



# PHS Tree Tenders<sup>®</sup> handbook



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“A tree is a wondrous thing. It runs entirely by solar energy. It turns water and carbon dioxide into building material. It is powerful enough to split rocks. It can contain up to 50,000 cubic feet of wood. It has a plumbing system that can raise water 100 times as efficiently as the best suction pump made. It is the oldest and largest living thing on earth. It can tell time. It may grow to 300 feet in height, yet it supports itself entirely through a network of roots that are finer than a string. It may pour hundreds of gallons of water into the air in a day’s time. It befriends us by taking and using our waste products (carbon dioxide) and returning life-supporting oxygen. It sometimes grows so large that it contains enough wood to build a community of 50 six-room houses. It protects itself with bark against insects, disease, and fire. It does all these things and never moves.”

–Anonymous

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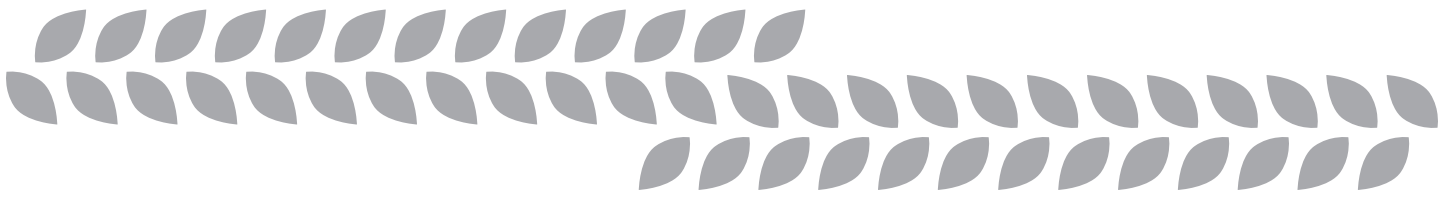
# PHS PENNSYLVANIA HORTICULTURAL SOCIETY®

a non-profit organization founded in 1827, is America's leading horticultural society. Today, PHS includes a diverse community of people who use horticulture to advance the greater good with a keen focus on creating healthier living environments, increasing access to fresh food, expanding economic opportunity, and building deep social connections among people. PHS utilizes neighborhood gardening, tree planting, and greening programs in more than 250 neighborhoods throughout the Philadelphia region; a network of public gardens and landscapes; learning and engagement opportunities for gardeners; and the Philadelphia Flower Show and other public events to engage audiences and advance its cause. PHS is supported by individuals, PHS members, foundations, and partners from the business, non-profit, and government sectors. To get involved, please visit [PHSonline.org](http://PHSonline.org).

**PHS includes a diverse community of people who use horticulture to advance the greater good**







## PHS Tree Tenders®

The acclaimed PHS Tree Tenders program is at the forefront of an urban tree movement across the country and is one of the oldest, most respected volunteer urban tree-care programs. It offers affordable training in tree planting, care and advocacy in the five-county Philadelphia region, and affiliated trainings take place across Pennsylvania. Since 1993, it has trained over 5000 volunteers who have in turn organized their neighbors in planting, monitoring and caring for over 1100 street trees in Philadelphia and surrounding municipalities every year. Strong growth in the number of groups participating in fall and spring plantings is an indication not only of the expanding reach of PHS Tree Tenders, but also of the pride and sense of accomplishment that people feel when they work together to create a healthier community.

PHS Tree Tenders training covers tree biology, identification, planting, maintenance, and community engagement. Tree Tenders works alongside local tree agencies, leveraging resources and extending the impact of municipal tree stewardship. In addition, trees planted by Tree Tenders have a high survival rate, as dedicated and trained volunteers remain focused on their care, reducing the cost of maintenance. The program has been replicated in communities across the nation.



**PHS is committed to making communities healthier and more livable through large-scale tree planting, but we can't do it without your support. You can help by making a gift at [PHSonline.org/deepen-your-impact](https://PHSonline.org/deepen-your-impact)**

# How Trees Help

## Provide oxygen

Each of us inhales 35 pounds of oxygen daily, all from plants. Every day, we need seven trees to convert our carbon dioxide to oxygen.

– David Nowak, *USDA Forest Service Study*

## Remove large quantities of pollution from the air

Pollution removal varies among cities with total annual air pollution removal by US urban trees estimated at 711,000 metric tons (\$3.8 billion value).

– David Nowak et al., *Urban Forestry & Urban Greening* 4 (2006)

## Save energy and reduce cooling costs

Trees strategically placed around a home can shade the home in the summer, cutting air-conditioning costs by 30%, and act as windbreaks in the winter, cutting heating costs by 20-50%.

– *USDA Forest Service*

The net cooling effect of a young, healthy tree is equivalent to 10 room size air conditioners operating 20 hours a day.

– *U.S. Department of Agriculture*

## Increase the value of your home

New tree plantings increase surrounding property values by approximately 10% in the New Kensington neighborhood of Philadelphia.

– Susan Wachter, *Wharton School, University of Pennsylvania*

## Improve health

Hospital patients with views of trees recovered 10% more quickly from surgery and required fewer painkillers than those without the view.

– Roger S Ulrich *Science* 27 Apr 1984:Vol. 224, Issue 4647, pp. 420-421

*A Toronto study found "having 10 more trees in a city block, on average, improves health perception in ways comparable to an increase in annual personal income of \$10,000...or being 7 years younger."*

– Kardan et al. *Neighborhood greenspace and health in a large urban center. 2015. Scientific Reports.*

## Encourage serenity and relaxation

Children with ADHD show fewer symptoms when they have access to nature. Exposure to trees and nature aids concentration by reducing mental fatigue.

– Taylor, Andrea Faber; Kuo, Frances E.; Sullivan, William C., 2002. Views of Nature and Self-Discipline: Evidence from Inner City Children. *Journal of Environmental Psychology* 22 (1-2)

## Reduce violence

Studies have shown that being near trees reduces violence among residents of public housing in Chicago, prison inmates, and Alzheimer patients in nursing homes.

– *Sullivan & Kuo, University of Illinois at Urbana-Champaign*

## Increase pride in local communities

People view outdoor urban residential spaces with trees as more attractive, safer, and more appealing to use.

– *Sullivan & Kuo, University of Illinois at Urbana-Champaign*

## Reduce global warming

As trees grow, they help stop global warming by removing carbon dioxide from the air, storing carbon in the wood and the soil, and releasing oxygen into the atmosphere. A single tree will absorb one ton of carbon dioxide over its lifetime.

– *Arbor Day Foundation*

## Protect Water Quality

Forests provide natural filtration and storage systems that process nearly two-thirds of the water supply in the U.S.

– *Greatest Value Of Forests Is Sustainable Water Supply, Science Daily, sciencedaily.com*

# How PHS Tree Tenders Can Help

## Advocacy

- Act as eyes in the community.
- Notice urban stresses on trees.
- Report risky trees to your municipal tree authority.
- Remedy through pruning and pit care.
- Call an arborist when necessary.
- Ask politicians to support more funding for tree planting and maintenance.

## Organizing

- Work with neighbors to organize a community tree program.
- Raise funds for tree planting and tree maintenance.

## Tree care

- Plant the right tree species in the right place not only for today, but for years to come.
- Water new transplants and drought-stressed trees slowly and deeply.
- Prune conservatively and correctly.
- Weed tree pits.
- Cultivate tree-pit soil.
- Mulch neighborhood trees.
- Hug a tree.
- Excavate buried root flares and remove girdling roots.
- Become the tree expert in your neighborhood.



*"To leave the world a bit better, whether by a healthy child, a garden patch or a redeemed social condition. To know that even one life has breathed easier because you have lived. This is to have succeeded."*

—Ralph Waldo Emerson

# I. GETTING ORGANIZED

## Building Your Group

Like trees, PHS Tree Tenders groups come in a wide variety of shapes and sizes. Along those lines, you can think of a group's organizational structure and operating principles like the root system of a tree. Some systems are large and complex, while others are less expansive. But whether the root system is simple or complex, all trees require a root system to grow. Clearly, all groups need a level of structure and intentionality to succeed.

No matter if your Tree Tenders group has 3 or 33 members, here are some key elements that will help your group to grow in healthy and well-nourished ways:

### Mission

Groups need to discuss and decide why they want to work together. Establishing the mission of a group can provide direction. The work of developing a mission or purpose can help a group discover the common ground that brings them together.

### Planning

The planning process includes:

#### Goal Setting

What do we want to do?

#### Outcomes

How will we know if we are successful?

#### Action Plan

How will we accomplish it?

### Roles and responsibilities

It is important that groups spend time clarifying roles and responsibilities. Once group members are clear about the plan, they need to know their roles and relationships to it. Who will do what by when? [See "Delegate responsibilities."]

### Leadership

All groups need leadership. Some groups may decide to have elected officers with terms of service, while other groups have individuals who volunteer to take on specific leadership roles. Whichever system you select, it's best when leadership is shared. There also must be opportunities to develop new leadership in groups.

### Decision-making process

There are many ways for a group to make decisions (for example, two-thirds majority of membership; simple majority of those present; a consensus, etc.). A group may also decide to use a wide range of decision-making processes, depending on the issue. Whichever method(s) a group employs, it's important to decide how to make decisions. This will help avoid problems and confusion down the road.

### Communication

Establish ways to share information, plan, and solve problems. Meetings, written minutes, phone calls, email, a website, articles in the local paper, and group workdays provide wonderful opportunities for communication. It's always good to talk.

### Evaluation

When you finish a project, it's helpful for the group to spend some time thinking about what they have learned from it. Reflecting together on what went well, what didn't go well, and making suggestions for improvement can significantly enhance future work.

### Make time to appreciate and celebrate

Make time to celebrate the efforts and achievements of the group. Consider having an annual Tree Tenders party or small gatherings to celebrate the work, build relationships in the group, and have fun together. [See "Reward volunteers."]

Building a strong PHS Tree Tenders group involves recruiting participants, identifying resources, and building on common goals as well as unique interests.

Recognize available resources in your neighborhood.

**People.** Identify and involve decision makers and other people in your neighborhood. The number-one reason people volunteer is because they were asked!

**Organizations.** Identify community and nonprofit groups, churches, and schools that could provide support such as people and meeting space. Seek and publicly acknowledge support from local banks, utility companies, and other organizations for special projects.

### Reach out to neighbors

**Flyers.** Be brief and to the point. Focus on the 4 "W's": who, what, when, and where. Photos and colorful images attract people's attention.

**Media.** Brief, clear, and concise public service announcements and press releases can reach a lot of readers.

**Special events.** Combining work sessions and cleanups with fun, food, and music is a highly visible way to keep veteran volunteers and attract newcomers. Be prepared with a sign-in sheet or hold a raffle to obtain new volunteer names, phone numbers, and addresses.

**Communications.** Volunteers calling or emailing each other not only share the responsibility, but it's also an opportunity for them to get to know each other better. Pre-existing, collaborative groups often have their own email list, Facebook page, blog, or website.



# I. GETTING ORGANIZED

**Neighborhood canvassing.** Distribute flyers and invitations door-to-door. People are likely to volunteer when asked by someone they know or recognize.

**Supplies and materials.** Identify, patronize, and ask local restaurants, bakeries, print shops, stationery stores, photocopying centers, and other businesses to donate supplies and offer their services. Approach business owners and managers for contributions. Be sure to thank them publicly for support.

**Government agencies, commissions, and politicians.** Identify and contact state legislators, local elected officials, relevant municipal staff, and departments such as Public Works, Streets, and Parks & Recreation, all of which may have funds, influence, skills, and other resources. Connect with municipal appointees such as Environmental Advisory Councils and Shade Tree Commissions.

**Delegate responsibilities.** Although it may seem easier to do everything yourself, it's important to share the work. Volunteers have a lot to offer and they appreciate the opportunity to contribute their skills, time, and energy. The more people get involved, the more they have a stake in making the project successful. Delegating helps avoid burnout and resentment from those eager to work.

### **How to delegate:**

- Decide the goal together.
- Identify the tasks and agree on ground rules.
- Assign tasks.
- Set deadlines.
- Hold scheduled meetings.
- Allow time for people to report on progress.

- Provide additional leadership if the task isn't being completed.
- Supply people with the necessary resources, instructions, tools, and partners.

Find and keep volunteers. People volunteer for many different reasons. Some want to do something positive for their community; others want to keep busy or learn new job skills.

**Ask, ask, ask!** People tend to volunteer when someone asks them. If one person isn't able to help, ask if she or he knows someone else who might be interested.

**Create volunteer job descriptions.** The process of identifying and defining volunteer jobs helps group members figure out what needs to be done. Having clear job descriptions helps volunteers understand tasks, expectations, and opportunities. Matching volunteers' interests with the work helps keep them happy. A satisfied, long-term volunteer is likely to bring friends along to help next time.

**Reward volunteers.** Being a volunteer is hard work. Everyone appreciates being thanked for a job well done, so be generous with praise and thoughtful rewards. Make sure volunteers feel special and valued.

### **Ways to say Thank You:**

- Having food at meetings
- Awarding certificates or other recognition
- Organizing a potluck dinner celebration
- Giving hats or T-shirts to build group identity
- Providing ongoing training
- Having volunteers be spokespeople at media events
- Including volunteers' names and photos with press releases



*"(Whomever) plants a tree, plants a hope"*

*- Lucy Larcom*

# I. GETTING ORGANIZED

## Working with Children

With any tree-care project you undertake, you'll want to consider how to involve children. Kids can undo a lot of tender loving care very quickly if they don't have a personal connection to your greening effort. But once you tap into kid energy, you will find that young Tree Tenders feel very strongly about improving their own communities. In addition, you can take advantage of their unlimited stamina and limber backs. In short, put them to work! Make sure to make it fun and give them plenty of positive reinforcement.

Check to see if Child Abuse and/or Criminal Record clearances are required prior to working with children.

**Schools.** PHS Tree Tenders who are interested in working with schools will find many opportunities to interact with budding environmentalists. There are often trees already growing on school property that you can help a classroom "adopt." You can also show the students how to identify, care for, and observe the trees. Here are some suggestions for other activities that you might want to try with schools:

- Read one of the many excellent children's books about trees to a class. [See Appendix for our children's recommended reading lists.]
- Sponsor a class of children on a field trip to a nearby

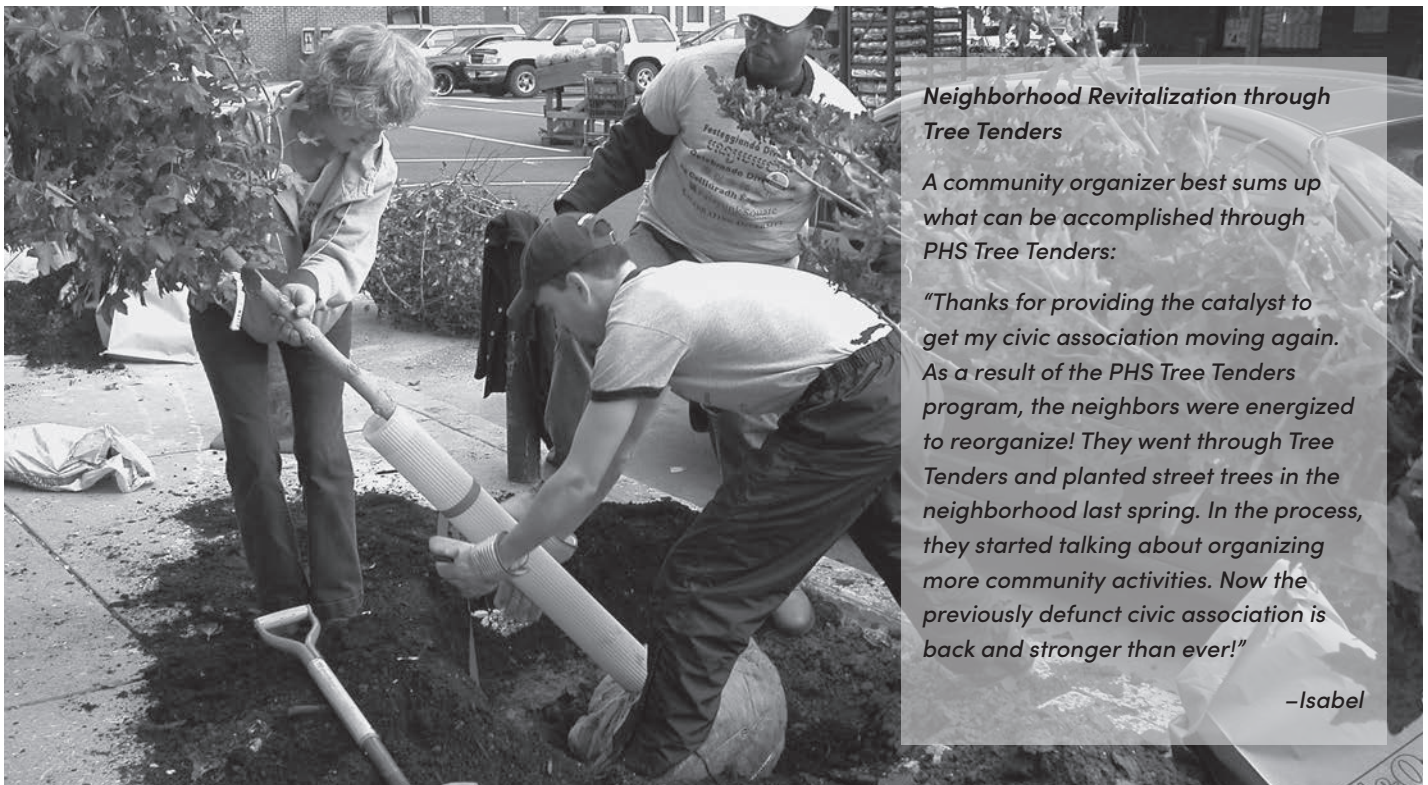
arboretum or park, or on a "walking field trip" to see neighborhood street trees.

- Assist with the planning and implementation of an Arbor Day or Earth Day celebration. [See p. 49]
- Participate in an initiative to renovate a schoolyard into a green refuge.

In addition, many teachers are interested in service-learning projects. An ideal service-learning experience combines academic content with hands-on activity, and many tasks relating to tree care readily fit the bill. Some suggestions for long-term service learning projects include involving older students in a neighborhood tree inventory project, or using student help to research, plan, and implement the planting of new trees on a nearby street.

**After-school programs.** Contact your neighborhood schools about enriching their after-school program with some of these same activities. Establishing a youth PHS Tree Tenders group during this period has the advantage of not competing with a teacher's instructional time during the day. Consider enlisting student help to patrol the schoolyard and pick up litter, for example.

**Support.** Take advantage of the resources of organizations that already have extensive experience working with youth, such as YM/YWCA, Boy Scouts, Girl Scouts, and 4-H.



### *Neighborhood Revitalization through Tree Tenders*

*A community organizer best sums up what can be accomplished through PHS Tree Tenders:*

*"Thanks for providing the catalyst to get my civic association moving again. As a result of the PHS Tree Tenders program, the neighbors were energized to reorganize! They went through Tree Tenders and planted street trees in the neighborhood last spring. In the process, they started talking about organizing more community activities. Now the previously defunct civic association is back and stronger than ever!"*

*—Isabel*



## Fundraising

Fundraising is related to every part of your program. Why do you need to raise funds? To purchase and plant new trees, pay for services such as sidewalk cuts, tree pruning, buying mulch or tools, and organizing special events like Arbor Day.

Volunteer involvement, publicity, and public education helps provide credibility and contacts for the fundraising process. Fortunately, fundraising events are good opportunities for recruiting new volunteers.

### Funding sources

**Individuals.** Don't be afraid to ask family, friends, and neighbors for contributions; the worst they can do is say "no." If they cannot provide money, perhaps they will volunteer their time.

**Community institutions.** Approach the following groups to start the process: churches, colleges, parent-teacher organizations, and community groups (Kiwans, garden clubs, etc.).

**Local businesses.** Ask home and garden centers, hardware stores, print shops, bakeries, delis, etc. for cash donations or in-kind services. Sometimes receiving donuts or tools can be more beneficial than a cash contribution, depending on your circumstances.

**Local politicians.** Contact state legislators and local elected officials to let them know of your activities in their districts.

**Local corporations.** Approach banks, utility companies, fuel companies, and other locally based corporations, such as pharmaceutical companies.

**Grants.** These can be obtained from organizations and agencies such as Tree Pennsylvania or US Environmental Protection Agency, as well as charitable organizations.

**Commemorative trees.** Individuals or groups may wish to plant a tree to celebrate events such as births, birthdays and graduations, or to remember a loved one.

### Grant writing

When writing a proposal, follow the instructions and guidelines precisely. Funders often eliminate proposals that do not contain the necessary information or meet their guidelines. Pay attention to the format including margin size, number of pages, and the sequence of information. Any additional materials that add credibility to your organization should be added. List and show supporting information from the following areas: cost estimates, letters of recommendation in support of the project, and any publicity that your group has received in the past.

#### **Information often required in proposals:**

- Who is applying for the grant?
- What is the group's mission?
- What is your group asking for?  
(Be as specific as possible.)
- How will your group accomplish the task?  
(Be as detailed as possible.)
- Who are the group's partners?
- What is the impact of this project on the community?
- How will the organization evaluate the project?
- How will budgeted funds be used?

### Other fundraising options

**Ongoing fundraising.** Sources may include direct mail, door-to-door canvassing, raffles, dedications, and bake/candy sales, etc. Keep a list of contributors and add their names to a potential volunteer file for a follow-up mailer.

**Event fundraising.** Special events are a great way to raise money and generate publicity. These events can be as varied as a community flea market, spaghetti dinner, tour of community houses and gardens, and concerts (with local talent from schools, churches, and other groups). Additional events that go hand-in-hand with the events mentioned are a 50/50 raffle or a silent auction.

**Ask for a donation.** Ask the recipients of the newly planted tree to contribute to part of the cost. For example, by asking the homeowner to contribute \$25 toward a tree that costs \$125 will save Tree Tenders 20% of the cost of the project. This adds up over several projects.

Collaborate with other organizations. Team up with a civic association, local school, or church. Tree Tenders groups without nonprofit status could collaborate with an established, tax-exempt 501(c)(3) group.

# I. GETTING ORGANIZED

## Advocacy

### Tips for meeting an elected official

A personal visit with an elected state or municipal official or a member of Congress is an effective way to emphasize your interest in an issue or legislative bill. Below are tips for a meeting to urge support or opposition to an issue or piece of legislation.

