Trees & Woody Landscape Plants

Topics covered:

- Benefits of Trees and Shrubs
- Tree Selection
- Buying Quality Trees and Shrubs
- New Tree and Shrub Planting
- Trees and Turf
- Mulching
- Mature Tree Care
- Tree Hazards
- Treatment of Damaged Trees
- Landscape Plant Values
- Certified Arborists

Learning Objectives

- Understand the environmental, economic, and aesthetic benefits of trees in communities
- Know basics of tree selection, purchasing, planting, and maintenance practices
- Recognize problems associated with poor plant selection and placement, construction damage, and improper maintenance practices
- Know of the International Society for Arboriculture and its research-based resources

By

The International Society of Arboriculture

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The International Society of Arboriculture (ISA) is a nonprofit organization supporting tree care research around the world. For more information, contact a local ISA Certified Arborist or visit www.isa-arbor.com.

Benefits of Trees and Shrubs

Most trees and shrubs in cities or communities are planted to provide beauty or shade. Woody plants also serve many other purposes, and it often is helpful to consider these other functions and benefits when selecting a tree or shrub for the landscape (Figure 1). The benefits can be grouped into social, communal, environmental, and economic categories.

Social Benefits

Most of us respond to the presence of trees beyond simply observing their beauty. We feel serene, peaceful, restful, and tranquil in a grove of trees. Hospital patients have been shown to recover from surgery more quickly when their hospital room offered a view of trees. The strong ties between people and trees are most evident in the resistance of community residents to removing trees to widen streets or in the heroic efforts of individuals and organizations to save particularly large or historic trees in a community.

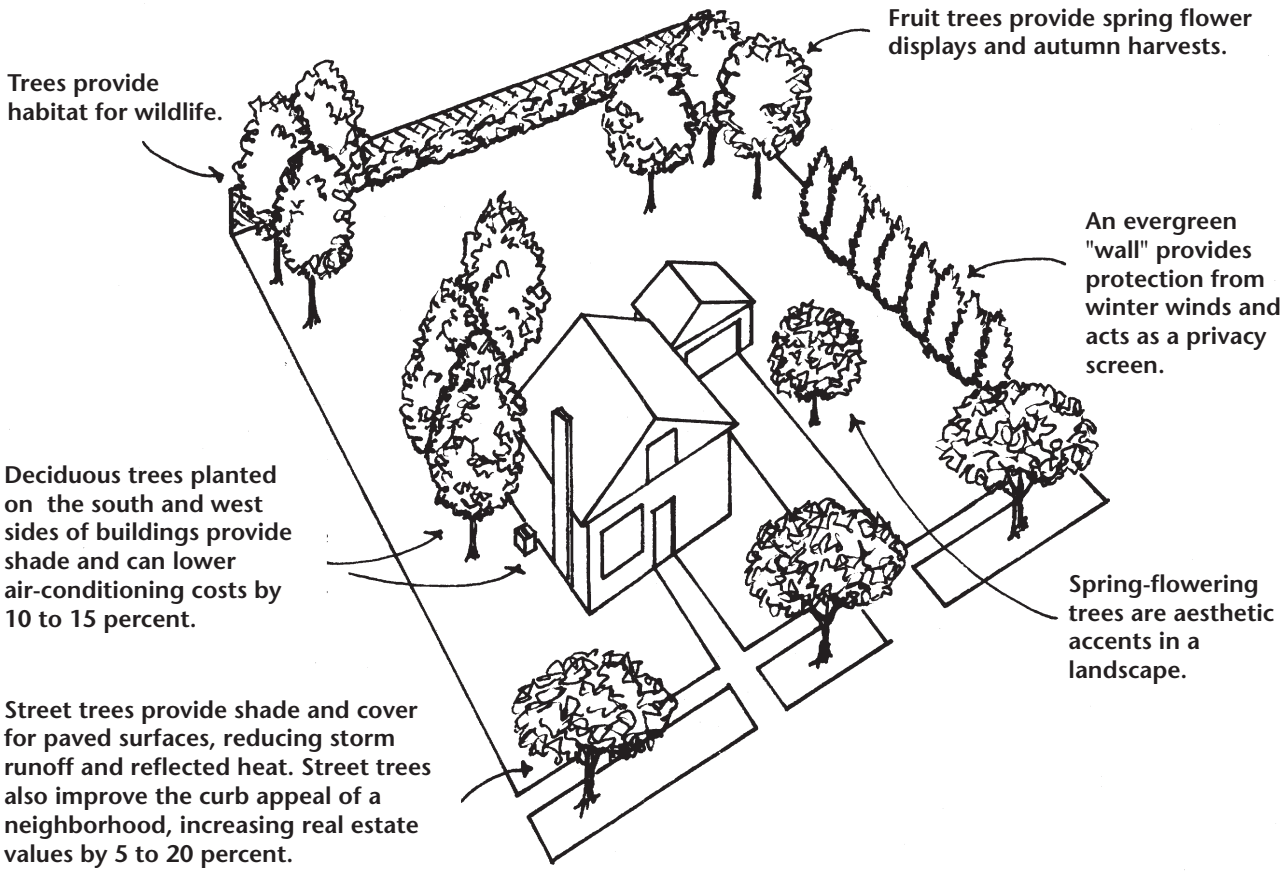

Figure 1. Trees and shrubs provide a wide variety of benefits to people, wildlife, and the environment.

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

Community Benefits

Even though trees may be private property, their size often makes them part of the community as well. Trees often serve several architectural and engineering functions. They provide privacy, emphasize views, or screen out objectionable views. They reduce glare and reflection. They direct pedestrian traffic. They provide background to and soften, complement, or enhance architecture.

Environmental Benefits

Trees alter the environment in which we live by moderating climate, improving air quality, conserving water, and harboring wildlife. Climate control is obtained by moderating the effects of sun, wind, and rain. Radiant energy from the sun is absorbed or deflected by leaves on deciduous trees in the summer and is only filtered by branches of deciduous trees in winter. We are cooler when we stand in the shade of trees and are not exposed to direct sunlight. In winter, we value the sun's radiant energy. Therefore, we should plant only small or deciduous trees on the south side of homes.

Wind speed and direction can be affected by trees. The more compact the foliage on the tree or group of trees, the greater the influence of the **windbreak**. Falling rain, sleet, and hail are initially absorbed or deflected by trees, providing some protection for people, pets, and buildings. Trees intercept water, store some of it, and reduce storm runoff and the possibility of flooding. Dew and frost are less common under trees because less radiant energy is released from the soil in those areas at night.

Temperatures in the vicinity of trees are cooler than temperatures away from trees. The larger the tree, the greater its cooling effect. By using trees in cities, we are able to moderate the heat-island effect caused by pavement and buildings in developed areas.

Air quality can be improved through the use of trees, shrubs, and turf. Leaves filter the air we breathe by removing dust and other particulates. Rain then washes the pollutants to the ground. Leaves absorb carbon dioxide from the air. In this process, leaves also absorb other air pollutants—such as ozone, carbon monoxide, and sulfur dioxide—and give off oxygen.

