhood which the localized map covers.
3. Go to a location on the map that the team can positively identify. The team can find this place by using the street name, lot lines, and intersect ing street corners.
4. Locate a public street tree that is found near the place where the team is standing.
5. Find that location on the map, and place a • in that spot.
6. Label the point (•) with the first number of the team's assigned range of unique identification numbers.
7. Gather the data about the tree and record the information on the Tree Inventory Data Inventory Data Sheet.
8. Locate the next tree and repeat the procedures.



RECORDINGTHE LOCATION ON THE AIR PHOTOGRAPH

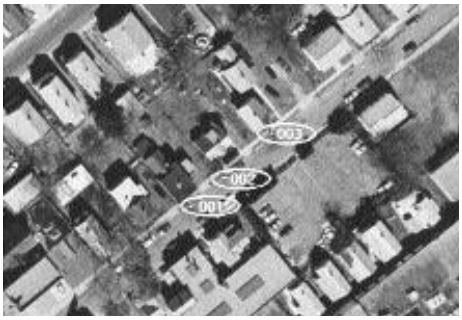
Overview

Indicating the exact location of a tree on the map requires that volunteers perform several steps that will ensure the accuracy of the information. If a precise determination is made of where the tree is growing as it relates to buildings and other landmarks around it, then it is possible to indicate this specific location on a map. The transfer of the real world location to the map presents a significant chance for error to occur. It is very important that care be taken when performing this step of the inventory.

The information recorded about each tree on its Tree Inventory Data Sheet will be taken from there and linked to the specific tree identified on the map. The most important components of the inventory are therefore 1) accuracy in finding where the tree is located in the real world and 2) transferring this information to the map. Volunteers are asked to pay special attention to the procedures outlined so that valid information is not only gathered, but also entered in the correct place.

Procedure

Although locating a specific tree and transferring the information to the air photographs may seem logical and simple, some volunteers may find it difficult to develop a method that will ensure uniform, accurate mapping of the tree locations. The methods used to identify tree locations will most likely be different for each individual inventory team, but the general techniques will be similar.



The following steps should be taken to transfer the locations of the trees to the air photographs being used for the inventory:

1. Record the names of the team members and the date on the air photographs.
2. Travel to the park indicated on your air photographs, using the master map found in your team project packet.
3. Go to a location on the air photographs that the team can positively identify. The team can find this location using recognizable elements on the air photograph such as buildings, street corners, edges of paved areas, ball fields, basketball and tennis courts, waterways, or other identifiable landmarks.
4. One you have oriented your team at the known location, look around the immediate area of the park for other landmarks that will give you an indication of the size, scale, and dimensions of the location as they relate to the air photograph.
5. After locating several known points, landmarks, etc. on the ground and relating them to the air photograph, you are ready to begin the survey of the trees.
6. Locate a tree near a known landmark and mark its location on the air photograph, using a simple dot (•) at the point where the tree appears on the air photo.
7. Label the point with he first number of the team's assigned range of unique identification numbers.
8. Gather the data about the tree and record the information on the Tree Inventory Data Sheet.
9. Locate the next tree and repeat the procedure.

USING THE TREE INVENTORY DATA SHEET

When surveying the street trees, volunteers will be using a paper recording sheet, called the Tree Inventory Data Sheet. The following items will be found on the sheets. For each response mark an X in the appropriate location. The items are as follows:

Tree Information

Tree Number - Record the first Tree Number your team has been assigned
Code - Record two letter Species Code (ie: AR)
DBH- Record Diameter at Breast Height

Condition

Place an X in the appropriate box
G = Good F = Fair P = Poor C = Consult
D = Dead

Root Cover- Type of material found over tree roots

Place an X in the appropriate box
P = Pervious I = Impervious

% Imper.- Percentage Impervious Material over root zone

0% = no impervious material over root zone
< 33% = less than 33 percent impervious
< 66% = between 33 and 66 percent impervious
< 100% = between 66 and 100 percent impervious

Width of Planting Strip

Sidewalk
< 2 foot width
> 2 foot width
lawn

Conditions

Weak Fork = Weak Fork Over Wires = Overhead Wires
Dead Wood = Dead Wood in crown Cav = Cavity

Is Pruning Needed?

Yes No

If Pruning Needed, What Type?

Answer these only if you placed an X in the Pruning Needed block in the previ - ous question
Clean = Crown cleaning Raise = Crown raising Reduct. = Crown Reduction

Comments _____