1. Make an appointment. State the subject of discussion, the time needed, and identify persons attending.
2. Select a spokesperson and agree on the presentation.
3. Know the legislative facts as related to your position. Know the bill's title and number.
4. Present the facts in a positive and concise manner.
5. Relate the positive impact from the legislation and state the problems it corrects. Or, if you are opposing legislation, highlight the negative impact. If possible, have an alternative approach.
6. Leave accompanying fact sheets and information about your organization.
7. Encourage questions and discussions.
8. Ask the legislator for favorable consideration of your position. Thank the legislator for his or her courtesy and time and leave promptly. Make sure you follow up the meeting with a thank-you note.

### Tips for writing to an elected official

Elected officials pay attention to their mail. They know your vote can be won or lost by their response to your letter. When writing to an elected official, a personal letter is most effective. The contents should be polite, informative, and concise.

1. Keep your letter to one typewritten page or send it by email.
2. State your purpose in the first paragraph. Keep it brief. Stay with one subject or issue. Support your position in the rest of the letter. Direct your approach to the legislator's committee assignments, interests, and background.
3. If the topic is related to a bill, cite it by name and number.
4. Know the value of the millage rate in your municipality so you can talk costs. It still is about the money.
5. If you are in opposition to a piece of legislation, say so, but then indicate the adverse effects it would have. Offer alternative approaches.
6. Ask for your legislator's views, but do not demand support.
7. Be sure your name and address are legible.

### Establishing a sustainable community tree program

The most effective community tree programs include: establishing a Shade Tree Commission, enacting a tree ordinance, and developing a tree management plan. For information about these activities, see "Managing Natural Resources: A Guide for Municipal Tree Commissions," published by the Pennsylvania State University College of Agricultural Sciences (<http://pubs.cas.psu.edu/FreePubs/pdfs/uh189.pdf>).



*"Whatever you think you can do or believe you can do, begin it. Action has magic, grace and power in it."*

—Goethe

### Tree Basics

All plants require sunlight, water, air, and nutrients to survive.

A tree is a woody perennial (a plant that lives for many years) with one or more main trunks to support its leafy crown.

To understand how to care for a tree, let's look at a tree's parts and how they function. A tree consists of five main components: roots, trunk, branches, leaves, and reproductive parts (flowers and fruits or cones).

#### Roots

- Anchor the tree
- Absorb and transport water, nutrients, and oxygen
- Store food

Tree roots grow where there is oxygen, water, favorable temperatures, and nutrients. Most tree roots can be found in the top two feet of soil, with the majority of absorbing roots in the top foot. Tree roots can be divided into two categories: absorbing roots and structural roots.

The **root flare** is where the first main roots attach to the trunk. It should be visible above the soil level.

**Structural roots** support the tree. They are large, heavy, and woody.

**Absorbing, fibrous roots** take in water and nutrients through small "root hairs." Most absorbing roots grow in the top 12 inches of soil and can extend more than three

times the width of the tree canopy (beyond the drip line). Tree roots often form a symbiotic association with fungi in the soil. This association, called **mycorrhiza** (fungus roots), can help plants absorb nutrients and water. The fungi get nourishment from the roots.

Some trees have long, downward growing "taproots" when they are young. In most cases, the taproot disappears as the tree grows. Exceptions are pecans and oaks, which keep their taproots. These trees are especially difficult to transplant.

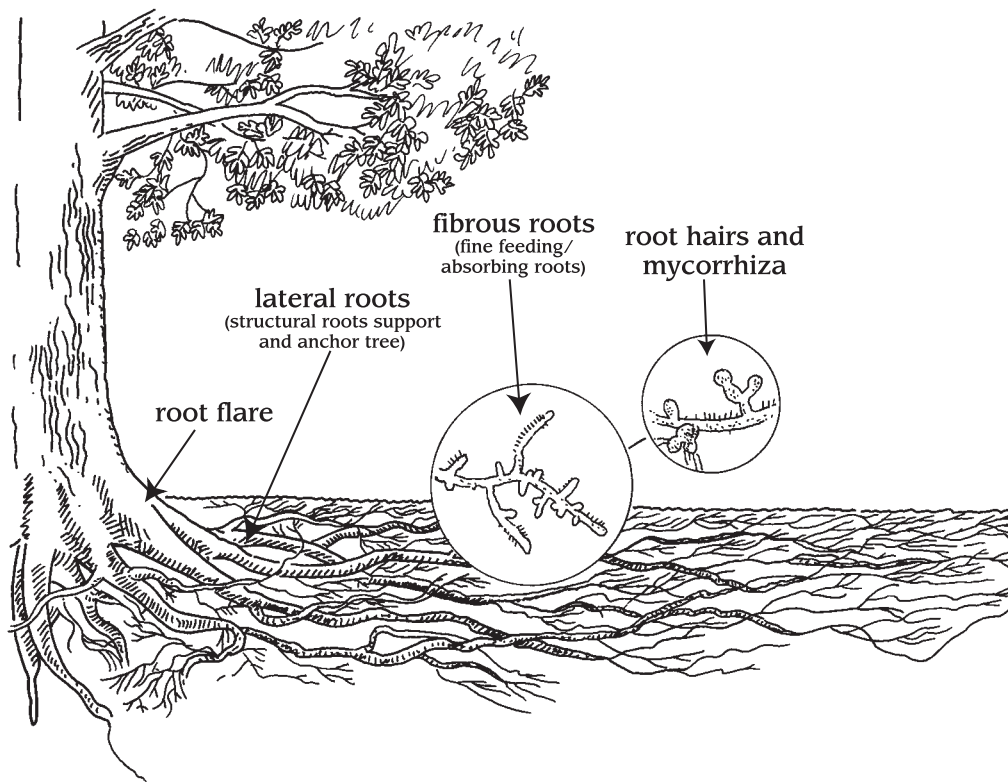
A tree's roots should be well watered, yet well drained. A root's function is to absorb water along with dissolved nutrients for plant growth. Meanwhile, root cells need oxygen to transform food into energy, a process called **Respiration**. Most tree roots will die in water-saturated or compacted soil.

In a forest, fallen leaves decaying on the forest floor nourish tree roots. In a town or city, however, tree roots are cramped into small tree pits or surrounded by concrete. They grow under sidewalks and between buildings to find water and nutrients. As roots struggle to survive, if their planting pits are too small, the result can be sidewalk and curb upheaval.

When choosing street trees for small tree pits, consider small-sized species such as hedge maple, redbud, and Winter King hawthorn. Larger species that tolerate compacted soil are London plane, red maple, and ginkgo.

#### Soils

Understanding soils is key to healthy tree planting and care. See "The Dirt on Soils" in Appendix, Page 55.





## II. HOW TREES WORK

### Trunk

- Transports water, nutrients and food between leaves and roots
- Provides structural support
- Stores food

A tree trunk consists of bark, phloem, cambium, and xylem.

**Bark.** The tree's protective outer layer, or "skin," protects the tree from insects, diseases, injury, and water loss.

**Phloem.** This inner bark is made up of cells that carry **glucose**—a simple sugar manufactured by the leaves—to the rest of the tree.

**Cambium.** This is a thin growth layer that produces the phloem (outward toward the bark) and the xylem (inward toward the center). Damage to the cambium can weaken or kill a tree because new phloem and xylem will not be produced, preventing food and water transport. Common forms of damage are wounds by cars and carved initials. The cambium is where growth in diameter occurs with the formation of new annual rings inside and new bark outside.

**Xylem.** The outer layers of functioning xylem are called sapwood. These cells carry sap (water and nutrients) from the roots to the branches and leaves. The inner layers, stained a dark color by chemicals produced by the tree to prevent decay, are called heartwood, and do not transport water. Trees may or may not have heartwood.

### Branches

- Transport water and nutrients
- Produce leaves, flowers, and fruits
- Provide structural support
- Are often called a tree within a tree. Branch growth occurs at the branch tip where terminal buds produce new leaves, twigs, and flowers.

### Leaves

- Produce food for the tree through photosynthesis
- Are the site for gas exchange (carbon dioxide [CO<sub>2</sub>] and oxygen [O<sub>2</sub>]), and water loss in transpiration.

**Evapotranspiration**, the release of water vapor into the air, causes trees to act like mini-air conditioners in the summer. This process enables the tree to pull water as much as hundreds of feet up from the roots to its leaves.

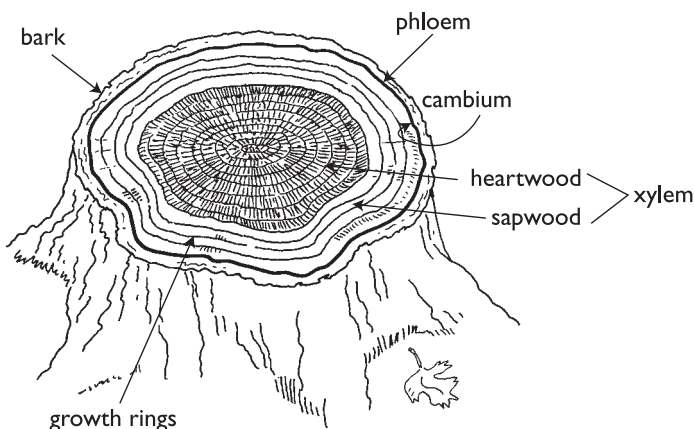
Each leaf is an amazing food factory. Through the process of photosynthesis, plants produce their own food and release oxygen, making life on earth possible. In **photosynthesis**, plants use the green pigment in their leaves (**chlorophyll**) to absorb the sun's energy and combine it with CO<sub>2</sub> from the air, plus water and nutrients from the soil. Presto—the tree produces the glucose it needs and the oxygen we breathe. Plants and animals depend on each other. Plants absorb our waste product, CO<sub>2</sub>, and release O<sub>2</sub> to us, which we return as CO<sub>2</sub> to plants.

A leaf may be waxy, fuzzy, or lighter in color to prevent water loss. **Stomates** are pores on the leaf's underside that control gas exchange and water loss. Stomates open daily for CO<sub>2</sub> and O<sub>2</sub> exchange during photosynthesis; they close at night and during hot weather to prevent water loss.

**Respiration** is the process by which the tree converts the glucose created by photosynthesis into energy. It uses the energy for all biological functions, including growth, defense and reproduction.

A leaf is comprised of a **blade** or needle that captures light for photosynthesis and a **petiole** (leaf stalk) that positions the leaf for photosynthesis. A bud, next year's leaf or flower, grows at the petiole's base. **Sessile** leaves, lacking a petiole, attach directly to the stem.

We enjoy the colorful, seasonal drama of **deciduous trees**, which drop their leaves in the fall. In the fall, food production slows in trees like maples and oaks. As leaves start to die, the green chlorophyll fades, allowing yellows and reds (carotene and xanthophyll pigment, which are always present in the leaf) to show through. In winter, these leafless trees live on food stored in the roots, trunk, and branches until spring, when new leaves emerge.



## II. HOW TREES WORK

**Evergreen trees**, such as pine and holly, drop their **needles** or leaves, but not all at once. Their leaves or needles live for more than a year. While older leaves or needles die and drop, younger ones continue to grow, so the tree is never bare. Not all needled trees are evergreen and not all **broad-leaf** trees are deciduous. The dawn redwood (*Metasequoia glyptostroboides*) is a deciduous conifer and the Southern magnolia and holly, both of which have broad leaves, are evergreen.

### Reproductive parts

**Flowers** attract insects and birds and are sites of pollen distribution. A fertilized flower develops into a fruit that may be dispersed by the wind; carried in an animal's mouth, digestive system, or furry coat; and/or transported by water. The **fruits** include nuts, samaras, pods, capsules, and fleshy fruits. Fruits hold seeds that, under the right conditions, germinate and grow into tree seedlings.

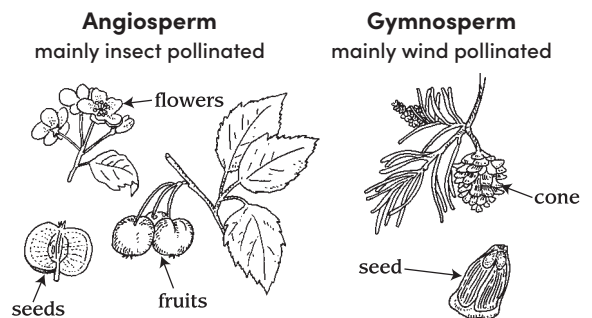
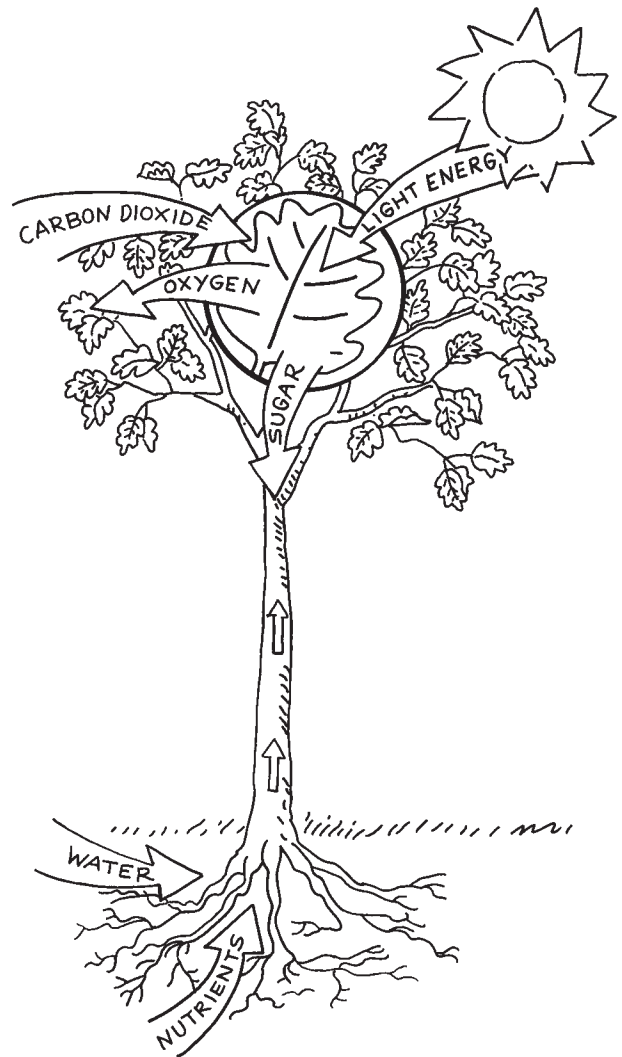
Some flower clusters, such as the crabapple (*Malus species*) and the golden rain tree (*Koelreuteria paniculata*), are quite attractive. Colorful or scented flowers are designed to attract pollinators such as hummingbirds, bees and other insects. Fertilized crabapple flowers become ornamental summer and fall fruits. Fertilized golden rain tree flowers become colorful, triangular fruit capsules in autumn.

Other flowering trees such as the zelkova (*Zelkova serrata*) have small, even petal-less, flower clusters. A cluster of fertilized ash flowers becomes "samaras," which are winged and easily dispersed through the air. Zelkova flowers develop into small, round fruits. These insignificant flowers are wind-pollinated and are responsible for some of our seasonal allergies.

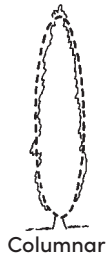
Trees can be divided into **angiosperms** (seed inside fruit) or **gymnosperms** (naked seed).

The **ovaries** of a pollinated angiosperm will develop fruit containing seeds. Angiosperms include flowering trees such as the crabapple, golden rain tree, and non-showy-flowering trees such as ash. "Angio" refers to vessel; "sperm" refers to seed.

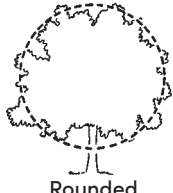
**Gymnosperms** are mostly non-flowering trees. Most gymnosperms reproduce via wind-carried pollen (which is also allergy causing) and exposed ovules that become seeds. Gymnosperms include all **conifers** (cone-bearing trees) such as pine, spruce and fir. Ginkgos, while gymnosperms, are in a category of their own.



# III. TREE IDENTIFICATION



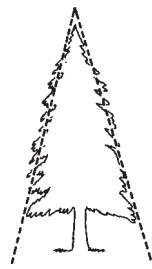
Columnar



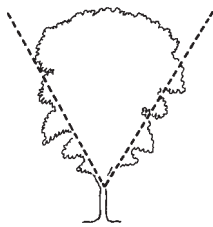
Rounded



Ovate



Pyramidal



Vase-shaped



Weeping

Every tree offers a variety of clues to identify it. A tree's form, leaves, bark, buds and twigs, flower, fruit, and site or cultural requirements are characteristics unique to a species, variety, and **cultivar**. The following details can help with the identification process. Consult a field guide with a botanical key (dichotomous key) for more information

## Form

Tree forms fall into six basic categories: columnar, rounded, ovate, pyramidal, vase-shaped, and weeping.

Even within the same species such as the maple, some tree varieties will take varied forms. A tree's tendency toward form is genetic, but other factors affect growth and structure: location, soil characteristics, wind, water, and light.

**Columnar form.** The upright, columnar form of the 'Freeman' maple, 'Princeton Sentry' ginkgo, and the European hornbeam makes a nice tree for a tight space or a small street.

**Rounded form.** The American sycamore, London plane tree, oaks, maples, and beech trees tend to be round. Large species are appropriate for wide streets and lawns. Smaller varieties, like hedge maple, work well on narrow streets.

**Ovate form.** Ovate form is narrow at the bottom, wide in the middle, narrow at the top. Ashes tend to be ovate. A small ovate tree, like the 'Washington' hawthorn, works well on most streets.

**Pyramidal form.** Pine, cedar, and spruce are pyramidal conifers. The deciduous littleleaf linden is also pyramidal. The ashes are pyramidal in form when young.

**Vase-shaped form.** Shaped like an inverted triangle, zelkova, evodia, and some elms have the vase-like form.

**Weeping form.** Having slender, drooping branches. (The weeping form, such as weeping cherry, is not an appropriate street tree.)

## Leaves

Leaves all grow in different shapes, each according to its tree species. A leaf's form, arrangement, blade shape, **margin** and vein pattern are means of identification.

## Leaf form

**Simple leaf:** one leaf blade per petiole (leaf stalk) with **bud**.

**Compound leaf:** many small blades (leaflets) on one petiole with bud.

**Broad leaf:** broad flat leaves usually deciduous but not always as in the holly or Southern magnolia.

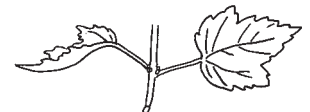
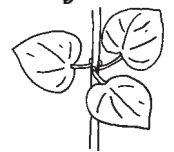
**Needlelike leaves:** mostly found on evergreens, although some found on deciduous trees like the dawn redwood (*Metasequoia*) and larch.

## Leaf arrangement on stem

**Alternate:** leaves and buds alternately spaced along a stem.

**Whorled:** three or more leaves and buds growing from the same node, evenly around the stem.

**Opposite:** leaves and buds across from each other on a stem.



## Branch arrangement

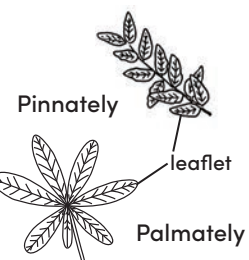
There are only four common opposite-branching trees in our area. They are **Maple**, **Ash**, **Dogwood**, and **Horse chestnut** (use the phrase "**M-A-D-Horse**" as a reminder).

## Leaf shape

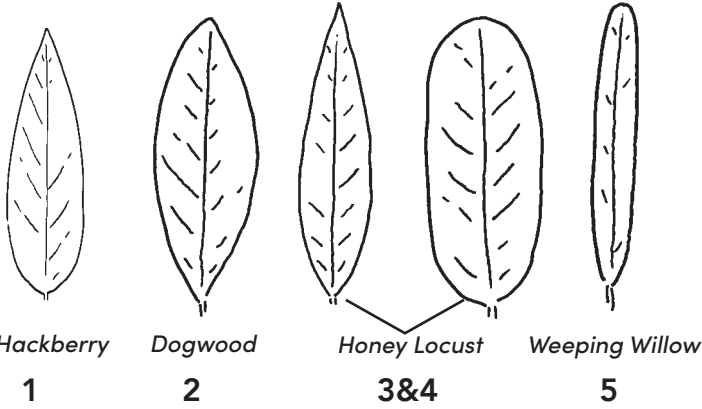
### Simple



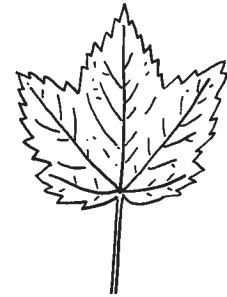
### Compound



# III. TREE IDENTIFICATION



- 1. Ovate
- 2. Elliptic
- 3. Lanceolate
- 4. Oblong
- 5. Linear

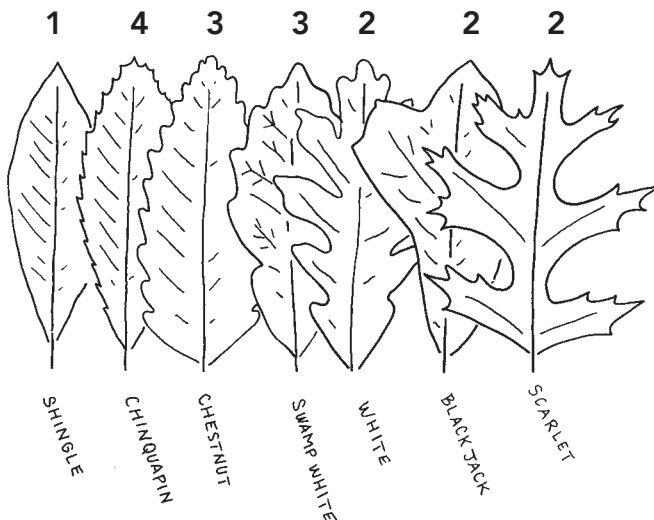


Maple  
**Palmate Veination**  
 Rounded Shape  
**Serrated Margin**

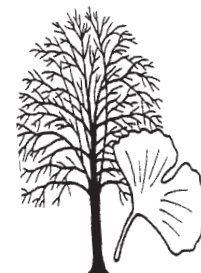


Oak  
**Pinnate Veination**  
 Ovate Shape  
**Lobed Margin**

## Leaf margins on a variety



- 1. **Entire:** (smooth-edged)
- 2. **Lobed:** (indented)
- 3. **Sinuate:** (wavy)
- 4. **Serrate:** (saw-toothed)



Ginkgo  
 Parallel Veination  
 Fan-shaped  
 Sinuate Margin

# III. TREE IDENTIFICATION

## Bark

Bark, or the tree's outer protective layer, is a year-round identifier.