Economic Benefits

Individual trees and shrubs have value, but the variability of species, size, condition, and function makes determining their economic value difficult. The economic benefits of trees can be both direct and indirect. Direct economic benefits are usually associated with energy costs/savings. Air-conditioning costs are lower in a tree-shaded home. Heating costs are reduced when a home has a windbreak. Trees increase in value from the time they are planted until they mature. Trees are a wise investment of funds because landscaped homes are more valuable than non-landscaped homes. The savings in energy costs and the increase in property value directly benefit each homeowner.

The indirect economic benefits of trees are even greater. These benefits are available to the community or region. When power companies are able to use less water in their cooling towers, build fewer new facilities to meet peak demands, use reduced amounts of fossil fuel in their furnaces, and use fewer measures to control air pollution, customers get lower energy bills. Communities also can save money if fewer facilities must be built to control storm water in the region. To the individual, these savings are small, but to the community, reductions in these expenses are often in the thousands of dollars.

Tree Selection

Tree selection is one of the most important investment decisions a homeowner makes when landscaping a new home or replacing a tree. Considering that most trees have the potential to outlive the people who plant them, the impact of this decision is one that can influence a lifetime. Match the tree to the site, and both lives will benefit.

Before selecting a tree for a particular site, consider these factors:

- Why is the tree being planted? Do you want the tree to provide shade, fruit, or seasonal color, or act as a windbreak or screen? Maybe more than one reason?
- What is the size and location of the planting site? Does the space lend itself to a large, medium, or small tree? Are there overhead or belowground wires or utilities in the vicinity? What clearance is needed for sidewalks, patios, or driveways? Are there other trees in the area? Are there barriers to future root growth, such as building foundations?
- Which type of soil conditions exist? Is the soil deep, fertile, and well drained, or is it shallow, compacted, and infertile?
- Which type of maintenance are you willing to provide? Do you have time to water, fertilize, and prune the newly

planted tree until it is established, or will you be relying on your garden or tree service for assistance?

Asking and answering these and other questions before selecting a tree will help you choose the "right tree for the right place."

Landscape Function

Trees and shrubs make our surroundings more pleasant. A large shade tree provides relief from summer's heat and, when properly placed, can reduce summer cooling costs. A tree that drops its leaves in the fall allows the sun to warm a house in the winter. An ornamental tree provides beautiful flowers, leaves, bark, or fruit. Evergreens with dense, persistent leaves or needles can provide a windbreak or a screen for privacy. A tree or shrub that produces fruit can provide food for the owner or attract birds and wildlife into your home landscape. Street trees decrease the glare from pavement, reduce runoff, filter out pollutants, and add oxygen to the air we breathe. Street trees also improve the overall appearance and quality of life in a city or neighborhood.

Trees and shrubs planted close to buildings reduce wind currents that otherwise would chill or heat the outside surfaces (Figure 2). These foundation plantings can create a dead air space which slows the escape of heat from a building in the winter. That same dead air space helps insulate buildings from the heat of summer, thus reducing the need for air conditioning.

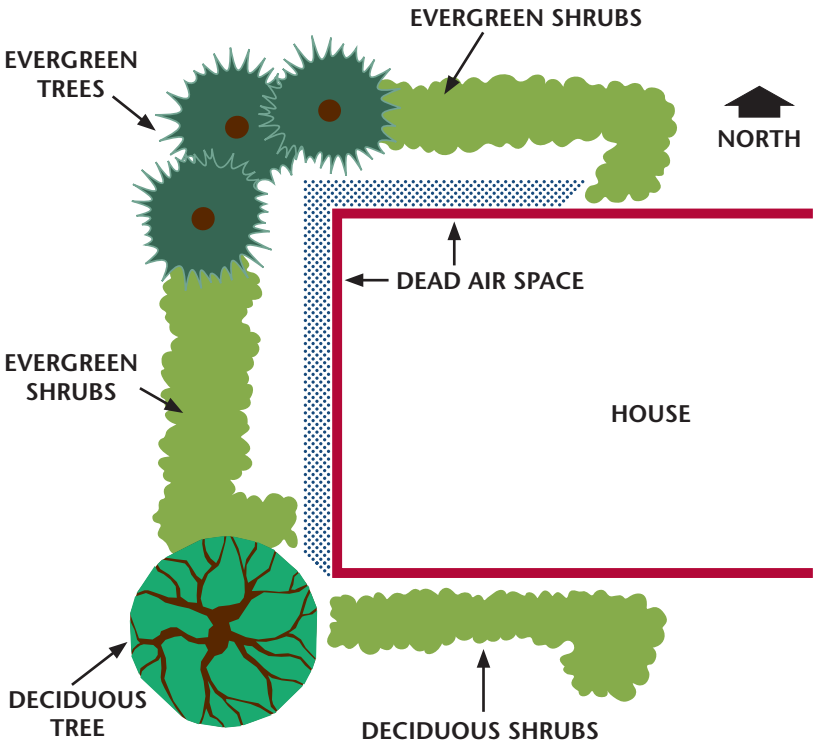

Figure 2. Select foundation plants with the full, mature size of those trees and shrubs in mind. See "Avoiding Tree–Utility Conflicts" for more details on plant size concerns.

Form and Size

A basic principle of modern architecture is "form follows function." This is a good rule to remember when selecting a tree or shrub. Selecting the right form (shape) to fit the desired function (what you want the tree to do) can significantly reduce maintenance costs and increase the tree's value in the landscape (Figure 3). Trees grow in a variety of not only shapes, but sizes. They can vary in height from a few feet to several hundred feet. Select both a form and size that will fit the planting space available.

Depending on your site restrictions, you can choose from among hundreds of combinations of form and size. You may choose a small-spreading tree for a location with overhead utility lines. You may select a narrow, columnar form to build a hedge that provides a screen between two buildings. You may choose large, vase-shaped trees to create an arbor over a driveway or city street. You may even determine that a site just does not have enough space for a tree of any kind.

Site Conditions

Selecting a tree that will thrive in a given set of site conditions is the key to long-term tree survival. Before selecting a tree for planting, consider the following list of major site conditions:

- soil conditions
- exposure (sun and wind)
- human activity
- drainage
- dimensional space
- hardiness zone

Soil Conditions. The amount and quality of soil present in a planting site can limit plant success. In urban sites, the topsoil

Figure 3. Trees can be classified according to their form.

often has been disturbed and frequently is shallow, compacted, and subject to drought. Under these conditions, trees are continuously under stress. For species that are not able to handle these types of conditions, proper maintenance designed to reduce stress is necessary to ensure adequate growth and survival.

Exposure. The amount of sunlight available will affect tree and shrub species selection for a particular location. Most woody plants require full sunlight for proper growth and flower bloom. Some do well in light shade, but few shrub or tree species perform well in dense shade. Exposure to wind is also a consideration. Wind can dry out soils, causing drought conditions and damage to branches and leaves during storms. Wind can also dessicate leaves and can actually uproot newly planted trees that have not had an opportunity to establish their root systems. Special maintenance, such as staking or more frequent watering, may be needed to establish young trees on windy sites.

Human Activity. The top five causes of tree death are actually the results from things people do. Soil compaction, underwatering, overwatering, vandalism, and planting the wrong tree (the number one cause) account for more tree deaths than all insect- and disease-related tree deaths combined.