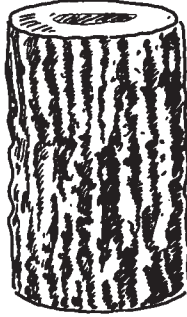
**Color:** brown, black, gray, or multi-colored

**Pattern:** solid, mottled, or spotted

**Texture:** smooth, fissured, shaggy or exfoliating



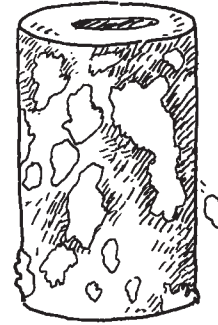
**Smooth:**  
*Beech*



**Fissured:**  
*Black Oak*



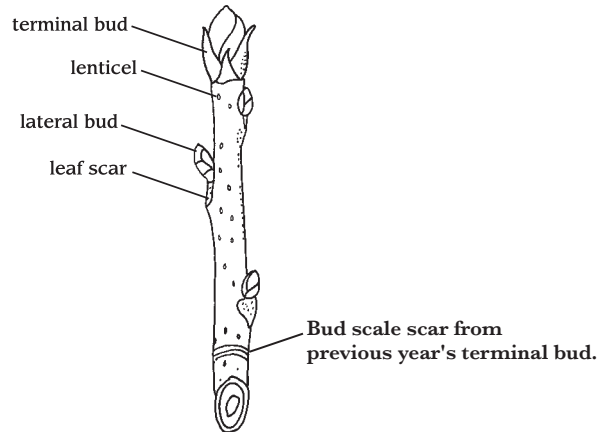
**Shaggy:**  
*Hickory*



**Exfoliating:**  
*London plane*

## Buds and twigs

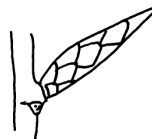
Buds and twigs are evident all year. They are distinguished by branching pattern (alternate or opposite); color, size and shape of buds; and presence of hairy, winged, or corky twigs. Twigs are also identifiable by leaf scars and lenticels.



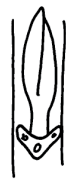
## Common buds



accessory



narrowly conical



stalked



rounded



ovoid

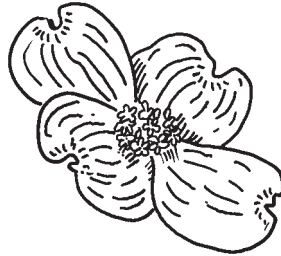


# III. TREE IDENTIFICATION

## Flowers and fruits

When in bloom, flowers are helpful in tree identification. They vary in bloom time, shape, size, color, number of petals, and scent.

Fruits come in many different forms. They hold the seeds for future trees.



**Flowering Dogwood**

## Fruits



capsule  
**Rhododendron**



samara  
**Ash**



nut  
**Oak**



drupe  
**Cherry**



double  
samara  
**Maple**



cone  
**Hemlock**

## Living Christmas Tree

*Celebrate an environmental Christmas this year by purchasing and planting a live Christmas tree.*

*Here is how to do it: In the fall, before the ground freezes, dig a hole, being careful to save the soil for future backfilling. You should store the soil in a garage, unheated porch or shed so that it does not freeze. Purchase a potted or "balled and burlapped" evergreen and store it in a protected area, out of the wind and away from extreme cold temperatures. Cover the tree roots with mulch to protect it from drying out or freezing.*

*A week before Christmas, bring the tree indoors, making sure to mist and water it. Right after the holiday take the tree out and store it again in a protected area to harden it off. In a week the tree will be ready for planting in the hole you previously dug. Retrieve the saved soil to fill in around the tree. Water well and mulch for warmth.*

*The key to success with keeping Christmas trees alive is to limit their time indoors and keep them moist. Trees have a hard time acclimating to winter temperatures if left in a warm house for more than 10 days.*

# IV. TREE PLANTING

**Note:** Although the planting guidelines listed here refer to street trees and pits, the same basic procedures and practices apply to other planting locations such as parks, riparian zones and stormwater basins.

## 1. Obtain approval

Check with your municipal authorities to see if you need a planting permit to plant a tree along the street or on public property. A municipal official may need to approve each tree site and issue a planting permit before you can plant trees. They may also recommend the type of tree you should plant.

You may decide to hire a contractor to do all the up-front work before you plant the tree, such as obtaining a planting permit, contacting **PA One-Call System**, and cutting concrete. After securing the planting permit or hiring a contractor, choose a reputable nursery and begin your tree selection.

## 2. Choose the right tree

Before purchasing a tree, consider what kind of tree is most appropriate for the site. Consider overhead wires, amount of sunlight, how large the planting pit is, how far the site is from the building, the **soil pH**, and how well the soil drains (See “The Dirt on Soils” in Appendix, Page 55) Each tree species has specific requirements, and some are more tolerant of stresses like salt and compacted soil. Knowing your site will help you choose a tree that will thrive.

Check to see if your municipality has a list of recommended species. For species selection resources, check out Penn State Extension’s Landscape Tree Factsheets and in our appendix: Arbor Day Foundation and Missouri Botanical Garden (pg 52).

### What tree characteristics do you want?

Spring flowers and fall color are what come to mind first, but it’s important to consider all the pros and cons of a tree species.

### Will the tree be compatible with your spot in 25 years?

Imagine your planting site in the future with a mature tree planted there. Can it accommodate a large tree? Would a columnar tree or a wide-spreading tree suit the site best?

## 3. Purchase the tree

Many nurseries belong to the Pennsylvania Landscape & Nursery Association and will provide a one-year guarantee on their trees. When pricing trees, ask if a guarantee is included and if it stipulates that the nursery must plant the tree.

In the Mid-Atlantic states, the ideal planting seasons for deciduous trees are fall and spring.

For the best-quality trees, shop when the nursery is well stocked. Trees are sold in containers, balled-and-burlapped, or bare-root. At this point, they are susceptible to stress, because

they are often stored above ground, have insufficient water, and can be adversely affected by wind, freezing temperatures, sun, and heat. All of these can affect the tree’s overall health.

### When buying a tree, also consider the following:

#### Choose a tree with an appealing overall form

When buying a tree, make sure its form is suited for the proposed site at the time of planting and as it matures.

#### Check to see if the tree is healthy

During the growing season, a tree should have a full canopy of leaves. Avoid trees with dead branches and branch tips, deteriorated and/or insect-damaged foliage. Also, check for wilt, and brown leaves.

#### Note the tree’s structure

Look for a full, evenly branched crown. Choose a tree with one strong central leader. A tree with a double leader or v-shaped crotch may break and be susceptible to disease. Check the branching habit. Would loss of a limb destroy its shape? Are branches crossing, rubbing, or growing too close together?

#### Examine the trunk

Is it damaged? Is the trunk straight and strong? Is the trunk discolored, swollen, scarred, or does it have sunken areas that could indicate poor health, disease, or damage? Check under the wrapping for wounds. Don’t accept a tree with unhealed pruning cuts, flush cuts, or wounds. The trunk should not move within the container or ball.

#### Check the roots

Examine the overall appearance of the root ball or container. If the roots are balled-and-burlapped, the ball should be firm and unbroken. A broken ball may indicate that the roots have been damaged. Shabbiness or damage to the ball could indicate poor care. Also, look for or feel for the roots. Girdling roots growing around the root ball or container could strangle the plant.

If the tree is small enough, remove it from the container to see if the roots are well established. Look for a fibrous root system rather than a pot-bound plant with circling roots. A pot-bound plant that’s been packaged too long is less vigorous and more prone to stress and shock during transplanting than a plant with a fibrous root system.

#### Is the root ball large enough for the trunk diameter?

Because each plant type develops a different root system, root ball size will vary. Deciduous trees tend to have larger root balls than conifers.

#### Before buying, step back and examine the entire tree

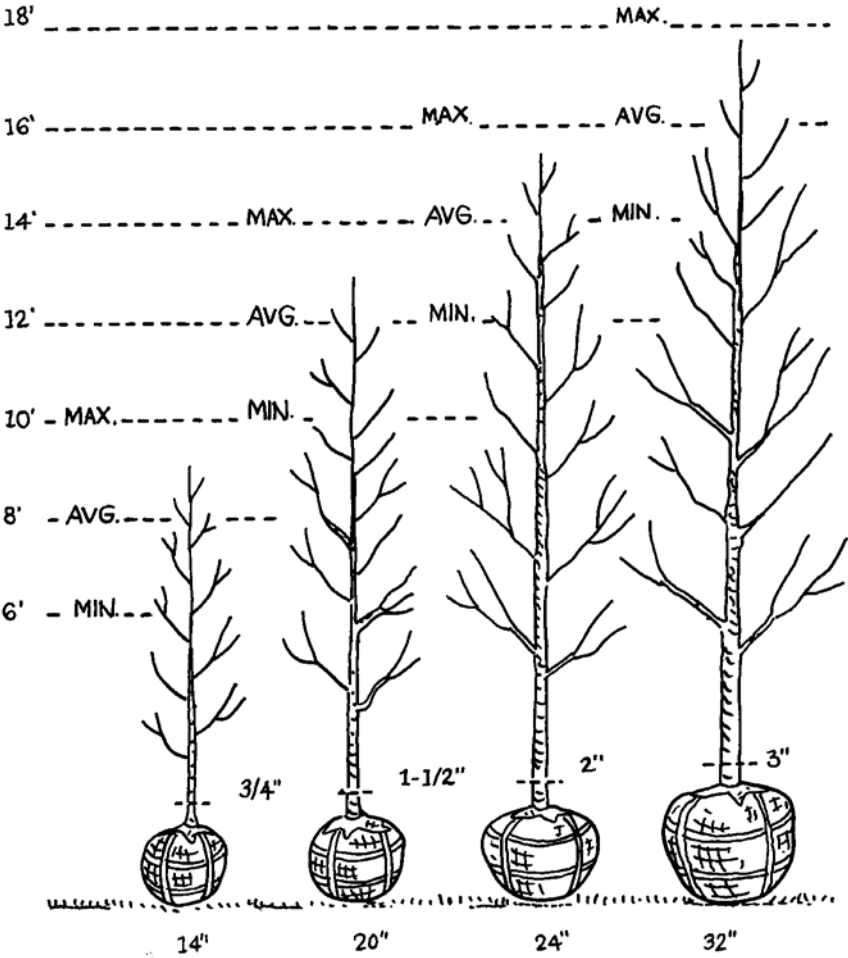
Has the plant been growing properly? Are the proportions correct?

# IV. TREE PLANTING

**Here are some basic standards:**

These are rough estimates. Check the American Nurseryman Standards Website for more species-specific guidelines:  
<http://www.americanhort.org/standard>.

A tree with a:	should be:	and have a root ball...
3/4" diameter trunk	6 - 10' tall	14" in diameter
1-1/2" diameter trunk	10 - 14' tall	20" (or more)
2" diameter trunk	12 - 16' tall	24" (or more)



**4. Prepare the site**

The law requires that all utility lines under the sidewalk be located and marked. This is to ensure your safety when digging and planting a tree. **Contact the PA One-Call System** (811, 1.800.242.1776, or [contact@pa1call.org](mailto:contact@pa1call.org)) at least a week before you intend to dig. The utility companies require three days notice, but it's best to allow for more time.

**When calling, have the following information ready:**

- House number, street, and specific location (front, side, etc.) of planting site
- The name of the nearest cross street
- The type of work you are doing, such as planting a tree along the sidewalk
- Who you are doing the work for (yourself, Ms./Mr. \_\_\_\_\_, etc.)
- The day you plan to begin digging

At the end of the call, you will be assigned a proof of notification number. Write it down.

Make sure that the PA One-Call System has sent a utilities representative out to mark the sidewalk. Colored arrows will be spray-painted on the sidewalk to show you where the utility is and the direction the pipes are going. Before cutting, mark on the sidewalk with chalk or white paint where you plan to cut and dig.

*Do not be afraid to go out on a limb...  
 That's where the fruit is.  
 - Anonymous*

## IV. TREE PLANTING

### Guidelines for locating street tree pits

Below are typical guidelines for siting and marking tree pits in Philadelphia. Check your local municipal requirements. Given the limitations of each site, tree pits should be as generous as possible to provide for the future growth of the tree.

**Note:** *In this handbook, references to tree pits apply to any ground area surrounding a planted tree.*

### Pit sizes

- Minimum: 3' x 3'
- Preferred: 4' x 4' for small trees, or 5' x 5' for larger trees
- Variations: 3' x 5' and others, including a property-wide planting strip

### Locations

- Not in front of steps, doorways, or alleyways
- 15' from light poles, street signs, utility poles, and fire hydrants
- 30' from stop signs and traffic lights
- 15'–30' from other trees (depending on mature size and form)
- 30' from street corners
- 5' from driveways
- 5' from manhole covers, storm drains, and main utility lines
- Edge of tree pit 18" minimum from residential utility lines (or soil must be hand dug)
- Edge of tree pit at least 3' from steps, stoops, or walls to allow 3' of unobstructed sidewalk (unless area is covered with tree grate or paving)

### Pavement Removal

After you have marked the sidewalk pit and contacted PA One-Call, use a concrete saw to make even, straight cuts. You can rent a saw from a tool rental company or the contractor you choose to do the work may provide one. Wear safety goggles and steel-tipped boots. Use a sledgehammer with caution to break up and remove the concrete.

If you encounter something that looks like a utility line while digging, call PA One-Call System again. The operator will then notify the appropriate utilities representatives.

### 5. Prepare the tree pit

Dig a sample hole to check drainage. Shovel about 12 inches of soil from a small area. Fill the hole with water. If the soil is loose, easy to dig, and drains well, it will be a good environment for healthy tree roots. If the water remains in the hole for an hour or more, the drainage is poor. There are two alternatives for a site with poor drainage: select another planting site or choose a tree tolerant of wet soils, such as red maple or baldcypress.

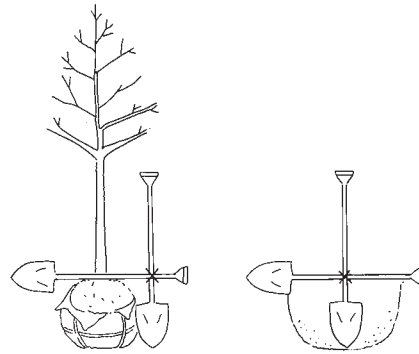
### 6. Locate the tree's root flare.

A tree's trunk usually flares out slightly, widening before it enters the soil. It is important to plant the tree with the root flare exposed. Note that often the graft line is mistaken for the root flare. To be sure it is the root flare, you should look for a flare AND the existence of the first woody roots. Do not assume the tree was at the proper depth at the nursery.

### 7. Dig the tree pit

To gauge the right depth and width, use a measuring stick or shovel to estimate the height of the rootball. Make sure to measure from the bottom of the rootball only to the root flare. (Some trees may have soil above the root flare that needs to be removed before planting.) When the planting hole is 2x width of root ball, roughen the sides and bottom with a pickaxe or shovel so the roots will more easily move out from the planting hole.

### Gauging hole depth & width



**Never leave an open pit unattended.** If you can't finish the job in one day, cover the pit with heavy plywood and mark the site with caution tape or signs. Remember that the sidewalk is a public right-of-way and safety should always come first.

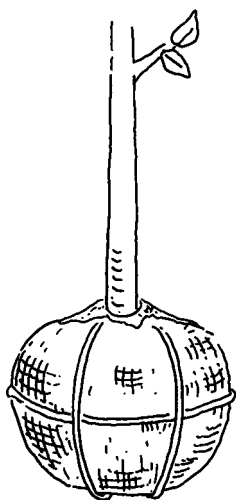
### Planting a balled-and-burlapped tree

Prepare the tree by removing all dead, broken, and rubbing branches as well as twine and labels. By laying the tree on its side, you can easily reach these branches, as well as any twine or tags in the branches. Pruning of healthy branches must be minimal at planting time.

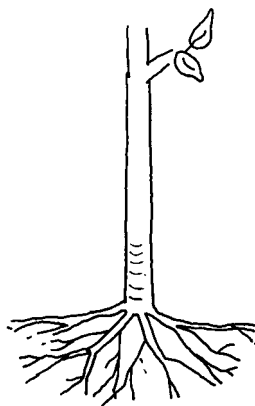
### Gently roll the tree into position by pushing and turning the rootball.

Don't handle a tree by the trunk; moving the tree around by the trunk may cause separation from the rootball. Consider which way the tree should face before putting it in the hole. Now carefully lower the rootball into the pit. Take care not to drop the tree. A sudden drop can fracture the rootball and break up the root system, causing tree injury and eventual death.

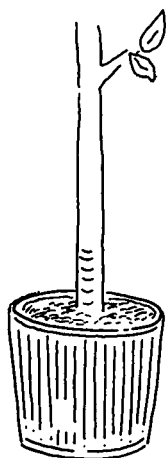
## IV. TREE PLANTING



balled-and-burlapped



bare-root



container-grown

### Prepare the rootball.

With the tree properly positioned remove at least the top half of the wire basket using bolt cutters. Untie the twine and burlap from the tree's trunk to expose the top half of the rootball. Natural fiber burlap will decompose. Fold down the burlap, cutting away excess fabric that might get in the way as you backfill with soil. Remove as much burlap as possible. Do not allow the burlap to be exposed above ground or it will wick water from the tree's roots.

Carefully cut and remove any plastic or synthetic materials from the rootball. Non-degradable materials will keep water from reaching roots and hinder root growth. The basket provides support to the rootball and must be left on while lowering the tree, but should be removed once it is permanently in place.

### Refill the planting pit.

Using the same soil that you removed from the pit, fill in and around the root ball. It is not generally recommended to add any soil amendments when backfilling. You don't want to create such a pleasing environment that the roots grow quickly then hit the hard pit wall, causing **girdling roots**. Just backfill with the same soil you originally dug out.

Gently press the soil down to prevent air pockets, but do not compact it. **Backfill** until the surrounding soil is level with the tree's root flare. Water gently to settle the soil and eliminate air pockets. Add soil and water again as necessary to have a level planting.

### Planting a bare-root tree

As with a balled-and-burlapped tree, dig the planting hole the same depth as the existing root system, so as not to bury it too deep. The hole should be twice as wide as the root system to allow for spreading. Bare-root trees are very susceptible to the elements, especially severe cold or heat. Roots can easily dry out and must be protected until planted; covering with mulch will help. Inspect the roots before putting the tree in the ground. Any torn roots should be pruned back to healthy tissue.

When digging the planting hole, create a firm, cone-shaped mound in the center of the planting hole, and spread the roots out evenly

around the mound. Backfill gently, working the soil around the roots to eliminate air pockets. When filled with soil, water and allow to settle. Finish backfilling and water again.

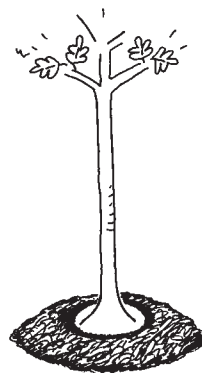
### Planting a container-grown tree

Container grown trees almost always have numerous encircling roots within the root ball, which must be corrected at planting. Use a serrated kitchen knife or axe to cut from the outer edge of the root ball toward the trunk in 4-6 places to sever and spread circling roots radially. Hand loosen smaller circling roots. The objective is to have roots spreading outward radially with some at the surface.

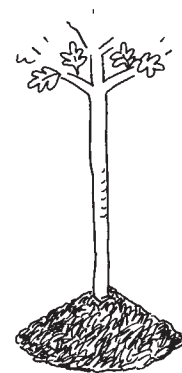
### Mulch for a healthy tree

Mulching helps a tree grow strong and healthy. Mulch retains moisture, reduces weeds, and helps keep lawn mowers and weed whackers away from tree trunks. It can also increase root growth by 10 times and may reduce soil compaction and increase root aeration. The organic matter breaks down into useful nutrients.

We follow the **3-3-3 method of mulching**: no more than three inches of mulch depth, at least three inches away from the trunk, and three feet wide if possible. The wider the mulch ring the greater the benefits in encouraging outward root growth. Use organic material such as wood chips, **composted** leaves, bark nuggets, or pine needles on the tree pit. Do not use plastic, stone, rubber, sawdust, or grass clippings. Place the mulch at least three inches from the trunk so as not to harbor moisture and insects that will harm the bark.



correct mulching



incorrect mulching



## IV. TREE PLANTING

### Optional staking for protection

Staking is optional although bare-root trees benefit from staking. It is useful to protect vulnerable transplants from vandalism and vehicular damage. Recent research indicates that un-staked trees grow into stronger, healthier, and more flexible mature trees than staked trees. If you stake, be sure to keep the ties loose so the sapling can sway in the breeze and won't be girdled.

### To stake:

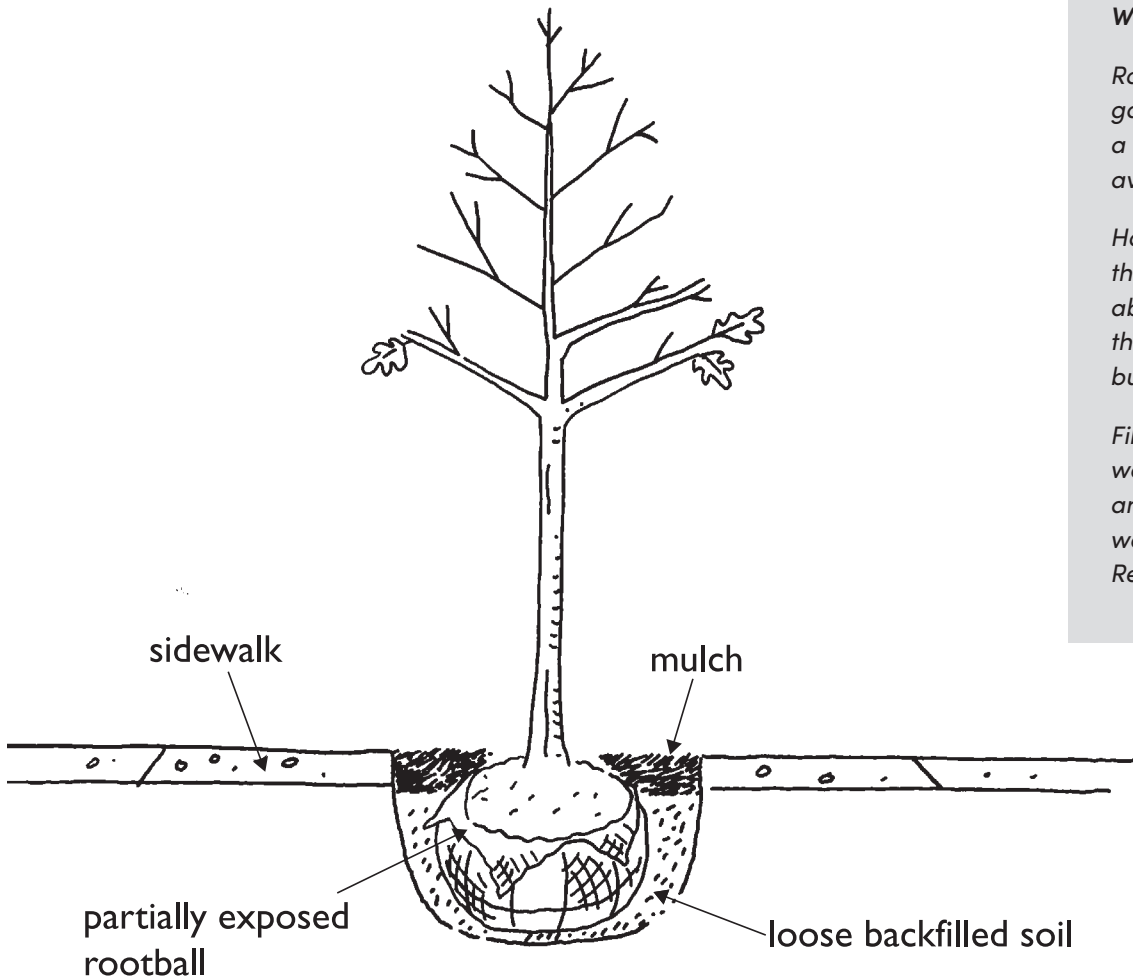
Two pieces of lumber (2" x 2" x 6') will support an average street tree. At planting time, drive stakes about 12 to 18 inches into the undisturbed soil at the pit's bottom.