Drainage. Tree roots require oxygen to develop and thrive. Poor drainage can remove the oxygen available to the roots from the soil and kill the tree. Before planting, do a percolation test: dig some test holes 12 inches wide by 12 inches deep in the areas you are considering planting trees. Fill the holes with water and time how long it takes for the water to drain away. If it takes more than 6 hours, you may have a drainage problem and should choose a different site.

Space Constraints. Many different factors can limit the planting space available to the tree: overhead or underground utilities, pavement, buildings, other trees, visibility requirements, etc. The list goes on and on. Make sure there is adequate room for the tree you select to grow to maturity, both above and below ground.

Hardiness. Hardiness is a plant's ability to survive the extreme temperatures of a particular geographic region. Make sure the plant you have selected is hardy in your area. See Chapter 10: Herbaceous Landscape Plants for more discussion of climate and hardiness zones.

Pest Problems. Insects and diseases affect almost every tree and shrub species. Every plant species has its own particular pest problems, and the severity varies geographically. These pests may or may not be life threatening to the plant. It is best to select plants resistant to pest problems for your area.

Right Plant—Right Place

The notion of planting the right plant in the right place is drilled into Master Gardener volunteers over and over again. What exactly does it mean? Getting plants, including trees, in the right place means considering all of a plant's traits and requirements—cold hardiness; light, soil, and water requirements; and mature size—before purchasing and planting something.

For trees, knowing the mature size is critical. Planting a tree in a space that is too small for its ultimate size will only result in frustration and extra work later on. No amount of pruning will keep a large tree from trying to fulfill its genetic destiny and reach its full size. Continuous trimming both weakens the tree and leaves it vulnerable to pests and disease. Continuous trimming also encourages rampant regrowth (which will require yet more trimming) as the tree tries to recover what it lost; after all, the tree's roots were not trimmed and they are still following their genetic blueprint and growing to support a canopy of ultimate size.

If space is limited, look for smaller varieties of the species you want to plant—many new hybrids have been developed for smaller planting spaces such as city or suburban lots. Save both yourself and the tree a lot of frustration and wasted energy.

Buying Quality Trees and Shrubs

When you buy a quality tree or shrub, then plant it correctly and treat it properly, you and your landscape plant will benefit greatly in many ways for many years. When you buy a low-quality tree, you and your tree will have many costly problems even if you take great care in planting and maintenance.

Defining Plant Quality

A high-quality tree or shrub has

- a large enough and healthy root system to support growth;
- trunks free of mechanical wounds and wounds from incorrect pruning; and
- a strong form with well-spaced, firmly attached branches.

A low-quality tree or shrub has

- crushed or circling roots in a too-small root-ball or container;
- a trunk with wounds from mechanical impacts or incorrect pruning; or
- a weak form in which multiple stems squeeze against each other or branches squeeze against the trunk.

Any of these problems alone or in combination with the others will greatly reduce a plant's chances for a long, healthy, and productive life.

When buying a tree or shrub, inspect it carefully to make certain it does not have problems with roots, injuries, or form. Remember the acronym RIF; it will help you remember **R**oots, **I**njuries, and **F**orm.

Here are some details on potential problems and some other considerations that you should be aware of when buying landscape plants.

Root Quality

Roots specifically on trees and shrubs for sale are available as one of three types:

- bare-root: no soil; typically for small trees or roses that are dormant (Figure 4A)
- root-balled: roots in soil held in place by burlap or some other fabric; the root-ball may be in a wire basket (Figure 4B)
- container-grown: roots and soil in a container (Figure 4C)

Figure 4 (A—bare-root plant, B—root-balled plant, and C—container-grown plant). Quality trees and shrubs can be purchased with a variety of root treatments. When grown and treated properly, all of these plants can successfully establish in a landscape.

Bare-root Stock. Bare-root plants should be dormant with buds that have not opened. Roots should not be crushed or torn. The ends of the roots should be clean-cut. If a few roots are crushed, use sharp tools to re-cut them to remove the injured portions. Make straight cuts. Do not paint the ends. The cuts should be made immediately before planting and watering. Handle the bare roots gently and keep them moist; do not let them dry out before they get into the ground.

Root-balled Stock. You should be able to see the basal **trunk flare**. The flare is the spreading trunk base that connects the trunk with the roots and signals the change from stem tissue to root tissue. Root-balls should be flat on top. Roots in soil in round bags often have many major woody roots cut or torn during the bagging process. Avoid trees with many crushed or torn roots.

The diameter of the root-ball should be at least 10 to 12 times the diameter of the trunk as measured 6 inches above the trunk flare.

At the time of planting, cut the root-ball ties or the wire on any wire baskets and carefully pull away the burlap or other fabric. Examine any roots that protrude from the soil. If many roots are obviously crushed or torn, the tree may have severe growth problems. If only a few roots are injured, use a sharp tool to cut away only the injured portions. Be careful not to break the soil ball around the roots.

If the trunk flare has been buried, gently expose it with a stream of water before planting the tree, taking care not to damage the bark.

Container-grown Stock. Roots should not twist or circle in the container. Remove the root-ball from the container. Inspect the larger exposed roots carefully to see whether they are twisting or turning in circles. Circling roots often girdle and kill other roots. If only a few roots are circling, cut them away with a sharp tool.

The trunk flare should be obvious. Be alert for trees planted too deeply in containers or "buried" in fabric bags. As with root-balled stock, you should be able to see the trunk flare on container-grown plants. If the trunk flare has been buried, gently expose it before planting the tree, taking care not to damage the bark. Plant the tree so the trunk flare is at the ground surface (not buried).

Injuries

Never buy a tree without thoroughly checking the trunk. Beware of injuries beneath trunk wraps. If the tree is wrapped, remove the wrap and inspect the trunk for wounds, incorrect pruning cuts, and insect injuries. Wrap can be used to protect the trunk during transit but should be removed after planting.

Incorrect pruning cuts are major problems. Incorrect pruning cuts that remove or injure the swollen branch collar at the base of branches can start many serious tree problems, cankers, decay, and cracks.

Form

Good, strong form starts with branches evenly spaced along the trunk. Branches should have firm, strong attachments with the trunk.

Squeezed branches portend problems: weak branch unions occur where the branch and trunk squeeze together. Because branches and trunks increase in diameter as they grow, the squeezing increases and dead spots or cracks will begin to form where the branch is attached to the trunk. Once this problem starts, the weak branch attachment could lead to branches cracking or breaking during mild to moderate storms.

When several branches are at the same position on the trunk, the likelihood of weak attachments and cracks increases greatly. As the branches grow larger and squeeze tighter together, the chances for splitting increase.

Avoid trees with two or more vertical stems squeezing together. As stems squeeze together, cracks will form down the trunk. The cracks could start from squeezed multiple leader stems or where the two trunks come together, pinching the bark between them (Figure 5).

If you desire a tree with multiple trunks, make certain that the trunks are well separated at the ground line. Remember, trunks expand in diameter as they grow. Two trunks may be slightly

separated when small, but as they grow in girth, the trunks will squeeze together.