Secure the tree trunk to the stakes with loose, flexible loops of non-abrasive material such as elastic or canvas webbing, rubber cording, or polyethylene tape. The tie material should support the tree loosely, allowing wind movement, which promotes a sturdy trunk and a strong root system. Never tie a knot against the trunk.

**Important:** Remove ties about one year after planting. The tree should be sturdy enough to stand on its own by then. Stakes can remain to provide protection.

**Watering:** Always water a newly planted tree thoroughly after planting.

## A Properly Planted Street Tree



### Make Your Own Watering Bucket

Round up a five-gallon plastic bucket, a hammer, and an average-sized nail.

Hammer the nail into the side of the bucket about an inch from the bottom. Place the bucket in the tree pit.

Fill the bucket with water. Pull out the nail and direct the trickle of water into the root zone. Refill as needed.

## Watering, Weeding, Cultivating, and More

### Water weekly and deeply

Each week during the growing season your tree should receive 15 to 20 gallons of water (more during a drought) in several deep watering sessions. To help the water seep slowly down to the roots, it's best to use a trickling hose, a Tree Gator, five-gallon bucket with small holes, or "Clark Park Water Buffalo" (described below.) Discontinue watering when the ground freezes. Start again in the spring, when tree buds swell and sprout new leaves.

### Weeding

Weeds and grass have very strong root systems that compete with trees for nutrients, water, and air in the soil. Removing weeds and grass will help tree roots flourish.

### Cultivating

Soil that is compacted by foot traffic or vehicles does not allow water or air to get to the tree's root system. Compressed soil makes it tough for tree roots to grow. Cultivating or loosening the top few inches of soil will give the roots better access to water and air.

### Mulching

After weeding and cultivating a tree pit, applying mulch can prolong the good benefits. Mulch conserves water, releases nutrients into the soil, controls weeds and grass, prevents soil compaction, and buffers the trunk from lawn mowers. PHS recommends the **3-3-3 Method of Mulching**. Apply a three-inch layer of organic mulch evenly around the tree, to a radius of three feet and keep the mulch three inches away from the trunk. Mulch volcanos are evil! We do not recommend dyed mulch.

### Keeping the tree pit clean

Weeds, litter, and debris may keep water and oxygen from reaching tree roots. Substances like motor oil, de-icing salt, detergents, urine, and soda injure trees.

### Protecting the tree

Bark is the most important part of a tree's protection. Erect barriers and install tree guards to keep cars, doors, dogs, deer,

bicycles, lawn mowers, and weed whackers from wounding tree trunks. Low, open fencing around a tree pit can protect the tree. Avoid building a solid masonry or wooden wall around the pit, which prevents rainwater from draining from the surrounding sidewalk and encourages adding soil which would cover the root flare.

### Amending soil

Amending the soil in tree pits is not recommended unless the entire planting area can be amended, as in trench plantings or containerized plantings. Amending the soil in a planting pit will help the tree initially, but when the roots reach the unamended soil, they will go no farther, as if hitting a wall.

### Fertilizing

Fertilizer is not tree food. It is more like a prescription drug. Fertilizing will not solve problems caused by inadequate sunlight or water, air pollution, plant diseases or insect attack. The young sapling, the mature healthy tree, the declining tree, or the tree with yellowing leaves all have different needs. If you feel your tree needs fertilizer, it is best to consult a professional.

There are three major nutrients for plant growth: nitrogen, phosphorus, and potassium. Nitrogen (N) is essential for leaf growth. Phosphorus (P) promotes flower and fruit production and root growth. Potassium (K) promotes root growth, increases disease resistance, and balances plant nutrients.

Studies show that much of the chemicals applied to the soil washes into our streams and sewers as **non-point source pollution**, without ever being taken up by tree roots. Always follow guidelines from a soil test.

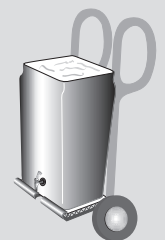
### Leaves into compost

Leaves make quick and easy compost. Chop into smaller pieces with the lawn mower and heap into a pile. Turn once or twice a month. The mix will be ready to use as a soil conditioner next spring and summer. Add the compost to the mulch layer - no more than 20%.

Most leaves when decomposed are alkaline; exceptions are pine needles, oak, and beech leaves, which are acidic and can be used on acid-loving plants such as evergreens and rhododendrons.

**Build Your Own Clark Park Water Buffalo**  
By Clark Park Tree Tender  
Lewis Mellman

- Purchase hand-truck, 35-gallon trash bin, lashing straps, and high-volume beer tap.
- Bolt a piece of 3/4-inch plywood to the tongue of the hand-truck.
- Cut a notch in plywood to expose tap.
- Nail two pieces of garden hose, split lengthwise, to front of plywood as a buffer to protect tree trunks.
- Strap on the trash container.
- Install the tap near the bottom of the container.
- Add water until container is half full.
- Travel from tree to tree, opening tap and watering so each tree gets 15 to 20 gallons.



# V. TREE CARE

## Pruning

Proper pruning of trees preserves their health and appearance and may prevent damage to human life and property. Pruning is done to control and direct growth, prevent structural problems, and maintain tree health.

### Minor and major tree pruning

**Minor tree pruning** is removing dead, damaged, diseased and crossing branches, as well as root suckers. Tree Tenders must have both feet firmly on the ground when pruning. Bypass hand pruners, pruning saws, and loppers are some of the common tools used for minor pruning.

**Major tree pruning** involves removing large branches from mature trees. Pruning tree branches beyond the reach of a pole pruner requires a professional, not a Tree Tender with a ladder. Major pruning should be done by an arborist certified by the International Society of Arboriculture.

Carefully evaluate the bids for major pruning or tree removal work; the least expensive estimate may cost more in the long run. Ask for credentials, insurance verification, and references. Your contractor should obtain a pruning permit from your municipality if required.

### Pruning Precautions

**Climbing a tree with spikes is not acceptable. This can harm the tree and spread disease.**

**Don't allow an arborist to top a tree. Topping (removing the top branches) weakens a tree.**

Clean all tools with 10% chlorine bleach solution, alcohol, or household disinfectant between each cut to avoid spreading disease and insects.

Before picking up the pruners or saw, evaluate the tree and site using the following guidelines:

### Reasons to prune

- Safety: to remove low limbs in the pedestrian right-of-way
- Appearance: to enhance tree shape or form; only advisable for young trees
- Health: to remove dead, diseased, and damaged branches

### When to prune

- Anytime for dead, diseased, and damaged branches (winter is a good time to check trees/locate problems)
- Late winter: before leaf buds open
- Fall to spring: when there are no leaves
- Midsummer: once new shoot growth becomes woody

### When not to prune

- Avoid pruning healthy branches just after new leaves emerge until they harden off in midsummer.
- Do not prune when a tree has been recently transplanted.
- Do not prune branches adjacent to energized power lines.

### What to prune

Always prune the 5Ds: dead, diseased, damaged, decayed and dying branches. Prune these branches anytime to prevent unwanted injuries and property damage, as well as maintain tree health. Any of the 5Ds may indicate disease or insect damage. Pruning will prevent disease from spreading throughout the tree and to neighboring trees.

Dead branches are brittle and brown, not green, under the bark. They have no green leaves in the summer and the buds are shriveled.

Damaged branches may be green and alive, but are broken, fractured, or stripped.

Diseased branches may be blackened, swollen, misshapen, have shriveled bark, mushrooms, cankers, galls, or dead leaves that indicate fungi or bacterial infection. Prune diseased limbs immediately to the closest healthy side branch or branch collar, the swollen area at the base of the branch.

Selectively removing water **sprouts** (thin upright branches within the canopy) or **suckers** that emerge at the tree base, can alter a tree's energy. They may reappear and require more pruning if cut, so it is best to twist them off when tiny and yank manually by hand. Current research indicates water sprouts make photosynthate used locally in the restoration process.

The weaker of any crossing or rubbing branches should be removed to the **branch collar**, the swollen area where trunk and branch tissues overlap. This area may contain chemical and physical properties that help prevent the spread of decay into the trunk, and should not be removed or nicked.

When more than one central, similarly sized branch competes as the main trunk, select the strongest, most central branch to be the main leader. Remove or shorten competing branches by one-half to one-third of their length.

Remove low-hanging branches (under six feet) and unsafe branches.

For a young tree with many branches, avoid pruning too much healthy wood at one time. Individual branches may be cut back by one-half to one-third in one year, then removed back to the branch collar the next year.

Notice branches with narrow unions. When the angle between the branch and the trunk is less than 20 degrees, this narrow branch attachment is weak. Branches may break due to heavy ice or high winds.

## How to prune

To prune a tree properly, consider the tree's natural growth habit. Tree branches grow from the trunk at a point known as the branch collar. Always prune to the branch collar and healthy wood, but do not nick the branch collar.

## Pruning tips

Evaluate first, prune second. Do not remove more than one quarter of the tree's living branches in one year.

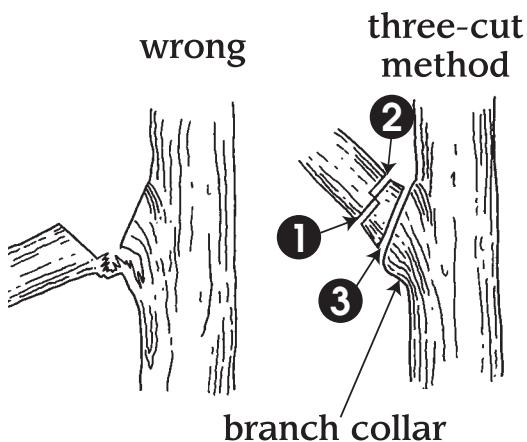
### Use a hand pruner to cut small branches

For branches one-half inch or smaller in diameter, bypass hand pruners will do the job. Cut on a diagonal, less than one-quarter inch above an outward facing bud or branch. Place the cutting blade next to the stem to make the closest, cleanest cut.

**Prune large branches with a hand saw using the three-cut method:** Make the first cut on the underside of the branch, several inches from the trunk. Cut upwards one third of the way through the branch (see 1 in diagram below). This upward cut will prevent the limb from ripping tree bark as it falls.

Start the second cut on the upper side of the limb. Saw through to the first cut. (See 2 in diagram.) This through-cut will remove the branch's weight.

Locate the branch collar or branch bark ridge close to the trunk. Carefully cut just beyond the collar. (See 3 in diagram.) The branch collar is the swollen area at the base of the branch. Do not cut into the branch collar; it provides a natural barrier against decay and speeds formation of a callous over the wound.

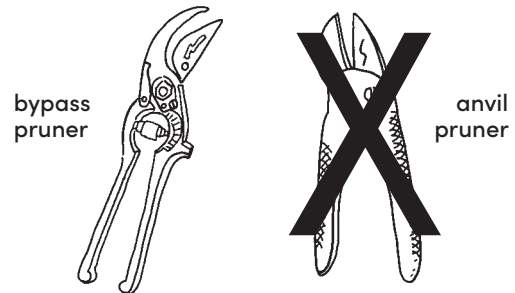


## Pruning equipment

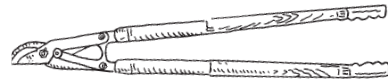
- Use the right tool for the job.
- Use sharp tools with disinfected blades.
- Long sleeves and long pants are encouraged.
- Wear a safety vest if near traffic

**Gloves (washable):** for protecting hands from scratches.

**Hand pruners:** for removing branches 1/2 inch or less in diameter. By-pass pruners are recommended because they provide a clean cut and do not damage woody stems. Anvil pruners are not recommended because they crush the woody tissue.



**Loppers (bypass only):** for removing branches 1/2 to 1-1/2 inches in diameter



**Folding saw:** for removing branches 1 inch or larger in diameter. Use only saws intended for tree pruning to avoid damaging branches.



**Alcohol or household disinfectant:** used to clean cutting blades or any pruning tool after cutting diseased branches.

**Goggles:** for protecting eyes from branches and sawdust when pruning over your head.

**Head protection:** such as a bicycle helmet or hard hat for overhead work.

**Metal snips/wire cutters:** for removing wires and straps.

**Hand cultivator or trowel:** for loosening soil in the tree pit.

**Rake, dustpan, and broom:** for cleaning the tree pit and sidewalk.

# V. TREE CARE

## Tool Care

Clean blades with 10% bleach solution, alcohol, or household disinfectant after every use. When pruning disease- and insect-infested branches, clean tools between each cut.

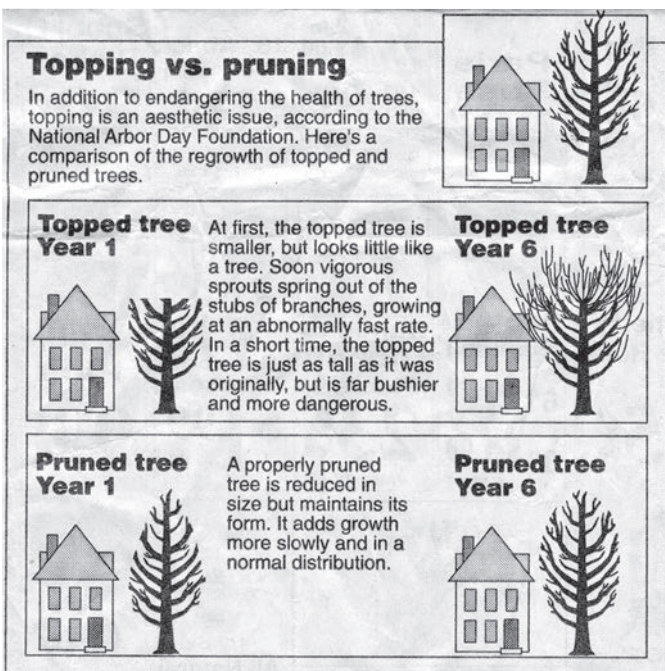
Sharpen blades periodically for sharp clean cuts. Healing occurs much quicker with clean cuts.

Oil to prevent rust.

Store in a safe, dry location out of the reach of children.

## Pruning safety

- Work when you're alert, not tired.
- Wear gloves, and wash both hands and gloves after the job.
- Only one person should prune a tree at a time. No one should be working beneath or above one another.
- Keep tools out of people's way; not on the sidewalk, the ground, or on cars. Sharp and pointy edges should be turned toward the ground.
- Keep tools sharp and clean. Before using a hand saw, check to be sure that the blade is secure, not loose. Glass cleaner with ammonia or a weak solution of bleach should be used to clean tools, especially when removing diseased branches.
- Keep hand pruners and folding saws in the locked position when they're not in use.
- Keep hands and arms away from all cutting edges.
- Always keep both feet firmly on the ground. Do not stand on a ladder or trash can, or climb a tree.
- Wear a hard hat (or bicycle helmet) and goggles when pruning overhead branches.
- Branches may fall when pruning. Make sure the area below is clear of people and objects, especially cars. Even a small branch could cause injury or damage property.
- Place each pruned branch carefully on the sidewalk. Cut up branches. Dispose of them by composting or bundling for trash pick-up.



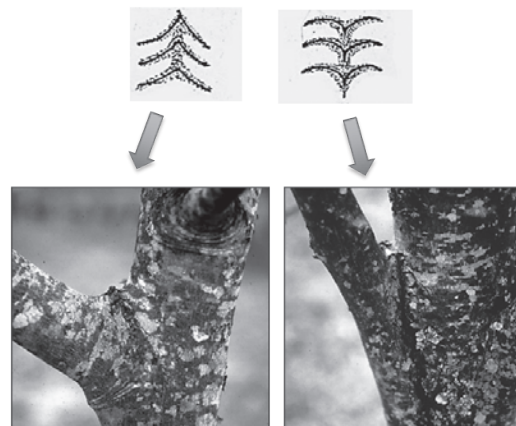
Source:  
Arbor Day  
Foundation

## Strong Branch

**Union** - wider angle; branch bark ridges upturned; no bark between stems

## Weak Branch

**Union** - narrow angle; branch bark ridges inrolled; bark between stems

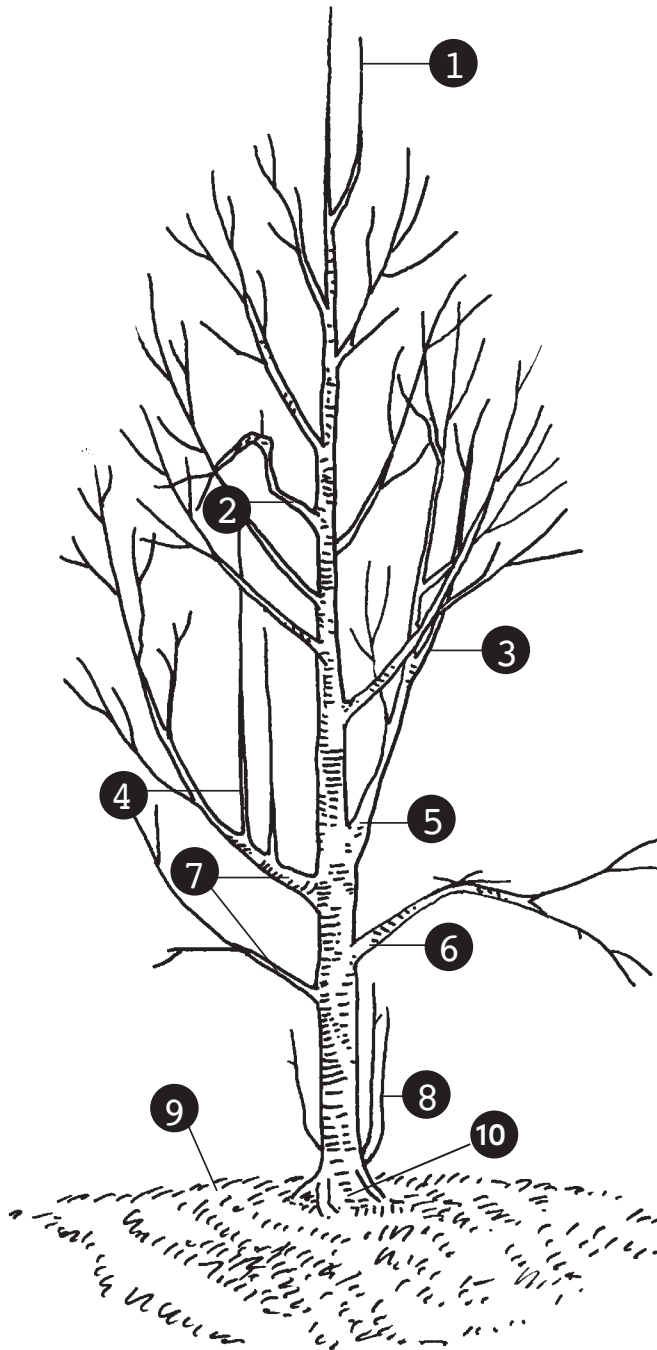


Strong

Weak



## Young Tree Pruning Priority



1. Prune a competing leader. Prune back the less vigorous branch to prevent the development of two leaders, which could cause the fork to split as the top grows larger.
2. Remove any crossing branch, which will affect the other branch's growth and create an undesirable form.
3. Although they are a sign of tree stress, water sprouts provide important leaf area for the tree and contribute to the tree's overall health. Never remove more than 1/3 at any one pruning session.
4. Remove any branch growing at a sharp or unusual angle. When this branch becomes larger it might rub another branch, split, or rot giving water a chance to collect at the fork.
5. Prune any broken or badly damaged branch.
6. Prune temporary branches over time. These branches should be removed during the 2nd to 4th years to provide clearance for vehicles and pedestrians.
7. Pinch and twist small suckers to remove. They take energy away from desirable growth.
8. Apply 3 inches of composted mulch at the base of the tree. Mulch should be kept 3 inches away from the trunk of the tree and, where possible, should be placed in a 3-foot ring around the tree.
9. If root flare is not visible, excavate soil/mulch in a 6 inch radius around the trunk. Cut any small roots that are girdling the trunk.

### Say No to Grass

Lawns of green grass aren't so "green" for the environment. In fact, fibrous tree roots under grass are stunted by the competition! Furthermore, to keep grass green requires huge amounts of water and pesticides and herbicides that pollute our water. That patch of green isn't necessary; there are plenty of alternatives. Xeriscaping, for example, uses native plants and mulch to limit the amount of water and maintenance needed in a garden. Habitat gardening has the added benefit of attracting wildlife to your space. My favorite solution is to replace your lawn with a meadow

- Adapted from Sarah Zielinski, SMITHSONIAN.COM

Illustration adapted from "Pruning Landscape Trees," Penn State College of Agricultural Sciences.

# V. TREE CARE

## Trees for the Birds

Planting the right species of tree can attract birds and other wildlife to your home. Each species of bird or other animal has a preferred habitat and specific dietary needs. By providing food and shelter, you can target the kind of wildlife you want to attract.