Look for early signs of vertical trunk cracks. Examine branch unions carefully for small cracks below the unions. Cracks are major starting points for fractures of branches and trunks. The small cracks can be present for many years before a fracture happens. Always keep a close watch for vertical cracks below squeezed branches and squeezed trunks.

If your tree has only a few minor problems, corrective pruning may help. Start corrective pruning one year after planting. Space major pruning over several years. Remove broken or torn branches at the time of planting. After a year, start corrective pruning by removing any branches that died after planting.

Figure 5. Acute angles between tree branches can result in the bark getting pinched between them. This leads to cracking and splitting of the branches so that one eventually breaks off and falls. In this example, one of the branches should have been eliminated when they were small to avoid this problem, and one should be cut now before it breaks off and falls.

New Tree and Shrub Planting

Planning before plant selection and planting can help ensure that the right tree is planted in the right place. Proper tree selection and placement enhance your property value and prevent costly maintenance, trimming, and damage to your home or property.

Timing and Preparation

The ideal time to plant trees and shrubs is during the dormant season, which is in the fall after leaf drop or early spring before budbreak. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, plants properly cared for in the nursery or garden center and given the appropriate care during transport to prevent damage can be planted throughout the growing season, provided that sufficient water is available. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. Before you begin planting your tree or shrub, be sure you have had all underground utilities located prior to digging.

If the tree you are planting is balled or bare-root, its root system has been reduced by 90 to 95 percent of its original size. As a result of the trauma caused by the digging up and root reduction process, many plants exhibit what is known as transplant shock. Containerized trees may also experience transplant shock, particularly if they have circling roots that must be cut. Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting, coupled with good follow-up care, reduces the amount of time the plant remains in transplant shock and allows the plant to quickly establish in its new location.

Steps for Planting

Following these steps can significantly reduce the stress placed on a plant at the time of its planting.

1. **Dig a shallow, broad planting hole.** Make the hole wide, as much as three times the diameter of the root-ball but only as deep as the root-ball. It is important to make the hole wide because the roots on the newly establishing tree or shrub must push through surrounding soil in order to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.
2. **Identify a tree's trunk flare.** The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (Figure 6). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root-ball. Find it so you can determine how deep the hole needs to be for proper planting.
3. **Remove the container from containerized trees.** Carefully cutting down the sides of the container may make this easier. Cut or remove any circling roots in the root-ball. Expose the trunk flare, if it isn't already showing.
4. **Place the tree at the proper depth.** Before placing the tree in the hole, check to see that the hole has been dug to the proper depth and not deeper. The majority of the roots on a tree will develop in the top 12 inches of soil. If a tree is planted too deeply, new roots will have difficulty developing because of a lack of oxygen. It is better to plant the tree a little shallow, 2 to 3 inches above the base of the trunk flare, than to plant it at or below the original growing level. This planting level will allow for some settling. To avoid damage when setting the tree in the hole, always lift the tree by the root-ball and never by the trunk.
5. **Straighten the tree in the hole.** Before you begin backfilling, have someone view the tree from several directions to confirm that the tree is straight. Once you begin backfilling, it is difficult to reposition the tree.
6. **Fill the hole gently but firmly.** Fill the hole about one-third full and gently but firmly pack the soil around the base of the root-ball. Then, if the root-ball is wrapped, cut and remove any fabric, plastic, string, and wire from around the trunk and root-ball to facilitate growth (Figure 6). Be careful not to damage the trunk or roots in the process.
7. Firmly pack the soil as you fill the remainder of the hole to eliminate air pockets that may cause roots to dry out.

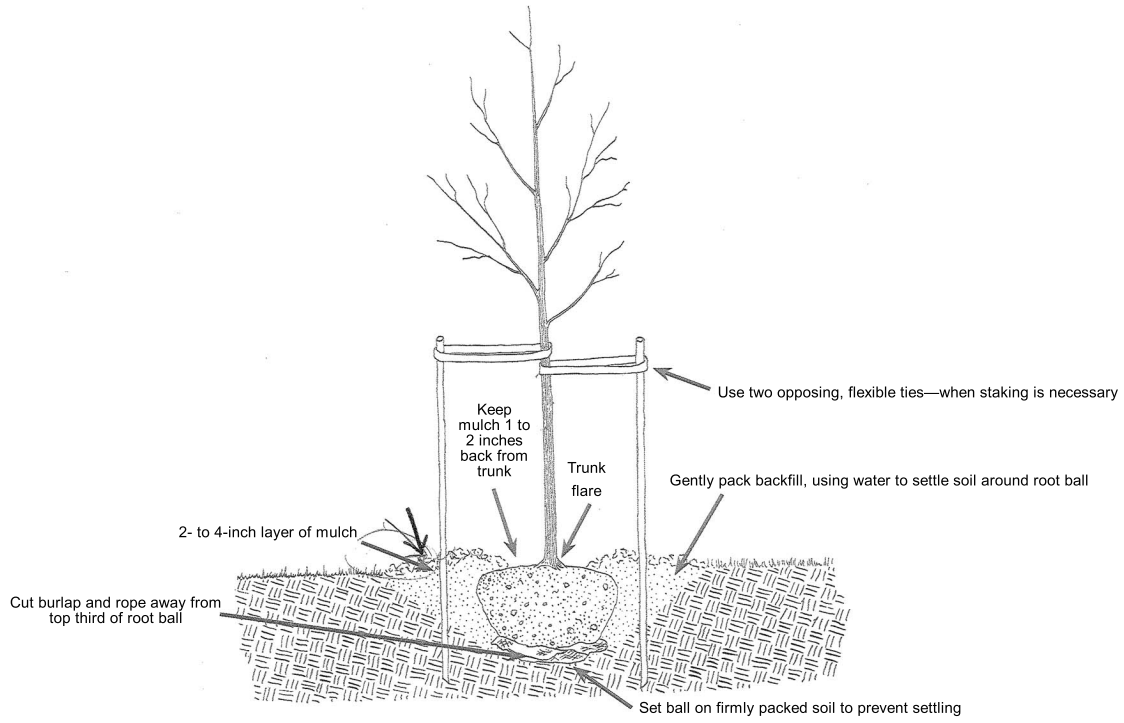

Figure 6. Good tree planting practices include removing the plant root container, backfilling the hole and settling the soil, mulching, and staking the new tree if necessary.

To best avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. Do not apply fertilizer at the time of planting.

8. **Stake the tree, if necessary.** If the tree was grown and dug properly at the nursery, staking for support will not be necessary in most home landscape situations. Studies have shown that trees establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism, or windy conditions are concerns.

   If staking is necessary for support, two stakes used in conjunction with a wide, flexible tie material on the lower half of the tree will hold the tree upright, provide flexibility, and minimize injury to the trunk. Remove support staking and ties after the first year of growth.