## Love Takes Root in Andean Village

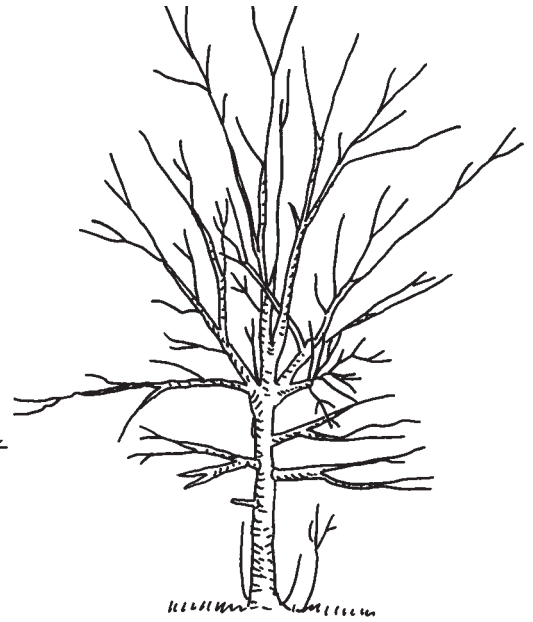
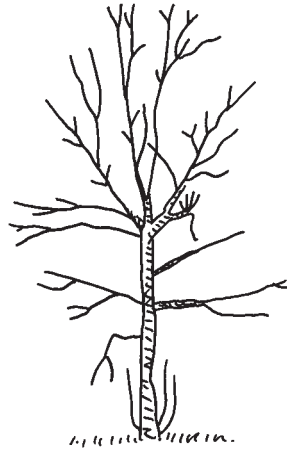
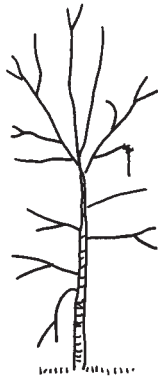
In most parts of the world, lovers say it with flowers. In the village of El Tambo in the Peruvian Andes, they say it through trees.

Inspired by a national drive to protect Peru's spectacular mountains and jungles, El Tambo requires couples to plant one or more saplings to obtain marriage certificates.

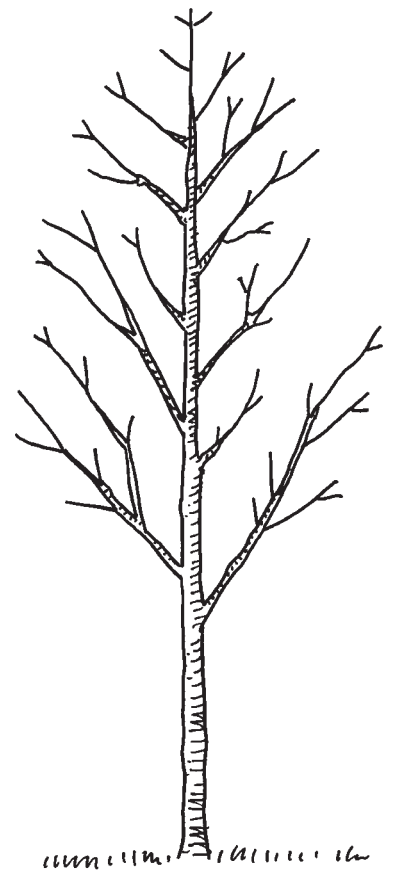
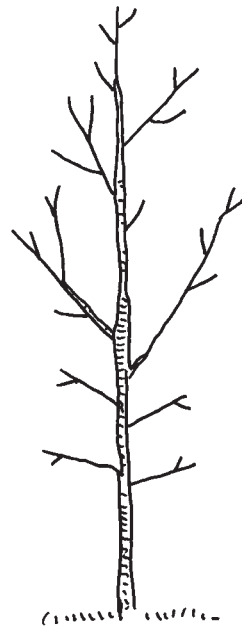
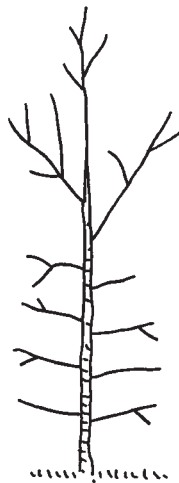
And for each baby that follows, birth certificates come at a similar cost. It adds new meaning to the term "Family Tree."

—Thomas J. Bradley,  
from the Philadelphia  
Inquirer Wire Service

### Never Pruned



### Properly Pruned



## Caring for Older Trees

A tree's life span varies according to species and environmental conditions, such as location, pollution, compaction, moisture, and nutrients. Urban street trees often grow under severe conditions: insects, disease, pollution, drought, soil compaction, and vandalism, to name a few. These conditions usually cause early decline.

Older trees have large, complex systems to maintain. They don't adapt well to environmental stresses. A tree's stored energy is taxed during emergencies like severe wounding, insect attack, and drought. Fighting diseases and insects diverts energy from food production and other life-sustaining processes. A mature tree, under stress, also sheds leaves and branches to conserve energy. Repeated stresses push trees into decline.

Aging is natural, but Tree Tenders can address some environmental conditions that accelerate the process. Older tree populations benefit from regular inspections of branches, trunk, foliage, and soil.

### Monitor for damage

Tree Tenders can monitor for obvious damage, injury, and disease in older trees. Leaf-off season, in late fall and winter, is the best time to see structural defects. Leaf-on season is the time to evaluate conditions and locate dead branches.

Watch for excessive branch loss and for mushroom growth on the tree. These are signs of internal decay. Be especially vigilant in pruning practices if tree branches overhang walkways and buildings. Tall trees, which are more likely to cause serious damage, should be monitored closely for internal decay. [See "Tree Risks" and "Common Tree Problems" to help evaluate a tree's condition.]

### Professional services

If you're in doubt about the seriousness of a tree problem, it's best to consult a tree care professional. Timely diagnosis can prevent costly removal or replacement. Every three years, older trees should be evaluated by a professional arborist for conditions such as: storm damage, weak limbs, diseases and other symptoms.

To locate a certified arborist near you, consult the website of the International Society of Arboriculture at [treesaregood.com](http://treesaregood.com).

### Older Tree Care

#### **Tree Tenders can help mature trees by:**

- Mulching to inhibit soil compaction, increase moisture retention, reduce soil erosion, improve soil condition, and protect surface roots.

- Pruning only dead, diseased, and damaged branches. Leave living branches with healthy, green leaves to produce food.
- Monitoring regularly for pests and diseases, so that you can control small infestations before they become serious problems.
- Watering trees according to the species' needs, tree location, weather conditions, and time of year. If in doubt, water regularly and in large quantities during the growing season, especially when the soil is dry below the surface.
- Mulch and compost release natural nutrients into the soil gradually the way Nature intended. Chemical fertilizers should only be applied according to soil test results. Follow fertilizing instructions closely and apply only to wet soil. Improper application can be harmful.

## Dead Trees

Some trees die because of car crashes, vandalism, bulldozers, lawn mowers, and weed whackers. Others die from less obvious insults: insufficient water, small tree pits, compacted soil, de-icing salts, air pollution, tight staking ties, improper pruning (including topping), and road or sidewalk work that accidentally cuts the roots.

The symptoms of stress may take years to show. Drought and excessive heat will injure healthy trees and will kill trees already under stress from old age, physical damage, disease, or insect infestation.

Insects stress trees, but are often not the cause of tree death. Many insects and diseases are opportunistic; they will take advantage of a tree weakened already by another stress. For example, during prolonged dry spells, aphids will attack newly emerging growth. Commonly it's not one stress that will kill the tree, but a combination of many unchecked stresses that together cause death.

Investigate the dead tree. Sometimes only a professional arborist can tell the cause of death. Tree Tenders can do some deduction, too. Is there evidence of something obvious like a wounded trunk, recent construction, decline of surrounding trees, or fungus growth? Did the tree die overnight?

Check the tree base. Gas leaks (which emit an odor) in the sidewalk can cause a fully leafed tree to turn completely brown and crisp in less than 24 hours. If you suspect a gas leak, call your gas company immediately. Lightning strikes can cause a similar death.

## V. TREE CARE

### Tree Removal

It's best to remove a dead tree. Homeowners are liable for damage caused by falling limbs. Many municipalities require a removal permit and are willing to help with the permit process.

With a permit, a property owner may remove a small tree (less than 2 1/2 to 3 inches in diameter). For anything larger, call a professionally certified **arborist** ([www.treesaregood.com](http://www.treesaregood.com)) with insurance. Make sure the arborist removes or grinds the stump to a depth of at least 2 feet if you want to replace a tree in the same pit.

If the tree died of a disease, do not replace it with the same or related species. Whatever killed the first tree may kill the second, too. An arborist can recommend tree species acceptable for a particular location, especially if the old tree died from environmental factors.

If you decide not to replace a removed tree, you are responsible for filling in the pit, either with pavers or concrete level with the sidewalk.

### Tree Risks

Trees can be risky to people as well as property, so check street trees for risky conditions before problems occur. Common potential tree risks are listed below. Deal with problems early by calling a certified arborist or tree care professional. [Consult Appendix: "Tree Care Professionals," for more information.]

#### Potentially risky conditions:

**Branch loss.** Falling branches may indicate a tree in distress and may cause injury to people, property, and other branches within the tree.

**Canker.** This wounding occurs on surface areas of dead bark and cambium, caused by fungi, weather, insects, and mechanical damage that may penetrate and weaken underlying wood.

**Cavities or hollows in trunk or branches.** A tree with little or no healthy woody tissue inside is vulnerable to wind damage, insect infestation, and the spread of decay.

**Cracks** may appear in several ways, as a fissure, wood separation, and/or deep split in wood or bark. These are all signs that a tree may be unhealthy or in failing condition.

**V-crotch crack.** Two competing leaders, joined at a narrow angle, creates a weak joint that can enlarge and cause tree sections to fall suddenly.

**Decay.** This is evident in old wounds and occurs where sloppy pruning cuts have been made. Decomposing woody tissue is susceptible to insects and diseases and generally weakens the tree.

**Fungus from decay.** Fungal decomposition of woody tissue (rotting wood) reduces the tree's structural soundness and stability. Fungus or mushrooms appear on the tree trunk or roots when decay has already progressed throughout the tree body or roots. This indicates a serious potential for tree decline. The trunk of the tree may be so infested with fungus colonies that there will be little support, causing the tree to fall.

**Gall (burl).** These swollen masses of abnormal tissue may be caused by insects, fungi, or bacteria.

**Leaning tree.** If the lean is a result of the tree seeking light, it might not be problematic. If the roots are being lifted out of the ground due to the lean, the potential for tree failure is high.

**Lightning scar.** An injured tree is a weakened tree. Wounds provide entry for pests and diseases.

**Storm damage.** Look for broken limbs that could fall any time. Make clean cuts where branches have snapped off.

**A tree too large for the site interferes with overhead wires.** During a storm, broken branches could interrupt power and telephone lines. Report to the power company.

### Common Tree Problems

Insects and diseases, as well as mechanical and environmental damage, are common problems for trees, especially in a city. In hot summer weather, aphids, multiplying by the hundredfold, can cover a stand of trees.

To help keep trees healthy, the first line of defense is using effective horticultural practices to discourage pests and diseases. Homemade concoctions and organic products are alternatives to toxic pesticides. Integrated Pest Management is an environmental approach to pest control. [See sections on "Diseases and Remedies" and "Insects and Controls" for details.]

#### Environmental damage

**Salt.** Used to melt icy sidewalks and streets, salt (sodium chloride) can accumulate to toxic levels in the soil causing excessive drying of foliage and roots, stunting growth, killing emerging buds, and causing early leaf drop. Washing the foliage and flooding the soil several times with water helps wash away salts. Applying gypsum neutralizes salt-damaged soil.

Calcium chloride and magnesium chloride effectively thaw ice, and are better for the environment. Applying sand, cinders or light gravel for traction are other alternatives.

**Urine.** Irregular white, yellow, or brown spots in plants around trees may be caused by animal urine. Cats like newly cultivated soil. Once a dog or cat has marked a spot, it is difficult to control further urination there. Animal repellent products

such as dried blood, mothballs, and chemicals are available but none guarantees results. Apply chemicals according to directions; reapply as needed, especially after rain.

To revitalize the tree site, gently remove dead plants if any. Apply a few handfuls of compost or mushroom soil to counteract the urine. Cultivate the amendments gently into the soil. Water thoroughly to dilute urine and blend in the amendments. Fencing the planting area may control dogs and deer, but not cats.

**Drought.** Plant cells collapse when they don't get water. In a water-stressed tree, the leaves often look wilted, puckered, flat, and flaccid. A series of deep waterings will likely revitalize a young tree. Brown leaf edges may also indicate water stress. In prolonged drought, tree leaves wilt, turn brown, shrivel, and fall. In this case, the tree may go prematurely dormant. Drought prevention is the best approach. Water plants regularly. Apply mulch to conserve moisture and control weeds.

**Mechanical damage.** Lawn mowers and weed whackers are often the "serial killers" of trees. Cuts and scrapes to the bark and cambium weaken and may eventually kill a tree. Damaged bark allows insects and diseases into the woody tissue. Damaged cambium can hinder and even stop food and water transport.

**Prevention is best.** Extend the tree pit and apply a mulch layer, putting the tree beyond the lawn mower or weed whacker's reach. If the damage is done, remove rough bark edges with a sharp, clean, disinfected knife. Keep area dry and free of insects, too. Using tar or paint is not recommended for covering the wound.

## Preventing Diseases and Pests

Plant diseases, caused by organisms such as bacteria, fungi, and viruses, are always present and waiting for a susceptible host. Stressed or damaged trees are easy targets. Insect infestations weaken plants, which is why early detection and treatment are important. [The sections, "Diseases and Remedies," and "Insects and Controls," include organic treatments that are more effective in the early stages of disease or insect problems.]

### Prevention

**Prevention is the best cure. Good planning and thoughtful maintenance can help prevent problems from starting.**

- Select trees appropriate for existing light, moisture, soil conditions, and environmental factors.
- Use different, disease-resistant cultivars if one tree species has contracted diseases in the past. Do not plant the same species in that site.

- Be gentle. Diseases look for plants that are injured or easily affected. Try not to bruise or break plant material when transplanting or doing tree maintenance. A leaf or stem injury gives disease a way to enter the plant.
- Good air circulation can help reduce the incidence of diseases such as mildew and anthracnose.
- Water is vital to plant survival but the droplets can spread disease from tree to tree. Direct water onto soil rather than foliage. Water early in the day so the moisture dries before nightfall, depriving fungi of their preferred warm and moist environment.

Pests can be a nuisance or a very serious problem. Before calling for professional service, ask yourself:

1. Have you properly identified the pest? Do you know exactly what you're battling? Are you sure it's harmful and not a beneficial insect?
2. Have you tried other control methods such as handpicking, hosing, or scrubbing with soapy water to dislodge the pests?
3. Is the damage severe enough to require professional service? A few leaf holes or bug sightings are not reasons to spray.

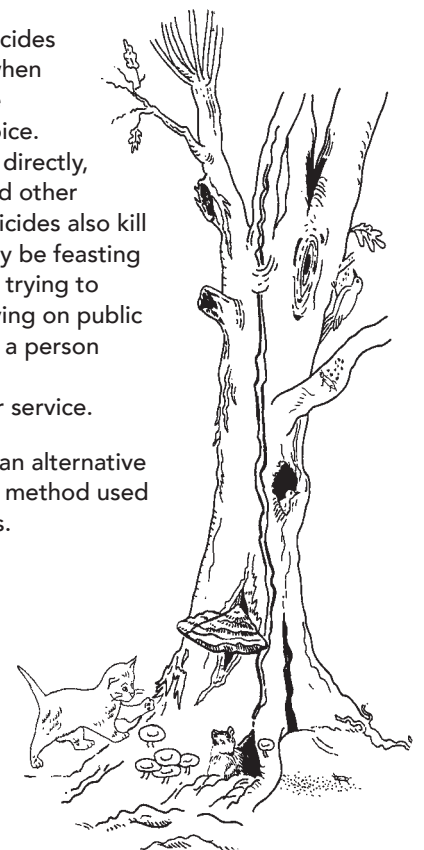
### Pesticides

Toxic chemicals and pesticides are only recommended when infestations are so severe that there is no other choice. Pesticides often kill birds directly, or through the insects and other things that they eat. Pesticides also kill beneficial insects that may be feasting on the same pests you're trying to eliminate. Pesticide spraying on public land can only be done by a person certified by the state. Consult a professional for service.

Dormant oil treatment is an alternative and is a less toxic control method used by tree care professionals.

### To Reduce Diseases and Pests

**Weed** tree pits regularly to keep insects from nesting in the weeds. Remove infested or diseased plants and fallen leaves as soon as possible.





## V. TREE CARE

Weeding and grass removal also encourage tree growth by reducing competition for nutrients and water.

**Prune, remove, and destroy** infected branches. Unsanitized pruning tools spread diseases and insects, so disinfect saws and pruners between each and every cut. Use alcohol, household disinfectant, or 10% chlorine bleach solution.

**Mulch** following the 3-3-3 Rule (see Mulching, Page 27)) for general tree health.

**Encourage birds**, which eat insects, to nest by feeding them during the winter. Teach children not to chase or harm birds.

**Protect young trees** from deer browsing and/or antler rubbing using plastic mesh tree bark protector. A chicken wire fence around the mulch ring is also effective.

### Anthracnose

**Symptoms:** Vary. Generally, sunken, circular or irregular lesions surrounded by a pale outline develop on leaves and stems. Cankering of twigs can occur. The disease attacks new growth.

**Cause:** Airborne fungus. Wet weather and high humidity help spread the disease.

**Controls:** Remove infected debris in fall when weather is dry. Dispose of properly and do not add to compost piles. Provide good air circulation. Treat with organic fungicide.

**Host plants:** Ash, elm, London plane tree, maple, sycamore, walnut, and dogwood.

**Canker** (Group of stem diseases that range from single-season to long-term infection)

**Symptoms:** Dead bark areas and sunken or swollen lesions on branches and trunks.

One-season (annual) types will recover and form a callous. Long-term (perennial) types may girdle and kill branches and trees.

**Cause:** Fungus, frost, sun-scald.

**Controls:** Prune and destroy infected twigs, leaves, and branches. Disinfect saws and pruners between each cut.

**Host plants:** Japanese pagoda tree gets twig blight from *Nectria canker*. London plane tree is susceptible to canker stain, which is a fungal cousin of Dutch elm disease.

### Fireblight

**Symptoms:** Leaves, stems, and flowers turn brown or black (resembling fire damage), shrivel, turn crispy or limp, and die. If damaged or dead leaves stay on branches, the whole tree may die.

**Cause:** Bacteria *Erwinia amylovora* produced from cankers, and carried by wind, rain, and insects. Bacteria enter through the growing tips and may travel to roots, killing tree.

**Controls:** Prune two feet below diseased area. Dip saw blade in 10% chlorine bleach, isopropyl alcohol, or disinfectant between each cut.

Prune away cankers before late spring when they are active.

**Host plants:** Callery pear, crabapple, hawthorn.

### Powdery Mildew

**Symptoms:** White powder on leaves.

**Cause:** Fungi thrive in cool, hot, or humid conditions. Seldom fatal.

**Controls:** Grow resistant varieties. Provide good sun exposure and air circulation. Treat with a fungicide or simply tolerate the mildew.

**Host plants:** English oak, London plane tree, crabapple.

### Galls

**Symptoms:** Swollen, tumor-like growths on trunk, branches, roots, or leaves. Fungal gall infects American elm, maple, oak.

**Cause:** Crown gall and some canker galls are caused by bacteria. Insect-caused galls develop from midges, mites, and wasps.

**Controls:** Prune and destroy galls and diseased or damaged growth.

**Host plants:** birch, cherry, crabapple, maple, oak, various conifers.

### Oak Wilt:

**Symptoms:** : Leaves turn dull green or bronze, appear water-soaked, wilt, and then turn yellow or brown from the tip and outer edges toward the midrib and base. Wilting leaves typically curl around the midrib. Symptoms quickly appear throughout the crown.

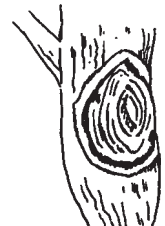
**Cause:** Nonnative fungus that clogs the xylem of oak trees and eventually kills most infected trees. Oak bark beetles and infected tools transmit the fungus from tree to tree.

**Controls:** No known controls; maintain healthy trees through prevention and early detection and prompt removal of dead or dying trees.

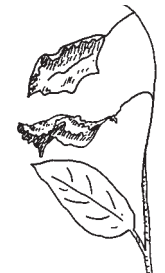
**Host plants:** All species of oaks



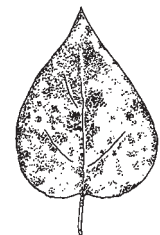
Anthracnose



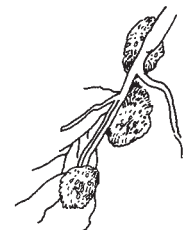
Canker



Fireblight



Powdery Mildew



Galls



Oak Wilt

## Insects and Controls

### Aphid

**Adult:** Approx. 1/8-inch long, soft-bodied, pear-shaped. Winged and wingless. Colors include green, pink, black, dusty gray, translucent; white fluffy coating.

**Life cycle:** Eggs overwinter on woody stems. Colonies develop quickly. Winged forms appear when they become crowded. Females can give birth to live nymphs without mating. Nymphs mature in one to two weeks.

**Feeding habits:** Sucking can damage foliage and cause leaf, bud, and flower distortion. Aphids secrete honeydew that supports sooty mold on leaves and fruit.

**Controls:** Power hose young trees. Spritz young, recently planted trees with a soapy solution of grated brown soap (Fels Naptha) and warm water. Spray frequently with insecticidal soap to kill on direct contact. For mature trees, contact a tree care professional.

**Susceptible trees:** linden, tulip poplar.

### Asian Longhorn Beetle

**Life cycle:** One generation per year. Adults are active from June to October. Adults emerge by cutting a 3/8-inch hole from the cambium layer through the bark.

**Feeding habits:** Adults eat twigs. Most severe damage is caused by larva that feeds on the cambium tissue.

**Controls:** Cut down tree, remove, and burn.

**Susceptible trees:** maple, elm, willow, poplar, horse chestnut

### Bagworm

**Life cycle:** The bagworm overwinters as eggs within a bag-like structure. The insect spends most of its life within the well-camouflaged bag. Eggs hatch from May to June, releasing feeding larvae.

**Feeding habits:** Bagworm caterpillars eat tree foliage. As a result, the tree will have a ragged appearance. In cases where there is heavy infestation, defoliation may occur.

**Controls:** Handpick bagworms in winter. Cut away with a knife to avoid leaving a girdling band of silk on the tree.

**Susceptible trees:** conifers.

### Eastern Tent Caterpillar

**Adult:** Two inches, reddish-brown with stripes on wings. Shiny, hard eggs are laid in rings around twigs. Larvae are black with white stripes, and hairy with brown and yellow dots.