9. **Mulch the base of the tree.** Mulch acts as a blanket to hold moisture, moderates soil temperature extremes, and reduces competition from grass and weeds. Some good choices are leaf litter, pine needles, shredded bark, or composted wood chips. A 2- to 4-inch layer is ideal. More than 4 inches may cause problems with oxygen and moisture levels. When placing mulch, be sure that

the actual trunk of the tree is not covered. Covering the trunk may cause decay of the living bark at the base of the tree. A mulch-free area, 1 to 2 inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

10. **Provide follow-up care.** Water newly planted trees at least once a week, barring rain, and more frequently during hot weather. Keep the soil moist but not soaked; overwatering causes leaves to turn yellow or fall off. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off at times of lower temperatures that require less-frequent watering.
11. **Limit pruning.** Only remove branches damaged during the planting process. Prune sparingly immediately after planting and wait to begin necessary corrective pruning until after a full season of growth in the new location.

Trees and Turf

Trees and turf grasses provide many of the same environmental benefits including:

- processing carbon dioxide and releasing oxygen into the air we breathe
- cooling the air by changing water into water vapor
- stabilizing dust
- entrapping air polluting gases
- controlling erosion

However, we've all seen poor, thinning grass under large shade trees, large surface tree roots that cause safety hazards and mowing obstacles, young trees that don't seem to grow, and tree trunks badly damaged by lawn mowers or string trimmers. All of these undesirable effects can be caused by trees and turf growing together.

When trees and turf are used in the same areas, an effort should be made to make the trees and lawn compatible. Grass is generally a sun-loving plant. Most grass species will not grow well in areas that get less than 50 percent open sunlight; however, there are varieties with improved shade tolerance. Refer to the discussion of shade-tolerant grasses in Chapter 9: Lawns.

In areas where the lawn is the primary design feature, select woody plants that compete least with grass growth and maintenance. These woody plants should be small, have an open canopy (to allow sunlight to penetrate to the ground), or have a high canopy. Select trees that do not root near the soil surface. Spruce, Norway maples, poplars, and aspens all have shallow root systems, but surface rooting on any tree can be serious where

shallow topsoil or composted clay soils are present. Remember, tree roots get larger as the tree gets older, so surface roots will only become bigger problems later.

Competition

Each plant in the landscape competes with neighboring plants for available sunlight, water, nutrients, and rooting space for growth. Because woody plants increase in size each year, they require even more space over time. A landscape design should provide adequate space for these plants to mature.

While shade is the biggest, most obvious problem trees create for turf growth, a tree's roots also contribute to poor turf performance. Most tree roots are in the top 2 feet of soil. More importantly, the majority of fine, water-absorbing roots are in the top 6 inches of soil. Grass roots ordinarily occupy a much greater percentage of the soil volume than tree roots do and so outcompete them for water and nutrients, especially around young trees. However, grass root density is often much lower in areas where trees were established first. In these situations, tree roots compete much better for water and nutrients and can prevent or reduce the success of establishing new turf.

The newest plant in a landscape must be given special treatment and must receive adequate water, nutrients, and sunlight. This frequently means that competing sod should be removed from around transplanted trees and shrubs, or that some of the lower branches should be removed from existing trees above a newly sodded lawn. In any case, do not do any rototilling around trees.

Mulching is an alternative to growing turf around trees, and its use eliminates potential competition. A 2- to 4-inch layer of wood chips, bark, or other organic material over the soil within the **drip line**—the outermost reaches of the tree canopy—is recommended (Figure 7).

Maintenance Practices

Maintenance practices for trees and turf are different and because tree and grass roots exist together in the upper 6 to 8 inches of the topsoil, treatment of one may damage the other. Fertilizer applied to one plant will also be absorbed by the roots of any nearby plant. Normally that is good, but excessive fertilizing of either trees or turf can result in tree crown or grass blade growth greater than desired.

Many herbicides or weed killers that are used on turf can cause severe damage to trees when misapplied. Misapplication can occur on windy days, causing the drift to fall on non-target plants, or on hot days when the herbicide may vaporize and diffuse into the air. While most herbicides do not kill tree roots, some, such as soil sterilants and a few others, do. Herbicides that can cause tree

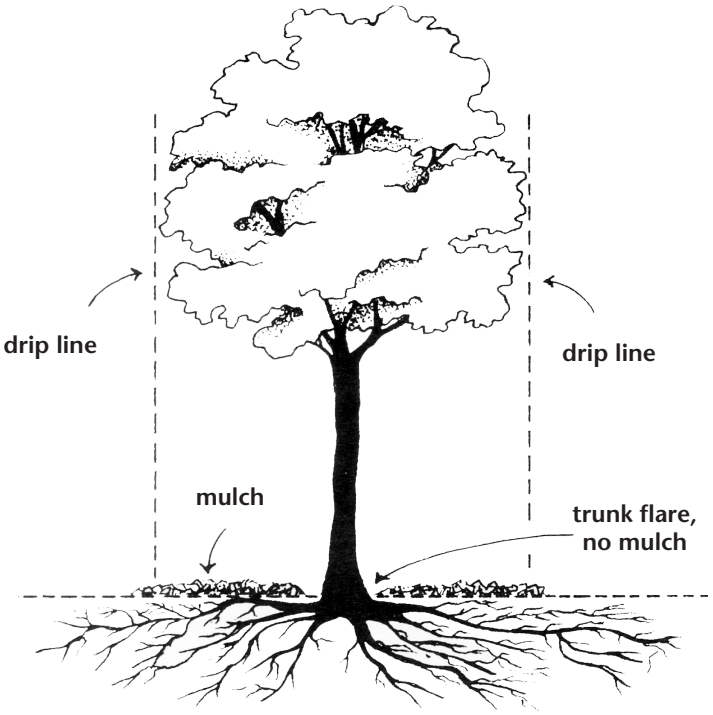

Figure 7. The drip line of a tree or shrub marks a rough circle on the ground around the plant where rain shed by the plant would land. The drip line is defined by the outer reaches of the plant's branches. At a minimum, mulch should cover all the ground within the drip line, but not pile up against tree trunks or plant stems.

damage have statements on their labels warning against using the product near trees.

Watering of lawns is beneficial to trees too, if the watering is done correctly. Trees need, on average, one inch of water every seven to ten days, depending on the species. Frequent, shallow watering does not properly meet the needs of either trees or turf and can be harmful to both.

Special Situations

Placing fill dirt around existing trees. Fill dirt may be desired around existing mature trees so that a level or more visually desirable lawn can be established. The added fill dirt changes the ratio of oxygen to carbon dioxide around tree roots and, as a result, the roots may die. Consult a tree care expert before adding fill or constructing soil wells around tree trunks.

Establishing lawns around existing trees. Preparation of a seedbed for lawns requires disruption of the upper 4 to 6 inches of topsoil. This soil contains the feeder roots of trees. Damage to tree roots often results in declining tree tops.

Lawn watering in arid sites. In arid regions, the watering that is required to maintain grass is especially damaging to dryland trees. Excess water at the tree trunk encourages growth of fungi that can kill trees.

Mulching

Mulching is one of the most beneficial things a home owner can do for the health of landscape plants. Mulches are materials placed over the soil surface to maintain moisture and improve soil conditions.

Benefits of Mulching

Trees growing in a natural forest environment have their roots anchored in a rich, well-aerated soil full of essential nutrients. That soil is blanketed by **humus**, derived from rotting leaves, needles, and organic materials, that replenishes soil nutrients and provide an optimal environment for root growth and mineral uptake. Urban landscapes, however, are typically a much harsher environment with poor soils, little organic matter, and large fluctuations in temperature and moisture. Applying a 2- to 4-inch layer of organic-matter mulch can mimic a more natural environment and improve plant health.