**Life cycle:** One generation per year.

**Feeding habits:** Larvae live in tents made in forks or crotches of trees.

**Controls:** Remove tents from infested twigs as soon as they appear.

**Susceptible trees:** apple, crabapple, cherry.

### Emerald Ash Borer

**Adult:** Slender, 1/2 inch long and generally larger and a brighter green than the native North American species. Adults are usually bronze or golden green overall, with darker, metallic, emerald green wing covers.

**Life cycle:** Larvae, white to cream-colored, reach a length of 1 to 1 1/4 inches. Larvae have a 10-segmented abdomen, with a brown head and a pair of brown, pincer-like appendages on the last segment. Adults leave a D-shaped exit hole when they emerge in spring.

**Feeding habits:** Larvae feed in the cambium between the bark and wood. They produce galleries that eventually girdle and kill the branches and entire tree.

**Controls:** Quarantine. Destroy trees. Firewood cannot be removed from infested areas.

**Susceptible trees:** ash, and white fringe tree.

### Lacebug

**Adult:** Oval or rectangular, 1/8 inch, lacy-patterned body. Nymph: Dark body with spines.

**Feeding habits:** Adults and nymphs found on underside of leaf. They suck juices from leaves and leave dark, varnish-like excrement.

Cause chlorotic flecks, giving the leaves a speckled and blotchy appearance. By August, leaves may have no food-producing tissue left.

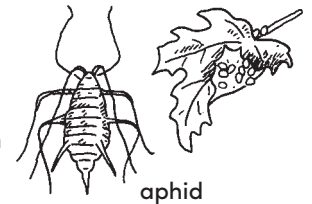
**Controls:** Consult a tree care professional.

**Susceptible trees:** London plane tree, sycamore, elm, hawthorn, oak, birch, alder.

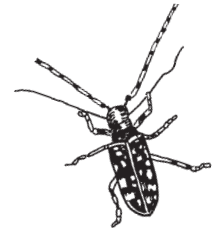
### Leafhopper

**Adult:** Wedge-shaped, 1/10 to 1/2 inch long, green or brown. Jumps rapidly when disturbed.

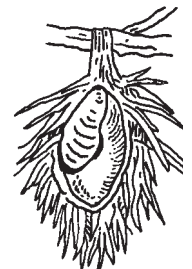
**Feeding habits:** Sucks juices from stems and plants. Causes tipburn and yellowed, curled leaves. Heavy populations can cause early



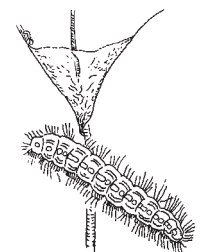
aphid



asian longhorn beetle



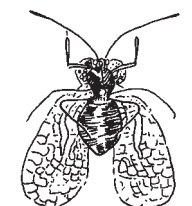
bagworm



eastern tent caterpillar



emerald ash borer

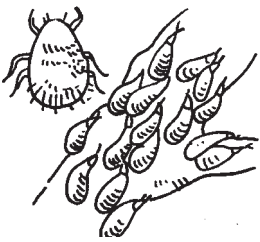


lacebug

## V. TREE CARE



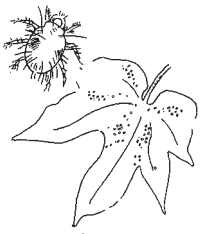
leafhopper



hard scale



soft scale



spider mite



spotted lanternfly

defoliation. Spreads viral diseases.

**Controls:** Wash with strong, stiff sprays of water and then spray with insecticidal soap or pyrethrin. For heavy infestations, consult a tree care professional.

**Susceptible trees:** honey locust.

### Hard Scale (Oystershell Scale)

**Adult:** Circular or oval-shaped hard bumps less than 1/10 inch in diameter, sometimes dimpled. Colors include gray, yellow, white, and reddish or purplish brown. All secrete a waxy armor in a circular or oyster-shell pattern.

**Life cycle:** One to two generations per year. Nymphs and eggs overwinter in bark.

**Feeding habits:** Sucks plant juices and some can inject toxic saliva into plant tissue.

**Controls:** Prune. Remove infected branches from site. Clean pruning tools with 10% chlorine bleach solution. Dormant oil sprays on eggs and nymphs.

**Susceptible trees:** tulip poplar, magnolia sweet gum, fruit trees.

### Soft Scale (Black Scale, Brown Soft Scale, Cottony Maple Scale, Cottony Cushion Scale, Hemispherical Scale)

**Females:** Oval or round, soft, legless bumps, 1/10 to 1/5 inch in diameter.

**Males:** Minute, yellow-winged insects. Nymphs resemble tiny mealybugs. Black, brown, white, reddish brown.

**Life cycle:** One to two generations per year. Nymphs or eggs overwinter in bark.

**Feeding habits:** Sucks plant juices and some can inject toxic saliva into plant tissues.

**Controls:** Prune. Remove infected branches from site. Clean pruning tools with 10% chlorine bleach solution. Dormant oil sprays smother eggs and nymphs. For light infestations, scrub away scale with a brush dipped in warm water and brown soap.

**Susceptible trees:** maple, oak, hemlock, holly.

### Spider Mite

**Adult:** Wingless, microscopic, reddish-brown, yellow, or pale green spider-like. Most spin fine webs.

**Life cycle:** Adults and eggs emerge in spring after overwintering in crevices and debris. Mature in several days. Many generations per season.

**Feeding habits:** Suck juice from underside of plant leaves. Leaves become speckled, yellowish, and drop. When severely damaged, leaves turn bronze, white, or yellow with brown edges. Webs may cover leaves and growing tips.

**Controls:** Very difficult to control. Hose plants daily with strong streams of water. Spray often with insecticidal soap.

**Susceptible trees:** conifers (such as fir, spruce, hemlock); all trees during drought

### Spotted Lanternfly

**Adult:** Approx. 1" long, invasive planthopper. Forewings grey/black spots with grey tips. Hind wings- red and black patches. Abdomen yellow & black.

**Life Cycle:** Lays egg masses of 30-50 eggs with grey mud-like covering Sept. thru Dec. on any flat surface, natural or man-made. Eggs hatch in spring to nymphs (black with white spots, that turn red).

**Feeding Habits:** Nymphs and adults suck sap from stems and leaves, causing weeping wounds that attract wasps and ants.

**Controls:** Quarantine area. Scrape off egg masses, double bag them and throw them away.

**Susceptible trees:** Ailanthus, cultivated grapes, fruit trees, and hardwood species.

### Dispose of Infested Branches Properly

- Put in black plastic bag
- Leave in sun
- Then put out with trash



### Good Street Trees to Plant

The Tree Tenders program recommends several varieties for street tree planting. Besides being attractive, they're able to withstand urban stresses. A good street tree has a straight trunk and a uniform branching habit; thrives in poor, alkaline and compacted soil; tolerates drought, air pollution and salt; and can withstand moderate mechanical injury.

The recommended trees are divided into two categories. Small, underwire trees are short enough to be planted safely under utility wires, particularly high voltage electrical lines which will require severe pruning of larger species. Large trees are tall and require larger planting pits.

There are many more species that are appropriate for street tree planting. Other species are particularly good for parks, stormwater management practices, riparian restoration or reforestation.

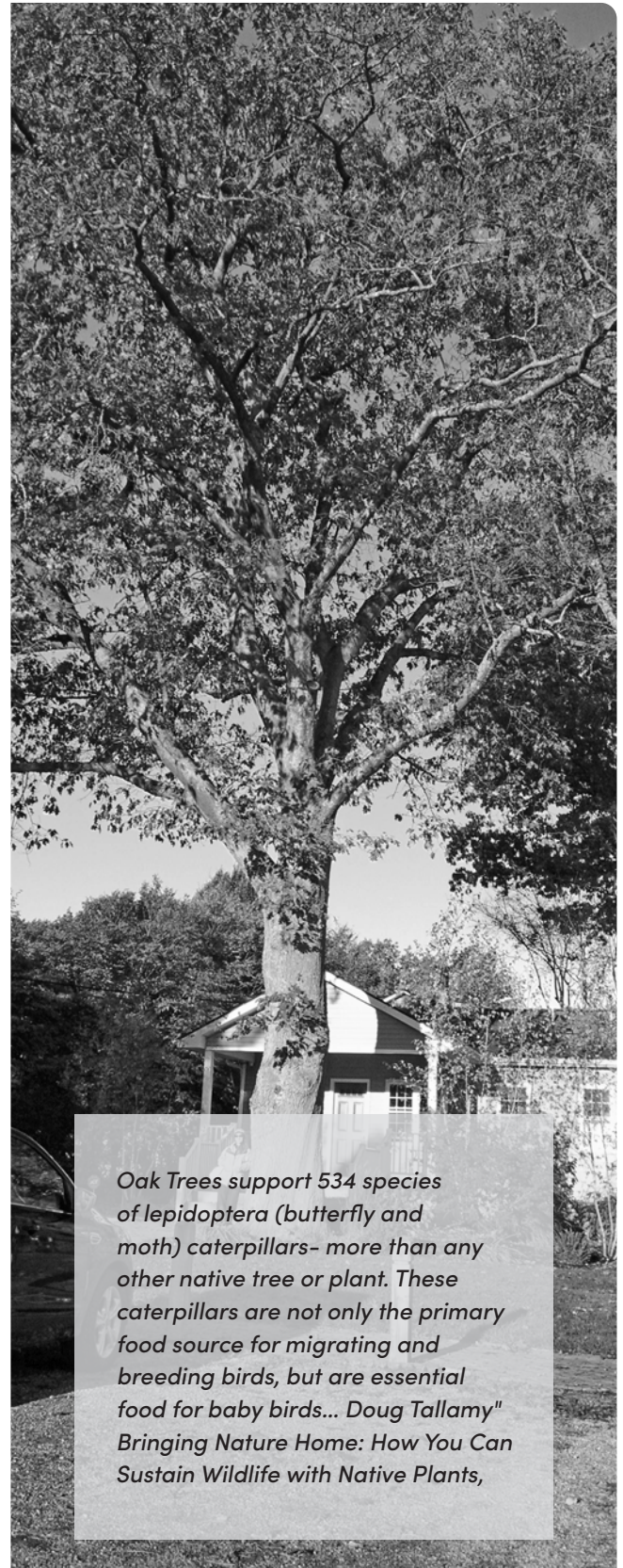
For recommendations, consult your tree commission, agricultural extension, or references listed in the Appendix: For recommendations, consult your tree commission, extension office or in the appendix Tree Philly (pg 53), Arbor Day Foundation or Missouri Botanical Garden (pg 52).

#### Botanical Names

All plants, including trees, are classified into Latin botanical names. A plant's full botanical name may include family, genus, specific epithet, subspecies, variety and form, and 'cultivar.' It is useful for a Tree Tender to at least know the tree's genus, specific epithet and 'cultivar,' where applicable, as well as the common name. Using the botanical name when purchasing trees will help ensure that you and the nursery staff are referring to the same tree.

#### Examples:

- *Acer rubrum*  
*Acer* = genus  
*rubrum* = specific epithet  
*Acer rubrum* = species name
- *Acer x freemanii* 'Autumn Blaze'  
*Acer* = genus  
*x* = indicates a hybrid (cross between two related species)  
*freemanii* = name given to the hybrid (Red Maple x Silver Maple, in this case)  
'Autumn Blaze' = cultivar name (bred or cloned to retain desired characteristics)



*Oak Trees support 534 species of lepidoptera (butterfly and moth) caterpillars- more than any other native tree or plant. These caterpillars are not only the primary food source for migrating and breeding birds, but are essential food for baby birds... Doug Tallamy" Bringing Nature Home: How You Can Sustain Wildlife with Native Plants,*

## VI. RECOMMENDED TREES

### Small trees, underwire 15 to 35 feet:

**CRABAPPLE** (*Malus sp.*) 'Spring Snow'

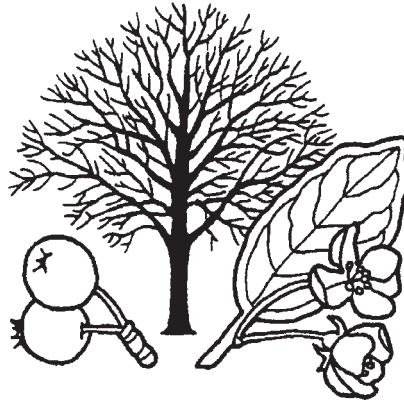
**Height:** 25 to 30 feet

**Width:** 20 to 30 feet

**Form:** Round

**Leaf:** Simple, elliptic, serrate, alternate

- Fruitless; produces little litter
- Full sun
- Tolerates many soil types
- Plant in spring
- Prune lower branches in the first few years for the safety of pedestrians and cars
- Showy, fragrant flowers in spring



CRABAPPLE

**HAWTHORN** (*Crataegus viridis*)

'Winter King'

**Height:** 25 to 30 feet

**Width:** 20 to 30 feet

**Form:** Ovate to vase-like

**Leaf:** Simple, doubly-serrate, alternate

- White flowers in spring
- Red drupe fruits in fall
- Purple to scarlet fall foliage
- Thorny branches
- Tolerates adverse conditions, wet or dry habitat, acid to alkaline pH, clay to sandy soil
- Less rust-susceptible than other varieties
- Staking required for young trees



HAWTHORN

**EASTERN REDBUD** (*Cercis canadensis*)

**Height:** 20 to 30 feet

**Width:** 25 to 35 feet

**Form:** Broadly ovate, becoming flat-topped

**Leaf:** Simple, heart-shaped, alternate

- Full sun or light shade
- Abundant early purple/rosy pink flowers hugging branches before leaves appear
- Acid or alkaline, well-drained soil
- Legume/nitrogen fixing
- Susceptible to canker, Verticillium wilt, leaf spot
- 2 to 3-inch long, thin pods
- Native



EASTERN REDBUD

### Medium to large trees 40 to 80 feet range:

**GINKGO** (*Ginkgo biloba*)

'Princeton Sentry' or PNI 2720'

**Height:** 40 to 50 feet

**Width:** 20 to 30 feet

**Form:** Narrow pyramidal form when young; irregular shape when mature

**Leaf:** Simple, fan-shaped, parallel veins, alternate

- Fruitless; sterile (male)
- Tolerates salt, drought, pollution, urban stress, wide range of soils
- Minimal maintenance; some pruning
- Plant in spring and fall
- Fossils date 200 million years ago

**HONEY LOCUST** (*Gleditsia triacanthos*)

'Shademaster' or 'PNI2835'

**Height:** 60 to 70 feet

**Width:** 50 to 60 feet

**Form:** Globular

**Leaf:** Compound, 18 to 30 leaflets with smooth edges, alternate

- Foliage provides light shade in open areas
- Insignificant green, fragrant flowers in June
- Reddish brown pods with hard, oval seeds
- Thornless
- Prefers full sun
- Tolerates wide range of soils, drought, heat, salt, and soil compaction
- Susceptible to insect damage and powdery mildew
- Over planted in some areas



## VI. RECOMMENDED TREES



GINKGO

### LONDON PLANE TREE

(*Platanus x acerifolia*)

'Bloodgood'

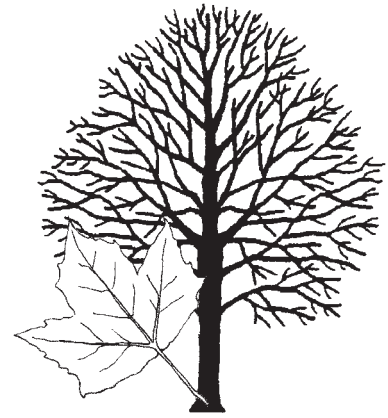
**Height:** 60 to 120 feet

**Spread:** 50 to 70 feet

**Form:** Broadly ovate

**Leaf:** Simple, lobed, palmate, alternate

- Proven durable cross between American sycamore & Oriental plane
- World's most widely planted urban tree
- Tolerates compacted soil, drought, urban conditions
- Showy trunk, exfoliating bark
- Requires little corrective pruning
- Susceptible to canker stain
- Requires sufficient room for root and crown expansion



LONDON PLANE



HONEY LOCUST

### BLACK GUM (*Nyssa silvatica*)

'Tupelo'

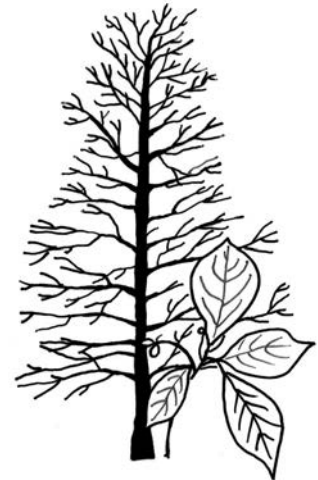
**Height:** 30 to 70 feet

**Width:** 20 to 45 feet

**Form:** Pyramidal when young, spreading, rounded as mature

**Leaf:** Alternate, simple, ovate, entire margin

- Full sun or light shade
- Prefers moist, well-drained, acidic soil; dislikes alkaline or compacted soil
- Outstanding summer and fall foliage
- Transplant in spring, B&B preferred
- Susceptible to cankers, leaf spot, rust, leaf miner and scale
- Native



BLACK GUM

### SWAMP WHITE OAK

(*Quercus bicolor*)

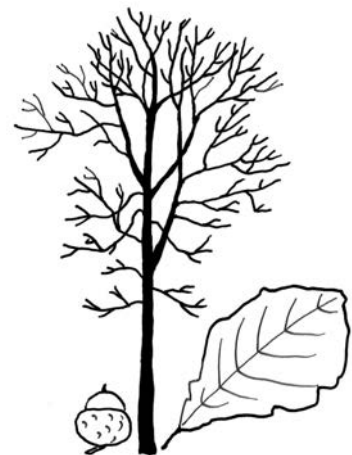
**Height:** 50 to 80 feet

**Width:** 50 to 80 feet

**Form:** Broad round-topped crown

**Leaf:** Oblong-ovate, rounded lobes, sometimes deep-lobed, 3-7 inches

- Moderate shade tolerance
- 1-inch acorns, usually in pairs
- Requires acid soil; alkaline conditions cause chlorosis
- Easier to transplant than other oaks; transplant in spring
- Occurs in swampy sites and stream banks, but tolerates drought and urban conditions
- Tolerates salt and soil compaction
- Native



SWAMP WHITE OAK



## VI. RECOMMENDED TREES

### Other Trees to Consider

Because urban trees often are planted in small spaces with limited water, varieties that stand less than 35 feet tall at maturity are recommended for planting areas measuring less than 16 square feet. Small areas don't hold sufficient water to meet the transpirational demands of larger trees. Consequences of planting larger species in restricted open spaces range from roots heaving sidewalks to trees dying from drought.

#### Native Trees for Urban Sites

American Linden (*Tilia americana*)  
Black Cherry (*Prunus serotina*)  
Catalpa (*Catalpa bignonioides*)  
Chokecherry (*Prunus virginiana*)  
Hackberry (*Celtis occidentalis*)  
Honey locust (*Gleditsia triacanthos*)  
Pin Oak (*Quercus palustris*)  
Redbud (*Cercis canadensis*)  
Red Maple (*Acer rubrum*)  
Red Oak (*Quercus rubra*)  
Serviceberry (*Amelanchier sp.*)  
White Oak (*Quercus alba*)

#### Riparian (Streamside) Trees

Hackberry (*Celtis occidentalis*)  
Pawpaw (*Asimina triloba*)  
Persimmon (*Diospyrus virginiana*)  
Pin Oak (*Quercus palustris*)  
Redbud (*Cercis canadensis*)  
Red Maple (*Acer rubrum*)  
River Birch (*Betula nigra*)  
Shadbush (*Amelanchier arborea*)  
Silver Maple (*Acer saccharinum*)  
Swamp White Oak (*Quercus bicolor*)  
Tulip Tree (*Liriodendron tulipifera*)

Additional riparian trees can be found at  
[http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr\\_003489.pdf](http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_003489.pdf)



*"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known but latterly often forgotten."*

*-Aldo Leopold,  
A Sand County Almanac*



## Trees and Watersheds

A tree is a tree is a tree—or is it? We’ve already learned that various species of trees have different tolerances to the environmental conditions in which they grow and that we use these characteristics to choose which tree to plant where. Street and park trees must be able to function in a built environment often plagued by road salt, reflected heat and sunlight, and drought-like conditions. Trees that are located in a natural setting, such as a **riparian** (streamside) zone, must not only survive the conditions there, but should also contribute to the health of their watershed. They can do this in a number of ways.

### Stormwater Management

Trees and forests reduce the amount of stormwater that flows through the watershed, and they also prevent many pollutants from reaching our streams. Leaf canopies intercept a significant amount of rainwater, directing it slowly along branches and down trunks toward the root zone. When water reaches the ground, much of it soaks into the soil and is absorbed by tiny root hairs or is filtered through the soil horizons to replenish ground water. Trees use the retrieved water for photosynthesis and release it back into the atmosphere by evapotranspiration. Clean, filtered ground water travels gradually below the surface to feed into streams.

The U.S. Forest Service determined that one small tree intercepted 67 percent of the rainwater that fell within its canopy, so each tree, whether on a street, in a woodlot or in the forest, can contribute significantly toward preventing surface flooding in the watershed

### Water Quality Protection

When water rushes across the surface of the earth, it picks up substances it encounters along the way and carries them into the receiving stream or other body of water. The faster it travels the more it picks up, especially when impervious surfaces prevent the water from infiltrating into the soil. These substances—including nutrients such as nitrates and phosphates that become pollutants when they enter waterways, as well as contaminants like pesticides, heavy metals, petroleum products, and even eroded soil—are detrimental to the health of streams and rivers. These are called **nonpoint source pollutants**.

Trees prevent nonpoint source pollution by not only reducing the volume of surface stormwater through interception, but also by slowing the remaining surface water as it hits stems and trunks, and by filtering sediment before the water reaches the stream. Root systems stabilize stream bank soils, preventing erosion. Trees absorb many of the nonpoint source pollutants, using the nutrients for growth and storing (sequestering) other substances in wood.

### Habitat

The web of life is a complex network of animals and plants that depend on each other for their survival. Trees, especially native trees, provide excellent habitat for native animals. They moderate temperatures throughout watersheds, forests, and streams as well as suburban and urban areas. They provide clean water and food sources for wildlife throughout the seasons. They provide shelter and home-building supplies for the finned, furred and feathered. Trees help define and enhance the space that most living things need to survive.