Although the guideline for many maintenance practices is the drip line the roots can grow many times that distance. In addition, most of the fine, absorbing roots are located within inches of the soil surface. These roots, which are essential for taking up water and minerals, require oxygen to survive. A thin layer of mulch, applied as broadly as practical, can improve the soil structure, oxygen levels, temperature, and moisture availability where these roots grow.

Types of Mulch

The two major types of mulch are inorganic and organic. Inorganic mulches include various types of stone, lava rock, pulverized rubber, geotextile fabrics, and other materials. Inorganic mulches do not decompose and do not need to be replenished often. On the other hand, they do not improve soil structure, add organic materials, or provide nutrients. For these reasons, most horticulturists and arborists prefer organic mulches.

Organic mulches include wood chips, pine needles, hardwood and softwood bark, leaves, compost mixes, and a variety of other products usually derived from plants. Organic mulches decompose in the landscape at different rates depending on the material and climate. Materials that decompose faster must be replenished more often. Because the decomposition process improves soil quality and fertility, many arborists and other landscape professionals consider decomposition a positive characteristic, despite the added maintenance.

Benefits of Mulching

- Evaporation of water from the soil is reduced, and the need for watering can be minimized.
- A 2- to 4-inch layer of mulch will reduce the germination and growth of weeds.
- Mulch serves as nature's insulating blanket, keeping soils warmer in the winter and cooler in the summer.
- Many types of mulch can improve soil aeration, structure, and drainage.
- Some mulches can improve soil fertility.
- A layer of mulch can inhibit certain plant diseases.
- Mulching around trees and shrubs makes maintenance easier and can reduce the likelihood of damage from string trimmers or lawn mowers.
- Mulch can give planting beds a uniform, well-cared-for look.

Mulching Techniques

Both the choice of mulch and the method of application are important to the health of landscape plants. Following are some guidelines to use when applying mulch.

- Inspect plants and soil in the area to be mulched. Determine whether drainage is adequate. Most commonly available mulches work well in most landscapes.
- If mulch is already present, check the depth. Do not add mulch if there is a sufficient layer in place. Rake the old mulch to break up any matted layers and to refresh the appearance.
- Do not pile mulch against stems or tree trunks; pull it back several inches so that the base of the trunk and the trunk- or root-flare remain exposed.
- Organic mulches usually are preferred to inorganic materials because of their soil-enhancing properties. If organic mulch is used, it should be well aerated and, preferably, composted. Avoid using sour-smelling mulch.
- Composted wood chips can make good mulch, especially when they contain a blend of leaves, bark, and wood. Fresh wood chips also may be used around established trees and shrubs, but they may tie up available nitrogen while they decompose.
- For well-drained sites, apply a 2- to 4-inch layer of mulch. If there are drainage problems, a thinner layer should be used. Spread mulch out to the tree's drip line or beyond.

Mulch Problems

Improperly applied mulch can lead to problems in a landscape.

- Mulch applied too thickly can lead to excess moisture in the root zone, which can stress the plant and cause root rot.
- Mulch piled high against the trunks of young trees may create habitats for rodents that chew the bark and can girdle the trees. Mulch placed right against tree trunks can stress stem tissues and may lead to insect and disease problems.
- Some mulches, especially those containing cut grass, can affect soil pH. Continued use of certain mulches over long periods can lead to micronutrient deficiencies or toxicities.
- Thick blankets of finely textured mulch can become matted and may prevent the penetration of water and air. In addition, a thick layer of fine mulch can decompose and become like potting soil that supports weed growth.
- Anaerobic "sour" mulch may give off pungent odors, and the alcohols and organic acids that build up may be toxic to young plants.

Mature Tree Care

Tree care is an investment: a healthy tree increases in value with age, paying big dividends by increasing property values, beautifying our surroundings, purifying our air, and saving energy by providing cooling shade from summer's heat and protection from winter's wind. Regular maintenance, designed to promote plant health and vigor, ensures their value will continue to grow.

Preventing a problem is much less costly and time-consuming than curing one once it has developed. An effective maintenance program, including regular inspections and the necessary follow-up care, can detect problems and correct them before they become damaging or fatal. Considering that many tree species can live as long as 200 to 300 years, including these practices when caring for your home landscape is an investment that will offer enjoyment and value for generations.

Tree Inspection

Tree inspection is an evaluation tool to assess any change in the tree's health before a problem becomes too serious. By providing regular inspections of mature trees at least once a year, you can prevent or reduce the severity of future disease, insect, and environmental problems. During tree inspection, examine four characteristics of tree vigor: new leaves or buds, leaf size, twig growth, and absence of **crown dieback** (gradual death of the upper part of the tree).

A reduction in the growth of shoots, buds, or new leaves is a fairly reliable cue that the tree's health has recently changed. To evaluate this factor, compare the growth of the shoots over the past three years. Determine whether there is a reduction in the tree's typical growth pattern.

Further signs of poor tree health are trunk decay, crown dieback, or both. These symptoms often indicate problems that began several years before. Loose bark or growths such as trunk conks (mushrooms) are common signs of stem decay.

Any abnormalities found during these inspections, including insect activity and spotted, deformed, discolored, or dead leaves and twigs, should be noted and watched closely.

Mulching

Mulching of established trees can reduce environmental stress by providing trees with a stable root environment that is cooler and contains more moisture than the surrounding soil. Mulch can also prevent mechanical damage by keeping machines such as lawn

mowers and string trimmers away from the tree's base. Further, mulch reduces competition from surrounding weeds and turf.

To do all this, mulch should be placed 2 to 4 inches deep and cover the entire root system, which may extend as far out as 2 or 3 times the diameter of the branch spread of the tree. If the area and activities happening around the tree do not permit the entire area to be mulched, mulch as much of the area under the drip line of the tree as possible.

Plastic sheet mulch should not be used because it interferes with the exchange of gases between soil and air, thus inhibiting root growth. Thicker mulch layers, 5 to 6 inches deep or greater, may also restrict gas exchange.

Fertilizing

Fertilizing a tree can improve growth; however, if fertilizer is not applied wisely, it may not benefit the tree at all and may even harm the tree. Mature trees with satisfactory growth may not require fertilization. When considering supplemental fertilizer, it is important to know which nutrients are needed and when and how they should be applied. Especially when dealing with a mature tree that provides considerable benefit and value to your landscape, it is worth the time and investment to have the soil tested for nutrient content.

The same herbicide that kills broadleaf weeds in your lawn is picked up by tree roots and, if incorrectly applied, can harm or kill your trees.

Mature trees have expansive root systems 2 to 3 times wider than the diameter of their canopies. A majority of the actively growing roots are located outside the tree's drip line. It is important to understand this when applying fertilizer to your trees as well as to your turf.

Lawn fertilizers that contain weed-and-feed formulations may be harmful to your trees. When you apply a broadleaf herbicide to your turf, remember that tree roots coexist with turf roots. The same herbicide that kills broadleaf weeds in your lawn is picked up by tree roots and, if incorrectly applied, can harm or kill your trees. Understanding the actual size and extent of a tree's root system before you fertilize is necessary to determine how much, what type, and where to best apply fertilizer.

Pruning

Pruning is the most common tree maintenance procedure next to watering. Pruning is often desirable or necessary to remove dead, diseased, or insect-infested branches and to improve tree structure, enhance vigor, or to maintain safety. Because each cut has the potential to change the growth of (or cause damage to) a tree, no branch should be removed without a reason.

Removing foliage from a tree has two distinct effects on its growth. Removing leaves reduces photosynthesis and may reduce overall growth. That is why pruning should always be performed sparingly. Over-pruning is extremely harmful because without enough leaves, a tree cannot gather and process enough sunlight to survive. However, after pruning, the growth that does occur takes place on fewer shoots, so they tend to grow longer than they would without pruning. Understanding how the tree responds to pruning should assist you when selecting branches for removal.

Pruning mature trees may require special equipment, training, and experience. If the pruning work requires climbing, the use of a chain or hand saw, or the removal of large limbs, then personal safety equipment, such as protective eyewear and hearing protection, must be used. Arborists can provide a variety of services to assist in performing the job safely and reducing risk of personal injury and damage to your property. They also are able to determine which type of pruning is necessary to maintain or improve the health, appearance, and safety of your trees. See Chapter 21 "Pruning Woody Landscape Plants" for details on how and when to prune trees and other woody landscape plants.

Tree Removal

Although tree removal is a last resort, there are circumstances when it is necessary. An arborist can help decide whether or not a tree should be removed. Professionally trained arborists have the skills and equipment to safely and efficiently remove trees. Removal is recommended when a tree:

- is dead, dying, or considered irreparably hazardous;
- is causing an obstruction;
- is crowding and causing harm to other trees and the situation is impossible to correct through pruning;
- is to be replaced by a more suitable specimen; or
- should be removed to allow for construction.

Pruning or removing trees, especially large trees, can be dangerous work. It should be performed only by those trained and equipped to work safely in trees.

Tree Hazards

While trees provide significant benefits to our homes and cities, when trees fall and injure people or damage property, they are liabilities. Recognizing and reducing tree hazards not only increases the safety of your property and that of your neighbors but also improves the tree's health and may increase its longevity.

It is an owner's responsibility to provide safety from trees on his or her property. However, evaluating the seriousness of tree defects is best done by a professional arborist. Once a hazard is recognized, steps may be taken to reduce the likelihood of the tree falling and injuring someone or causing more damage.

Trees that fall into utility lines have additional serious consequences. Hitting a line may cause power outages, surges, fires, and other damage. Downed lines still conducting electricity are especially dangerous. A tree with the potential to fall into a utility line is a very serious situation.

A severely leaning tree is an obvious hazard. The following are less obvious defects or signs of possible defects in urban trees that can become hazards (Figure 8):

1. regrowth after topping, line clearance, or other pruning
2. utility lines adjacent to tree
3. broken or partially attached branch
4. open cavity in trunk or branch
5. large dead or dying branches
6. multiple branches arising from a single point on the trunk
7. mushrooms and other signs of decay and rot present in old wounds
8. recent change in grade or soil level, or other construction

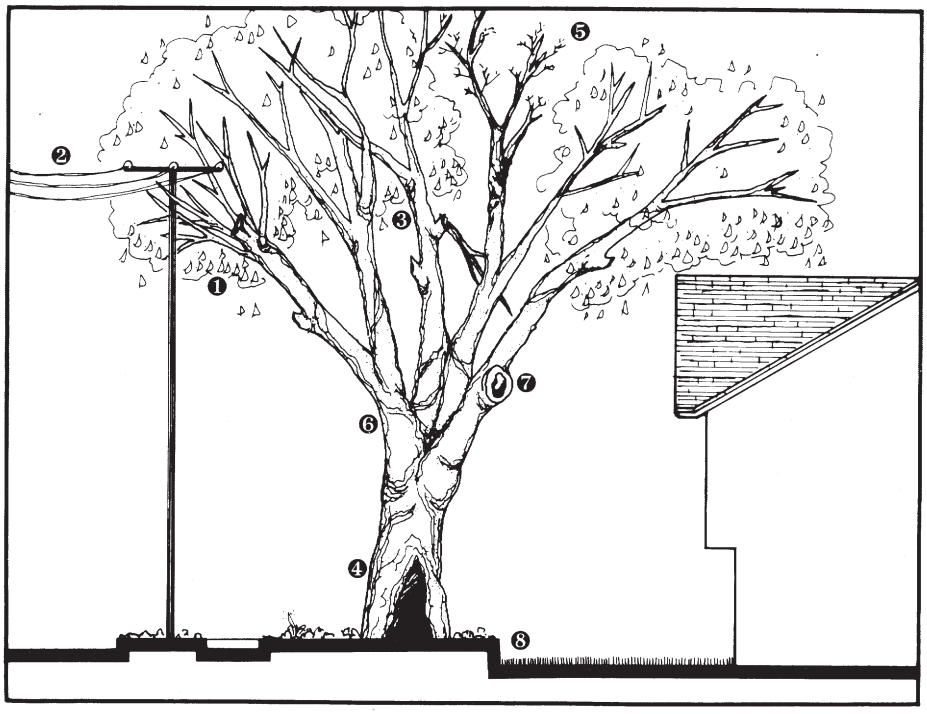

Figure 8. Common defects in urban trees can make them a hazard in the landscape. Refer to the text for details on each numbered defect.

Managing Tree Hazards

An arborist familiar with hazard tree evaluation may suggest one or more of the following:

- **Remove the target.** While a home or a nearby power line cannot be moved, it is possible to move picnic tables, cars, landscape features, or other possible targets to prevent them from being hit by a falling tree.
- **Prune the tree.** Remove the defective branches of the tree. Because inappropriate pruning may weaken a tree, pruning work is best done by an ISA Certified Arborist.
- **Cable and brace the tree.** Provide physical support for weak branches and stems to increase their strength and stability.
- **Provide routine care.** Mature trees need routine care in the form of water, fertilizer (in some cases), mulch, and pruning as dictated by the season and the tree structure.
- **Remove the tree.** Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement. And remember "right tree, right place." Don't plant a future problem for someone else.

Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement.

Avoiding Tree–Utility Conflicts

When planning what type of tree to plant, remember to look up and look down to determine where the tree will be located in relation to overhead and underground utility lines. For us to enjoy the convenience of reliable, uninterrupted utility service, distribution systems are required to bring utilities into our homes. These services arrive through overhead or underground lines. Overhead lines can be electric, telephone, or cable television. Underground lines include those three plus water, sewer, and natural gas.

The location of these lines should have a direct impact on your tree and planting site selection (Figure 9). The ultimate mature height of a tree to be planted must be within the available overhead growing space. Just as important, the soil area must be large enough to accommodate the particular rooting habits and ultimate trunk diameter of the tree.