*What can you do to Limit storm water runoff? Trees are key, they hold water through their leaves absorb it through their roots and the open ground they sit in. Trees are not the only answer! Consider installing Green Stormwater Infrastructure like downspout planters, rain gardens, permeable pavers, rain barrels or a Green Roof!*

## VII. APPENDIX

# Checklist for Planning a Workday One month ahead

### 1. Be clear about your goals

What do you want to accomplish? \_\_\_\_\_  
\_\_\_\_\_

Where do you want to hold the workday? \_\_\_\_\_  
\_\_\_\_\_

How many volunteers will be needed? Adults? Children? \_\_\_\_\_  
\_\_\_\_\_

What supplies are needed? \_\_\_\_\_  
\_\_\_\_\_

How can you make the workday fun? \_\_\_\_\_

### 2. Clearly define

#### Written job descriptions

**Example:** Hole digger: must have work boots, a strong back, and be available 9:00 am – 12:00 pm on Saturday

**Example:** Phone banker: must be comfortable with answering numerous questions, have an understanding of the project, and be available 6:00 – 8:00 pm weeknights

#### Tasks for all kinds of people

Down and dirty (dig holes, move trees, build fences)

Dainty and dirty (weed, plant flowers, prune, mulch)

Don't get dirty (face paint kids, answer emails and phone calls, organize food preparations, knock on doors, deliver water, take pictures)

### 3. Seek support from local groups and organizations

Churches, schools, and nonprofit groups can provide support including volunteers and meeting space. Make use of student's community service requirements.

### 4. Involve government agencies and politicians

Identify and contact state legislators, local elected officials, relevant municipal staff, and departments.

These are good sources of funding, provide physical assistance, and attract the media.

### 5. Solicit donations from local business

Identify patrons and ask local restaurants, bakeries, print shops, stationery stores, gardening centers, etc. for supplies and services.

### 6. Contact your community paper

Be brief and clear. Play up the event as fun and action-packed.



## One week ahead

1. Contact regional papers and TV
2. Update community paper
3. Confirm volunteers
4. Check on equipment
5. Get the word out
6. Make sure all permits are in order.

### **Distribute flyers**

Be brief and to the point.

Focus on the 4 Ws: who, what, where, and when.

Use photos, graphics, and colorful paper to attract attention.

Post flyers in places where people gather.

Post information on your group's website.

Send flyers through your neighborhood email list, or post to your group's Facebook page.

### **Knock door-to-door**

Distribute flyers and invitations door-to-door.

People are likely to volunteer when asked by someone they know or recognize.

You may want to start by writing a letter to everyone on your street, making copies, and hand-delivering them.

### **What to say when people answer the door**

Introduce yourself and thank them for their time.

Explain what it is you're doing (i.e., planting trees, organizing an event) and ask if they would like to get involved.

Start a list of names, addresses, and phone numbers of interested neighbors.

If they seem preoccupied, ask to come back at a more convenient time.





## The day of the event

1. Offer basic training and overview.
2. Have a raffle as a way to get everyone's name, email address, and phone number.
3. Call key people.
4. Confirm with the media.
5. Serve refreshments.
6. Mark tools with tape labeling to identify what belongs to whom.
7. Be ready early.
8. Provide gloves.
9. Thank volunteers, sponsors, supporters, politicians, and donors.
10. Take pictures.

## After the event

1. Send out thank-you notes to everyone.
2. Maintain contacts with volunteers for future events.
3. Post photos on community website.
4. Plan next event.

# VII. APPENDIX

age of tree	water	feeding	pruning	pit care	other
<p>newly planted through first two years</p> 	<p>15–20 gallons per week until ground freezes. Resume watering at thaw. Increase to twice a week during extreme hot or dry periods.</p>	<p>Consult an arborist to establish need.</p>	<p>Prune out only dead, damaged and diseased branches.</p>	<p>Weed and lightly cultivate the top 2-3" of soil. Put up tree guards anytime. Mulch. Plant shallow-rooted annuals (marigolds, vinca, begonias, petunias, portulaca, etc.).</p>	<p>Stake &amp; tie to prevent damage in high traffic areas. Check ties often to prevent choking tree. Remove after one year. Check root flare; excavate if buried.</p>
<p>after 2nd year</p> 	<p>Water as needed during dry spells</p>	<p>Consult an arborist to establish need.</p>	<p>Prune out dead, damaged and diseased branches and begin limbing up to 6'. Never remove more than 1/4 of tree's live branches in one year. Encourage central leader if appropriate.</p>	<p>Weed and lightly cultivate the top 2–3" of soil. Renew mulch. Clear trash and debris.</p>	<p>Check root flare for visibility. Excavate if buried.</p>
<p>adolescent</p> 	<p>Water as needed during dry spells.</p>	<p>None needed if mulched with compost each year. Consult an arborist to establish need.</p>	<p>Prune out dead, damaged and diseased branches. Train or prune branches away from porches and street if in vehicular right away.</p>	<p>Weed and lightly cultivate the top 2–3" of soil. Renew mulch. Clear trash and debris.</p>	<p>Check root flare for visibility. Excavate if buried. Enjoy your shade!</p>
<p>older</p> 	<p>Water as needed during dry spells.</p>	<p>None needed if mulched with compost each year. Consult an arborist to establish need.</p>	<p>Limited pruning; prune out dead wood, prune branches away from porches. If growing into utilities, contact a professional.</p>	<p>Weed and lightly cultivate the top 2–3" of soil. Renew mulch. Clear trash and debris.</p>	<p>Check root flare for visibility. Excavate if buried. Enjoy your shade!</p>

# Caring for your newly planted tree

1

**Water:** Careful watering is crucial for your tree's survival, particularly during the first two years after planting.

- Water your tree when the soil is dry beneath the mulch. Apply approximately 15-20 gallons of water once a week from March until the ground freezes, and as often as twice a week during hot and dry weather.
- Trickle water onto the soil surface using a hose, or allow water to seep from a bucket with small holes in the bottom. Watering slowly and deeply is best.

2

**Weed and Clean:** Weeds, grass and trash can prevent water from reaching your tree's roots and cause a decline in your tree's health.

- Weed and clean the area around your tree periodically to prevent toxic substances like dog urine, leaking garbage, motor oil, detergent or de-icing salt from entering the soil. These substances will kill trees. Weeds and grass compete for resources.

3

**Protect:** Tree roots require water, air and nutrients for survival. Compacted soil and cemented pits prevent water, air and nutrients from reaching tree roots. Make sure the first roots are just below the soil surface.

- Avoid compacting the soil: don't pile trash, walk, or drive around the tree's roots.
- Never cement over the surface of your tree pit.
- Bark protects the trunk and maintains tree health.
- Keep car doors, dogs, lawn mowers, string trimmers, and bicycles away from the trunk to avoid bark wounds.
- If you lay brick or stone around the tree, keep the material at least 6" from the trunk and check yearly to maintain this space (pavers placed too close to the trunk can strangle the trunk as it gets wider). Never raise the soil level around the tree; this will suffocate the roots.

4

**Remove stake straps:** Straps left on your tree for longer than a year may cut into the bark and strangle the tree.

- Remove straps one year after planting.
- It's okay to leave stakes in place for protection.

5

**Cultivate:**

- Loosen the soil surface around your tree frequently to encourage water and air to enter the soil; try doing it seasonally.
- If the soil surface around your tree becomes compacted, loosen the first few inches of soil and break up any large clumps. Avoid damaging any large woody roots.

6

**Mulch:** Mulch helps to conserve water, control weeds, moderate soil temperature, prevent lawnmower damage, prevent soil compaction, and nourish the tree.

- Use the 3.3.3 rule: Maintain a 3" layer of mulch around your tree, making sure to keep it 3" from the trunk and 3-feet in radius. Recommended mulches include wood chips, composted leaves, and pine needles.
- Always remember to weed and cultivate the soil before mulching.

7

**Prune:**

- On newly planted trees, prune only dead, diseased, or damaged branches.

8

**Don't fertilize newly planted trees.**

- Fertilizers are not a plant food, and when applied to newly planted trees, they can shock the transplanted trees.

9

**Plant flowers:**

- Plant annuals such as begonias and marigolds around your tree in the existing soil.
- As flowers wilt in the summer heat, they will remind you to water your tree.
- Avoid perennials that will compete with your tree.

enjoy your **new tree**



# VII. APPENDIX

## PHS Tree Tenders Monthly Planner\*

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Planting			✓	✓	✓					✓	✓	✓
Planting fruit trees, zelkova, oak, birch, Japanese maple & hawthorne (& others not recommended for fall planting)			✓	✓	✓							
Pruning for form	✓	✓	✓			✓	✓	✓			✓	✓
Pruning dead, diseased & damaged branches	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pruning flowering trees						✓						
Pruning elms & oaks	✓	✓	✓								✓	✓
Soil testing				✓	✓	✓	✓	✓	✓	✓	✓	
Weeding, cultivating and mulching			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Celebrate Arbor Day and Earth Day				✓	✓							
Watering			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

\* Recommendations are based on average daily temperatures, leaf bud break and leaf drop.



## Celebrating Arbor Day and Earth Day

The first Arbor Day was held in Nebraska on April 10, 1872. It was founded by J. Sterling Morton, who believed that trees should be planted in the state to act as wind breaks and to conserve moisture. Today Arbor Day is celebrated throughout the United States on the last Friday in April, as well as throughout the world at various times.

Earth Day, April 22, marks the anniversary of what many consider the birth of the modern environmental movement in 1970. Today, the Earth Day Network leads thousands of Earth Day events and actions worldwide each year.

These events provide opportunities for your Tree Tenders group to increase tree awareness and attract new members and volunteers.

### Educational materials can be purchased from:

#### For more information:

**The Arbor Day Foundation**  
100 Arbor Avenue  
Nebraska City, NE 68410  
888-448-7337  
[arborday.org](http://arborday.org)

**The Earth Day Network**  
1616 P St. NW, Suite 340  
Washington, DC 20036  
202-518-0044  
[earthday.org](http://earthday.org)

### Planning an Arbor Day or Earth Day event for schoolchildren

**Develop partnerships** among Tree Tenders, park groups, schools, and other neighborhood institutions. Work together to plan and implement school programs. Consider piggybacking the Arbor Day or Earth Day event with a larger project or something happening in the neighborhood. This is a great time to kick off a new garden or planting, commemorate a community leader, or honor a neighbor.

**Decide** on how many people to invite and where to have the program.

**Involve schools** Bring written information such as a poster advertising the event or news articles about Tree Tenders groups. Consider engaging high school students as mentors for the younger students. Provide community service credit to students.

**Plan educational, entertaining, and interactive activities** at various stations for students. Consider the attention span of young children and plan activities that last just 15 to 20 minutes so they can move from one station to the next.

**Invite dignitaries** to attend the event such as the mayor, school principal, city council members, and civic leaders.

**Send press releases** to TV, radio, and the press, as well as through social media. The more groups you have involved, the more newsworthy the event becomes. Make sure there are visually pleasing attractions for TV and photo shoots.

### A selection of Arbor Day or Earth Day educational activities:

- Planting trees, shrubs, & flowers
- Tree mulching
- Recycling games
- Arts and crafts
- Seed planting
- Storytelling

### Planning an Arbor Day or Earth Day event for the community

Plan an activity like tree planting, park cleanup, or a pruning day. An attraction such as music or a performance will draw crowds and the press. If possible, piggyback your Arbor Day program onto another event, such as a popular park festival or health fair.

**Choose a frequently visited spot**, such as a park, farmers market, or shopping area.

**Gather support** from businesses and community groups including neighborhood associations, town watch groups, etc. Donations of coffee, donuts, hats, and pens are great giveaways that also involve and publicize vendors.

**Plan educational and entertaining activities** for children to enjoy.

**Attract TV, radio, and press.** Notify local TV, newspapers, and radio stations prior to scheduled event. To ensure high turnout, encourage organizers to advertise the event through word of mouth, flyers, posters, etc.

**Be visible** and make sure to get your message across on the day of the event. A good public address system and great music can make your event a big success.

**Have display tables** where people can pick up educational information about tree care and your Tree Tenders group. Suggest ways volunteers can influence tree-related legislation. Have a prominent sign-up sheet for potential volunteers to list their names, addresses, email, and phone numbers. Holding a raffle is another way to get names and addresses.

### Connect with PHS

Visit [PHSonline.org](http://PHSonline.org) for ways to connect with PHS for Arbor Day and Earth Day. PHS offers volunteer opportunities for tree plantings and community greening projects on these days and throughout the year.

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### Tree City USA

Any town or city of any size can qualify for Tree City USA by addressing four standards established by the Arbor Day Foundation and the National Association of State Foresters. These standards document the municipality's viable tree management plan and program.

1. A Tree Board, Commission or Department: a group of concerned citizens charged by ordinance with developing and administering a comprehensive tree management program.
2. A Tree Care Ordinance: this provides an opportunity to set good policy and back it with the force of law when necessary. Ideally, it will provide clear guidance for planting, maintaining and removing trees from streets, parks and other public places.
3. A Community Forestry Program with an annual budget of at least \$2 per capita; dedicated community support ensures stability of the tree care program.
4. An Arbor Day Observance and Proclamation: the celebration can be simple and brief or an all-day or all-week observance with and for community residents.

More information about Tree City USA can be found at the Arbor Day Foundation's website, [arborday.org](http://arborday.org).

### Tree Campus USA

The Arbor Day Foundation's Tree Campus USA program recognizes college and university campuses that:

- Effectively manage their campus trees
- Develop connectivity with the community beyond campus borders to foster healthy, urban forests
- Strive to engage their student population through service-learning opportunities centered on campus and community forestry efforts

Colleges and universities across the United States can be recognized as a Tree Campus USA by meeting five standards developed to promote healthy trees and student involvement. These consist of a campus tree advisory committee, tree care plan, tree program with dedicated annual expenditures, an Arbor Day observance, and a tree-related service-learning project.

For details, visit [arborday.org/programs/treeCampusUSA/](http://arborday.org/programs/treeCampusUSA/).



## Recommended Reading List

### General Information

- Christopher Brickell, Elvin McDonald, *The American Horticultural Society Encyclopedia of Gardening* (1993)
- William Cullina, *Native Trees, Shrubs, and Vines: A Guide to Using, Growing, and Propagating Native North American Woody Plants* (2002)
- Michael Dirr, *Dirr's Hardy Trees and Shrubs: An Illustrated Encyclopedia* (1997)
- Michael Dirr, *Manual of Woody Landscape Plants* (1998)
- William F. Elmendorf & Henry D. Gerhold, *A Guide for Municipal Tree Commissions* (1996)
- Henry D. Gerhold, et. al., *Landscape Tree Factsheets* (2001)
- Andy and Katie Lipkis, *The Simple Act of Planting a Tree* (1990)
- Ann F. Rhoads and Timothy A. Block, *Trees of Pennsylvania: A Complete Reference Guide* (2005)
- Christopher Roddick and Beth Hanson, *The Tree Care Primer* (2007)
- Alex H. Shigo, *A New Tree Biology: Facts, Photos and Philosophies on Trees and Their Problems and Proper Care* (1986)
- Alex H. Shigo, *Tree Biology and Tree Care Photo Guide* (1987)
- Alex H. Shigo, *Modern Arboriculture: A Systems Approach to the Care of Trees and Their Associates* (1991)
- D. M. Van Gelderen, *Conifers: The Illustrated Encyclopedia* (1996)
- USDA Forest Service, *Tree Owner's Manual* ([www.treeownersmanual.info](http://www.treeownersmanual.info))
- S.J. Lilly, *Arborists' Certification Study Guide* (2010)

### Pests and Diseases

- Warren T. Johnson, *Insects That Feed on Trees and Shrubs* (1991)
- Wayne A. Sinclair and Howard H. Lyon, *Diseases of Trees and Shrubs* (2005)
- Terry A. Tattar, *Diseases of Shade Trees* (1989)

### Pruning

- Steve Bradley, *The Pruner's Bible* (2005)
- Christopher Brickell, *American Horticultural Society Pruning and Training* (1996)
- Alex H. Shigo, *Tree Pruning: A Worldwide Photo Guide* (1989)
- Edward F. Gilman, *An Illustrated Guide to Pruning* (2011)
- Andrew Pleninger and Christopher Luley, *The ABC's Field Guide to Young and Small Tree Pruning* (2012)

### Trees in the City

- Edward F. Gilman, *Trees for Urban and Suburban Landscapes* (1997)
- Henry Lawrence, *City Trees: A Historical Geography from the Renaissance through the Nineteenth Century* (2006)
- Robert W. Miller, *Urban Forestry: Planning and Managing Urban Greenspaces* (1997)
- Arthur Plotnik, *The Urban Tree Book: An Uncommon Field Guide for City and Town* (2000)
- Peter Trowbridge and Nina Bassuk, *Trees in the Urban Landscape: Site Assessment, Design, and Installation* (2004)

### Children's Titles / Fiction

- Lois Ehlert, *Red Leaf, Yellow Leaf* (1991)
- Tracy Gallup, *Tree Crazy* (2009)
- Arthur A. Levine, *Pearl Moscowitz's Last Stand* (1993)
- H. A. Rey, *Curious George Plants a Tree* (2009)
- Dr. Seuss, *The Lorax* (1971)
- Janice May Udry, *A Tree is Nice* (1987)
- Alan Zweibel, *Our Tree Named Steve* (2007)
- Alice McLerray, *The Mountain that Loved a Bird* (1985)

### Children's Titles / Nonfiction:

- Steven Aronson, *Fandex Family Field Guides: Trees* (1998)
- Diane L. Burns, *Trees, Leaves and Bark* (1997)
- Gail Gibbons, *Tell Me Tree: All About Trees for Kids* (2002)
- Bobbie Kalman, *The Life Cycle of a Tree* (2002)
- Jane Kirkland, *Take a Tree Walk* (2009)
- Richard Lewington and David Streeter, *The Natural History of the Oak Tree* (1993)
- Jeanette Winter, *Wangari's Trees of Peace: A True Story from Africa* (2008)



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### Helpful Websites

#### **actrees.org**

ACTrees (Alliance for Community Trees) is committed to helping shape public policy to protect, enhance, and sustain trees for the benefit of people and the places we live.

#### **americanforests.org**

American Forests is the nation's oldest nonprofit citizen conservation organization, founded in 1875. Through programs such as Global ReLeaf, and publications such as the National Historic Tree Register, American Forests advocates the benefits of rural and urban trees, good science, and sound policy.

#### **arborday.org**

The Arbor Day Foundation helps to promote tree care and conservation and to educate people on tree issues, offering nationally recognized programs such as Tree City USA and Tree Campus USA that promote responsible tree stewardship. They also have produce the Arbor Day Foundation Tree Guide.

#### **audubon.org**

The National Audubon Society works to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.

#### **call811.com**

This website provides state-specific "Call before You Dig" contact information.

#### **communitygarden.org**

The American Community Gardening Association promotes and supports community gardening and greening across the United States and Canada.

#### **www.dcnr.state.pa.us/forestry/index.aspx**

The Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry website provides a wide array of information about trees and topics related to trees.

#### **extension.psu.edu**

Locate your county extension office in Pennsylvania for information about trees, soil testing, plant problems and insects.

#### **fs.fed.us**

The U.S. Department of Agriculture Forest Service is the federal agency responsible for public lands in national forests and grasslands. The website includes a section on Urban and Community Forestry, a portal to recent research and recommendations.

#### **healthytreeshealthycities.org**

The Healthy Trees, Healthy Cities Initiative is a program to improve the health of city trees by engaging people in tree-planting and stewardship, early pest detection, and tree health monitoring.

#### **isa-arbor.com**

The International Society of Arboriculture (ISA), the professional organization for arborists, fosters a better understanding of trees and tree care through research and education.

#### **morrisarboretum.org**

The Morris Arboretum of the University of Pennsylvania is a historic public garden and educational institution, promoting an understanding of the relationship between plants, people and place.

#### **www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx**

The Missouri Botanical Garden provides excellent horticultural information about thousands of tree and shrub species.

#### **nature.org**

The Nature Conservancy is the leading science-driven conservation organization working around the world to protect ecologically important lands and waters for nature and people.

#### **nrs.fs.fed.us/philadelphia/**

The U.S. Forest Service Philadelphia Field Station fosters collaboration and generates, delivers, and shares the science to sustain the health and diversity of natural systems and enhance quality of life within the urban landscape. Look for events, studies, and research opportunities.

### **paconserve.org**

The Western Pennsylvania Conservancy protects and restores exceptional places to provide clean waters and healthy forests, wildlife, and natural areas for the benefit of present and future generations.

### **Pecpa.org**

The Pennsylvania Environmental Council protects and restores the natural and built environments through innovation, collaboration, education and advocacy.

### **pg-cloud.com/phs**

The PHS Urban Forest Cloud is an online map and data management tool for planting and maintaining trees in the Philadelphia region. Tree Tenders groups can track their trees.

### **phillytreemap.org**

PhillyTreeMap is a web-based map and database of trees in the greater 13-county, three-state Philadelphia region. Look up or add trees in your neighborhood.

### **PhillyTreePeople.org**

Philly Tree People is a Philadelphia based Tree Tenders group with non-profit status. Their website contains info on tree planting, care, species selection and more.

### **PHSonline.org**

The Pennsylvania Horticultural Society (PHS), a nonprofit membership organization founded in 1827, motivates people to improve the quality of life and create a sense of community through horticulture.

### **pittsburghforest.org**

Tree Pittsburgh is a nonprofit environmental organization dedicated to enhancing Pittsburgh's vitality and to being part of the solution to global warming by restoring and protecting city trees.

### **ser.org**

The Society for Ecological Restoration works to sustain the diversity of life on earth and reestablish an ecologically healthy relationship between nature and culture.

### **treesaregood.com**

This website of the International Society of Arboriculture (ISA), fosters a better understanding of trees and tree care through research and education. This site includes a list of certified arborists by city.

### **<https://treepennsylvania.org/>**

Tree Pennsylvania is the PA chapter of the National Urban and Community Forest Council. The website includes archived webinars, papers and upcoming events.

### **TreePhilly.org**

Tree Philly is a program of Philadelphia Parks and Recreation and the Fairmount Park Conservancy. They assist Philadelphia residents in planting and caring for trees. Their website has a list of approved Street Trees for Philadelphia.

### **treevitalize.net**

A program of the PA Department of Conservation and Natural Resources, TreeVitalize is a public-private partnership that helps to restore tree cover; educates citizens about planting trees; and builds capacity among local governments to understand, protect, and restore their urban trees.

### **ucgreen.org**

UC Green volunteers plant and tend hundreds of street trees and enhance public green spaces. UC Green is a model for universities focused on becoming anchor institutions for greening and sustainable development in their communities.

### **unri.org**

The Urban Natural Resources Institute (UNRI) is a science-based source for information on urban natural resources stewardship, increasing public awareness of urban natural resources research.

### **urbanecologycollaborative.org**

The Urban Ecology Collaborative (UEC) cultivates healthy, safe and vibrant cities through collective learning and united action.

### **Vibrantcitieslab.com**

Vibrant Cities Lab is a one stop resource for information on the benefits of trees and best practices for community tree management.



## VII. APPENDIX

### Tree Care Professionals

#### Commonly used terms for tree care professionals:

**Arborist** refers to anyone specializing in tree care and maintenance. A certified arborist is a professional who has earned formal recognition from the International Society of Arboriculture (ISA).

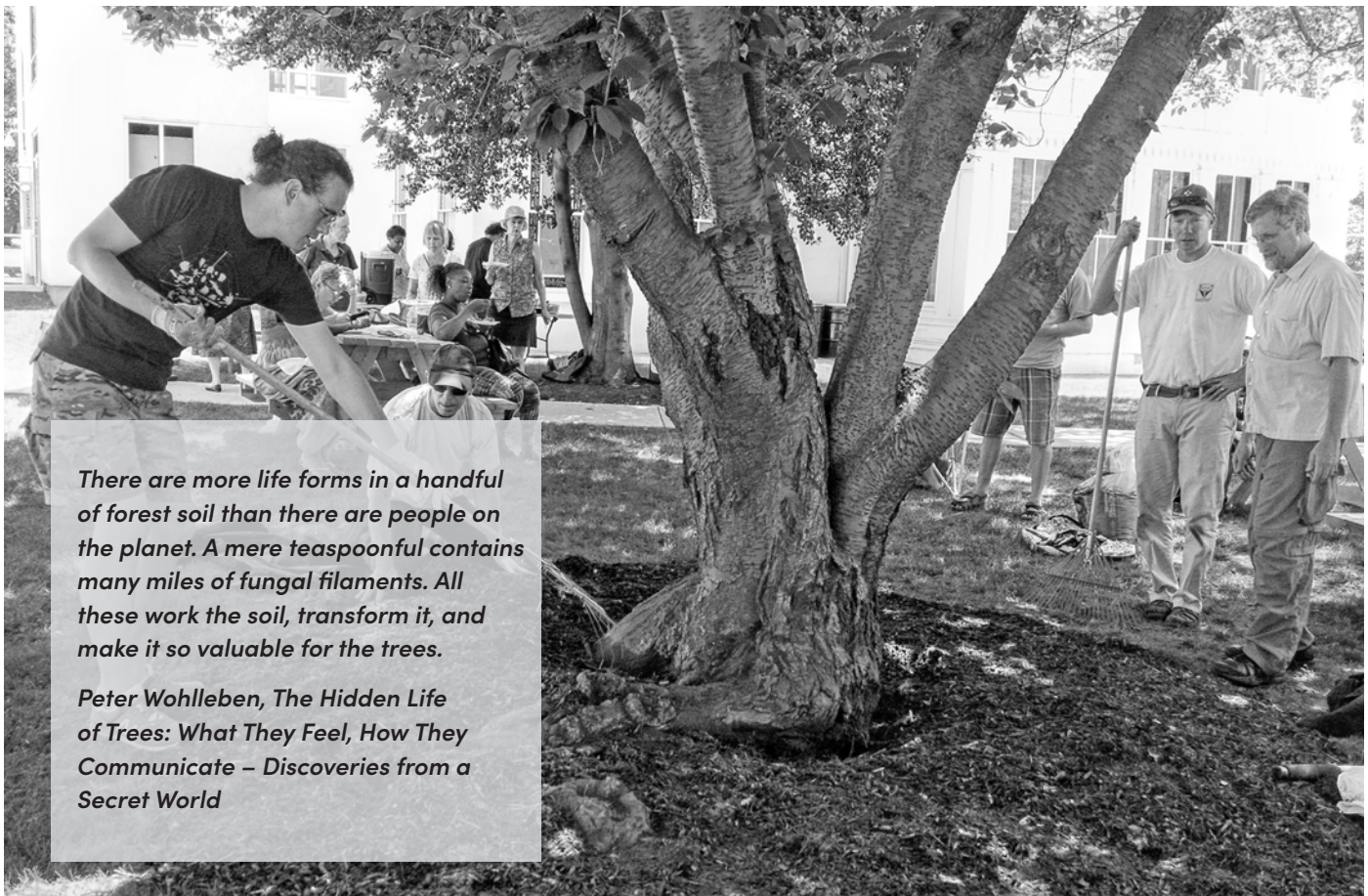
A certified arborist is qualified to do expert pruning, diagnose and treat disease and insect damage, and will also do tree removal and stump grinding. Check to verify insurance coverage.

Check to see that they are ISA certified by going to [www.TreesAreGood.org](http://www.TreesAreGood.org). Also verify that they have insurance.

**Landscape contractor** is a generic term referring to a person who does general maintenance such as cutting grass, installing plants, preparing planting beds, and general cleanup.

**Tree care professional** refers to a person who performs tree care and maintenance. She or he may be a certified arborist or a person with a lawn care business. Not all tree care companies employ certified arborists. Check credentials and references. An uncertified tree care professional usually is qualified to do projects such as stump grinding. When pruning, tree removal, pest/disease management or fertilizing is required, consult a certified arborist.

Contact several companies or individuals for cost estimates. When interviewing tree care professionals, consider quality of service, your comfort level, and cost. Ask for references, verification of certification and/or licensure, and insurance coverage. Remember the best bid is not necessarily the lowest, especially when caring for a live tree.

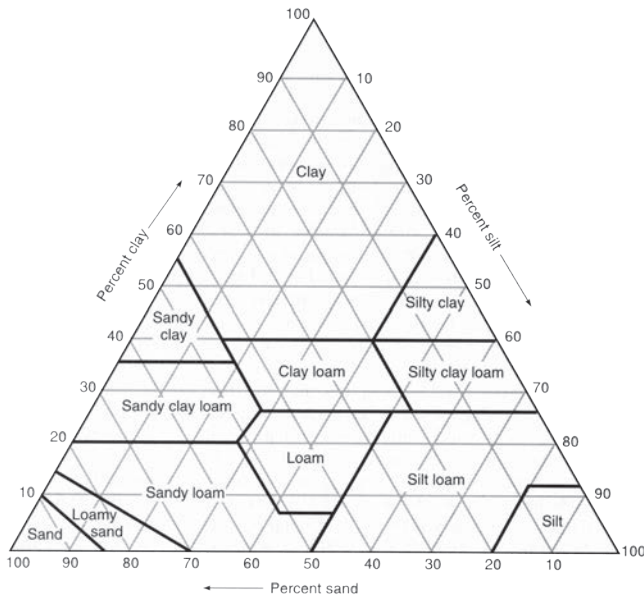


*There are more life forms in a handful of forest soil than there are people on the planet. A mere teaspoonful contains many miles of fungal filaments. All these work the soil, transform it, and make it so valuable for the trees.*

*Peter Wohlleben, The Hidden Life of Trees: What They Feel, How They Communicate – Discoveries from a Secret World*

## The Dirt on Soils

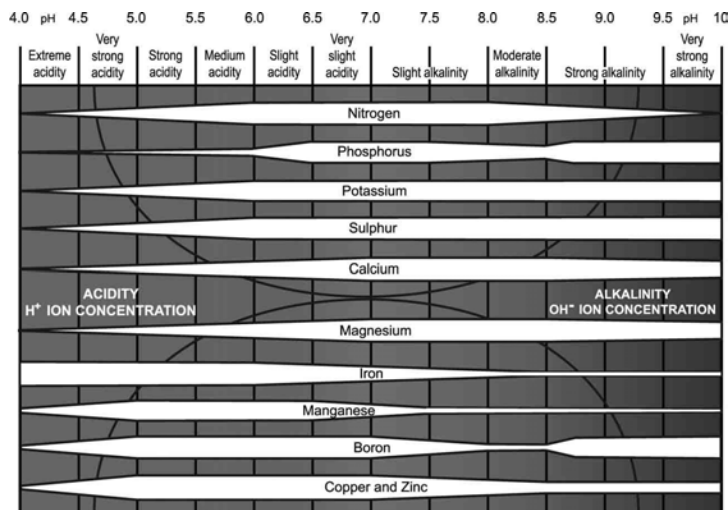
Soil is formed from mineral particles mixed with organic matter and is the source of vital minerals and nutrients the tree needs to grow and function. An ideal soil for most plants consists of around 45% mineral material, 5% organic material, and 50% open space - a mixture of larger and smaller pores in which air, water, and soil-dwelling organisms can move.



Soil texture is classified as clays (very fine particles with little pore space and poor drainage), silts (particles of intermediate size) and sands (coarse soils of relatively large particles and pore spaces and fast drainage). Loams, a mixture of clay, sand and silt are generally considered best for plant growth.

Tree roots need soil soft enough to grow into, access to air and water, and adequate minerals and organic materials to supply nutrients. They also need to breathe - they take in oxygen and exude carbon dioxide, just as leaves do. Compacted soils can deny trees almost all of these important soil conditions - the pore spaces can be reduced or eliminated, preventing roots from "breathing," having access to water, or even being able to push aside soil particles to grow.

Acidity and alkalinity, measured by the pH scale, is another key aspect of soil quality. A pH of 7 is considered neutral; a pH of 1 is extremely acidic, and a pH of 14 is extremely alkaline ("basic"). Soil pH is important because many important mineral elements may not be able to be taken up by tree roots at pH levels that are too high or low. Each tree species has its own optimum soil pH range. For example, most oaks grow best in low pH soils. A "sweet spot" for soil pH is in the 6.0-6.5 range; most trees will be able to access the elements they need under these conditions.



Urban soils are very different from forest soils. Healthy forest soils usually have distinct layers, or "horizons", and plenty of organic matter gradually decaying near the surface. Urban soils may lack organic matter since leaves are removed, and their original soil horizons have generally been disturbed or destroyed. They are prone to compaction, due to pedestrian/vehicle traffic and construction, and often shed water rather than absorb it. A shortage of soil organisms to churn up the soil and decay organic matter means fewer nutrients are available. City soils also tend to be more alkaline than forest soils. It is important to be aware of the composition and condition of soil when choosing the right tree to plant or when making tree care decisions.

## Sample Worksheet: Planning an Arbor Day or Earth Day

Adapt worksheet for your group, providing extra categories and spaces as needed

- Describe your event, as if for a press release. What kind of event do you and your group want (school event, public event, park cleanup, tree planting event)?
- Participants: No. of children expected \_\_\_\_\_ No. of adults expected \_\_\_\_\_
- Event date: \_\_\_\_\_ Rain date: \_\_\_\_\_

4. Event location \_\_\_\_\_  
 Rain location \_\_\_\_\_

- Potential partners (businesses, municipalities, nonprofits, civic groups, schools, PTA, student organizations, colleges, fraternities, community centers, churches, libraries, etc.) and roles (donate food or giveaways, print flyers, provide expertise, prepare planting site, provide site or PA system, etc.):

Partner \_\_\_\_\_ Role \_\_\_\_\_  
 Partner \_\_\_\_\_ Role \_\_\_\_\_  
 Partner \_\_\_\_\_ Role \_\_\_\_\_

- The chart below can help you plan your event. List each type of activity (speakers, music, awards, tree plantings, educational stations, student presentations, etc.). Include any materials you will need (PA system, tools, seeds, trees, mulch, recycled goods, beverages, snacks, posters, flyers, etc.); where you plan to get them (donors; purchase/cost; contact persons); and who will take responsibility for that activity.

Activity	Materials/Costs	Source/Resource/Contacts	Assigned to
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- List potential volunteers, their contact information and potential tasks they can complete (making phone calls, planting tree, creating, printing or distributing flyer, soliciting donations, etc.)

Volunteer	Phone	Email	Assignment
_____	_____	_____	_____
_____	_____	_____	_____

- Timeline (indicate each planning step and the deadline date)

Activity \_\_\_\_\_ Deadline \_\_\_\_\_  
 Activity \_\_\_\_\_ Deadline \_\_\_\_\_  
 Activity \_\_\_\_\_ Deadline \_\_\_\_\_

# VIII. WORKSHEETS

## Sample Worksheet: Planning a Street Tree

Planting Coordinator(s) \_\_\_\_\_  
 \_\_\_\_\_

### 1. Survey Neighborhood

#### A. What species of trees exist; which are doing well, which are not?

Healthy species \_\_\_\_\_

Unhealthy species \_\_\_\_\_

#### B. What stresses are affecting the unhealthy trees? \_\_\_\_\_

### 2. Planting Site(s) Checklist

Tree pit address	Homeowner's permission Yes / No	Sun / Shade	Site Status	Pit Size	Potential Site Hazards	Homeowner Preference	Potential Species	Planting Permit	One Call 811 or 1-800-242-1776	Comments
			① needs concrete cut ② open pit/clear ③ needs stump grinding ④ needs pit enlarged ⑤ overhead wires	20 to 25 square feet	① high traffic/trucks ② salt ③ high pedestrian traffic ④ sidewalk ⑤ other	① flowers ② limited leaf litter ③ small tree ④ fall/winter interest		✓	✓	After-planting care plan

### 3. Budget Estimates (Get 3 bids; remember, the lowest bid isn't always the best!)

A. Tree costs: balled & burlapped \_\_\_\_\_ bare-root \_\_\_\_\_ container \_\_\_\_\_

balled & burlapped \_\_\_\_\_ bare-root \_\_\_\_\_ container \_\_\_\_\_

balled & burlapped \_\_\_\_\_ bare-root \_\_\_\_\_ container \_\_\_\_\_

B. Sidewalk cutting \_\_\_\_\_

C. Root grinding \_\_\_\_\_

D. Package price \_\_\_\_\_

### 4. Planting Logistics

A. Where will the trees come from? \_\_\_\_\_

How will they get to the planting site? \_\_\_\_\_

B. Who will cut/remove the concrete? \_\_\_\_\_

C. Who will plant the trees? \_\_\_\_\_

D. Meeting site: staging area \_\_\_\_\_

#### E. Checklist for planting day

1. Shovels \_\_\_\_\_ 5. Wheelbarrow \_\_\_\_\_ 9. Rakes, brooms, \_\_\_\_\_ 12. Drinks, snacks \_\_\_\_\_

2. Picks \_\_\_\_\_ 6. Mulch \_\_\_\_\_ trash bags \_\_\_\_\_ 13. Press \_\_\_\_\_

3. Hose/buckets \_\_\_\_\_ 7. Gloves \_\_\_\_\_ 10. Ball carrier \_\_\_\_\_ 14. Bathrooms \_\_\_\_\_

4. Water source \_\_\_\_\_ 8. Stakes/ ties \_\_\_\_\_ 11. Camera \_\_\_\_\_



## IX. GLOSSARY

**3-3-3 Method of Mulching:** recommended mulch application formula -- no deeper than 3 inches, at least 3 feet in radius, and no closer than 3 inches from the trunk.

**Alternate:** leaves alternating along the stem.

**Amending (soil):** the practice of adding compost, mulch, or nutrient-rich soil to the existing soil in a tree pit.

**Angiosperm:** a flowering tree. A pollinated flower's ovaries develop fruits containing seeds or angiosperm. "Angio" refers to vessel; "sperm" refers to seed.

**Arborist:** a person who specializes in tree care and maintenance. A certified arborist is a professional who has passed the certification exam of the International Society of Arboriculture.

**Backfill:** to return soil to a planting area from which it was removed.

**Balled and burlapped (B & B):** method of preparing a tree for transplanting. The tree is dug with soil left around its roots. The soil and roots are wrapped in burlap or plastic until time of planting.

**Bare-root:** a transplanting method. Dormant trees are dug, and their roots washed, trimmed, and kept moist until replanting.

**Bark:** the outer protective tissue of woody plants.

**Blade:** flat part of leaf or leaflet.

**Branch collar:** the often visible swelling in a woody plant that forms at the base of a branch where it is attached to its parent branch or to the tree's trunk. The top of the branch collar consists of dense interlocking wood grain, which provides mechanical support to the branch attachment and also may contain chemicals that prevent the spread of decay.

**Broad-leaf:** broad, flat leaves, usually deciduous but not always, as is the case with evergreen holly or southern magnolia trees.

**Bud:** a structure of tissue that will become a leaf, flower, or a new shoot.

**Cambium:** the thin growth layer of the tree that produces the phloem (outward layer) and the xylem (inward layer).

**Chlorophyll:** the green pigment in leaves which absorbs the sun's energy, enabling photosynthesis.

**Community/urban forestry:** the planning, design, planting, and management of vegetation on public lands in and around a community. These forests provide visual, social, economic, and environmental benefits to the community.

**Composting:** the art and science of combining organic materials (such as food scraps or yard waste) and transforming them into humus.

**Compound leaf:** a leaf of two or more leaflets.

**Conifer:** a deciduous or evergreen tree bearing cones, as a pine, spruce, or fir. Foliage is needle-like.

**Contractor:** a person who performs services (such as cutting the grass or installing plants) at a specified price.

**Crown:** the canopy or leafy part of a tree.

**Cultivar:** a group of plants that has been selected and propagated for a particular attribute and given a unique name.

**Cultivate:** to loosen the top two to three inches of soil, allowing roots better access to water and air.

**Deciduous:** a tree that sheds leaves annually.

**Drain sump:** a pipe that helps to drain excess water from a planting hole.

**Entire:** a smooth leaf margin.

**Evergreen:** tree with needles or leaves that remain through winter, but drop intermittently year-round.

**Evapotranspiration:** movement of water from the ground through the tree and leaves, evaporating back into the atmosphere.

**Flower:** a reproductive structure that attracts insects and birds to assist in pollen distribution. A fertilized flower develops into a fruit.

**Fibrous roots:** absorbing roots which take in water and nutrients through small root hairs. Most fibrous roots grow in the top few inches of soil.

**Fruit:** the ripened ovary of a flower that carries the seeds for future trees. Fruits are dispersed by wind, animals, water, etc. They include nuts, samaras, legumes, capsules, and fleshy fruits.



## IX. GLOSSARY

**Girdling roots:** roots that are deflected from their normal course by limited or unpenetrable surroundings (frequently found in container-grown trees and pot-bound houseplants). By growing circularly around the trunk, girdling roots in time will strangle the tree. At planting time, girdling tree roots should either be removed or be spread out as evenly as possible in the planting area.

**Glucose:** the sugar food product of photosynthesis.

**Graft:** plant propagation by fusing tissues of one plant with those of another.

**Gymnosperm:** a non-flowering tree. Reproduces through wind-carried pollen and exposed ovules that become seeds. All conifers are gymnosperms.

**Impervious surfaces:** areas covered by impenetrable materials such as asphalt, concrete, or even compacted soil that prevents rainwater from soaking into the soil and recharging the water table.

**Lobed:** rounded leaf edges.

**Margin:** leaf edge.

**Mulch:** protective covering of various substances, usually organic, placed on top of the soil around plants to retard weed growth, prevent moisture loss, moderate temperatures, and release nutrients into the soil. Popular mulches are wood chips, bark chips, compost, and leaf mold.

**Mycorrhiza:** a symbiotic association formed between root and fungi in the soil, which helps roots absorb nutrients and water.

**Needle-like leaf:** needle-shaped leaves of conifers, providing the same function as broad-shaped leaves, adapted to lose less moisture during dry, cold weather.

**Nonpoint source pollution:** water pollution affecting a water body from diffuse sources, rather than a point source, which discharges to a water body at a single location.

**One-Call system (1-800-242-1776 or 811):** the number to call before you dig. They will locate all underground utilities and spray paint your sidewalk to indicate where it is safe to dig without hitting a utility line.

**Opposite:** leaves or branches directly across from each other on the same stem.

**Ovary:** the typically enlarged basal portion of the pistil that encloses the ovule(s).

**Palmate:** several leaves radiating from one point.

**Perennial:** a plant that lives for multiple years.

**Petiole:** the stalk of a leaf.

**Phloem:** the inner bark made up of cells that carry glucose (sugar made in the leaves) to the rest of the tree.

**Photosynthesis:** the process by which plants produce their own glucose. Plants absorb carbon dioxide and water, and in the presence of sunlight, produce glucose and release oxygen.

**Pinnate:** leaflets arranged like a feather upon one main axis.

**Pollen:** the powdery granular substance produced by flowering plants that functions as the male element in fertilization, distributed by wind or pollinators.

**Respiration:** in plants, the chemical reaction which uses oxygen and produces carbon dioxide to convert glucose into energy for use.

**Riparian zone:** the land area adjacent to a waterway.

**Root ball:** the clump of soil and tree roots dug with the tree, and covered with burlap and twine or a wire basket, awaiting planting.

**Root flare:** (also called Trunk flare) is where the first main roots attach to the trunk. These roots will become the buttress or supporting roots. Never allow excess soil to cover the root flare.

**Samara:** winged fruit.

**Sapling:** a young tree that measures two-to-four inches in diameter.

**Serrate:** toothed or notched leaf edge.

**Sessile:** a leaf without a stalk attached directly to the stem.

**Sidewalk pit:** A hole cut through the concrete of a sidewalk to create a planting site for a tree or other greenery.

**Simple leaf:** single leaf blade per petiole.

**Sinuate:** with a strongly wavy margin.

**Soil pH:** the level of soil acidity or alkalinity. The level of pH affects the plant's ability to take up nutrients from the soil. Soil pH is expressed numerically with 1 being extremely acidic (the pH of lemon juice) and 12 being extremely alkaline (the pH of ammonia).

**Sprouts:** an upright shoot originating from the trunk or a main branch, which is a sign of tree stress. They also provide photosynthetic surface area and wind dampening functions

**Stem:** a supporting woody member of a tree, shrub, or vine.

**Stomate:** a small pore on the underside of the leaf.

**Structural roots:** the support roots of the tree. They grow to be large, heavy, and woody.

**Sucker:** a shoot that originates from the root area.

**Topping:** involves cutting branches off in the middle rather than at the branch collar or branch node, leaving large branch stubs. This practice of reducing tree height is not recommended. It weakens the tree and opens it up to insects and decay.

**Tree pit:** the site where a tree is planted. This can be a sidewalk cut or planting strip for a street tree, or the area surrounding the trunk for a park, yard, or restoration tree.

**Watershed:** the land area that drains into a particular body of water.

**Whorled:** three leaves or buds growing from the same node, evenly around the stem.

**Xylem:** cells that carry sap (water and nutrients) from the roots to the branches and leaves. The outer layers of xylem are called sapwood. The inner layers become heartwood.

**Unless someone like you cares a whole awful lot, nothing is going to get better. It's not.  
-Dr. Suess, The Lorax**