Overhead Lines. Overhead utility lines are the easiest to see and probably the ones we take most for granted. Planting tall-growing trees under or near these lines eventually requires your utility company to prune them to maintain the required safe clearance from the wires. This pruning may result in the tree having an unnatural appearance and can also lead to a shortened life span for the tree. Trees that must be pruned away from power lines are under greater stress and are more susceptible to insects and disease. Small, immature trees planted today can become problem trees in the future.

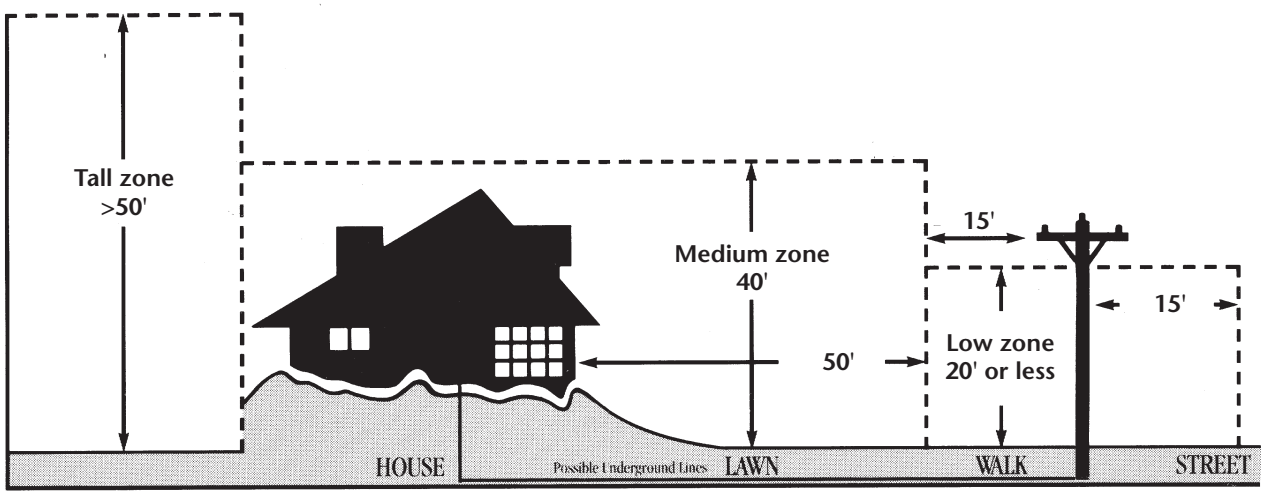

Figure 9. Trees should be placed within a landscape so that their mature size will not interfere with overhead or underground utility lines or other buildings and structures.

Tall trees near overhead lines can cause service interruptions when trees contact wires. Children or adults climbing in these trees can be severely injured or even killed if they come in contact with the wires. Proper selection and placement of trees in and around overhead utilities can eliminate potential public safety hazards, reduce expenses for utilities and their rate payers, and improve the appearance of landscapes (Figures 10, 11).

Underground Lines. Much of the utility services provided today run below ground. Tree roots and underground lines often coexist without problems. However, trees planted near underground lines could have their roots damaged if the lines need to be dug up for repairs.

Call before you dig! Visit www.callbeforeyoudig.org

The biggest danger to and from underground lines occurs during planting. Before you plant, make sure that you know the location of any underground utilities. To be certain that you do not accidentally dig into any lines and risk serious injury or a costly service interruption, call your utility company or utility protection service first. In Washington State, the law requires anyone doing an excavation to call for a utility locate service first. Visit www.callbeforeyoudig.org for more information and phone numbers of utility notification centers.

Never assume that utility lines are buried deeper than you plan to dig. In some cases, utility lines are very close to the surface.

Siting Urban Trees

Different size trees have different roles and places in the landscape. Trees that grow as tall as 60 feet need to be in large, open areas away from contact with any overhead wires. Before planting a tree that will grow large, consider whether the mature tree will interfere

Figure 10. This fir tree was probably less than 5 feet tall when it was planted more than 40 years ago. Pruning to keep it away from overhead utility lines has ruined its natural shape. Its near-surface roots have also cracked and lifted the adjacent sidewalk, creating a hazard.

with your neighbors' views and their existing trees. Plant large trees at least 35 feet away from a house for proper root development and to minimize potential damage to the house or building. Street planting sites for large trees must have no overhead wires and have wide planting areas or medians (wider than 8 feet) to allow for a large root system, trunk diameter, and trunk flare. Large trees are recommended for parks, meadows, or other open areas where their large size, both above and below ground, will not be restricted and not cause damage or become a liability.

Trees that grow up to 40 feet tall can be used to accent or frame your house or provide a park-like setting. Select your trees first, then plant shrubs to complement the trees. Medium-size trees are recommended for planting anywhere the available above- and below-ground growing space will allow them to reach a mature height of 30 to 40 feet. Appropriate soil spaces are wide planting areas or medians (4 to 8 feet wide), large planting squares (8 feet square or greater), and other open areas of similar size or larger.

Trees with a mature height of less than 20 feet are recommended when the growing space is limited, including within 15 feet of utility lines. These trees are appropriate as well for narrow planting areas (less than 4 feet wide); planting squares or circles surrounded by concrete; large, raised planting containers; or other locations where underground space for roots will not support tall- or medium-size trees.

*Figure 11. The short stature (20 feet tall at maturity) of these 'Crimson Sentry' Norway maples (*Acer platanoides*) will prevent them from growing up into the overhead power lines.*

Treatment of Damaged Trees

Despite the best intentions and most stringent tree preservation measures during a construction project, trees still might be injured. There are some remedial treatments that may save some construction-damaged trees, but immediate implementation is critical.

Treating Trunk and Crown Injuries

Pruning. Branches that are split, torn, or broken should be removed. Also remove any dead, diseased, or rubbing limbs from the crown of the tree. Sometimes it is necessary to remove some lower limbs to raise the canopy of a tree and provide clearance below. After such extensive pruning, it is best to postpone other maintenance pruning for a few years. It used to be recommended that tree canopies be thinned or topped to compensate for any root loss. There is no conclusive research to support this practice. In fact, thinning the crown can reduce a tree's food-making capability and may stress the tree further. It is better to limit pruning in the first few years to removal of damaged branches and dead wood. Do not top trees, ever.

Cabling and Bracing. Trees growing in wooded areas are usually not a threat to people or structures. Trees that are close to houses or other buildings must be maintained to keep them structurally sound. If branches or tree trunks need additional support, a professional arborist may be able to install cables or bracing rods. If cables or braces are installed, they must be inspected regularly. The amount of added security offered by the installation of support hardware is limited. Not all weak limbs are candidates for these measures.

Bark and Trunk Wounds. Often the bark may be damaged along the trunk or major limbs. If that happens, remove any loose bark. Use a sharp knife to cut away jagged edges. Take care not to cut into living tissues.

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings generally do not reduce decay or speed closure and rarely prevent insect or disease infestations. Most experts now recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, use just a thin coating of a nontoxic material.

Irrigation and Drainage

One of the most important tree maintenance procedures following construction damage is to maintain an adequate, but not excessive, supply of water to the root zone. If soil drainage is

good, be sure to keep trees well watered, especially during the dry summer months. A long, slow soak over the entire root zone is the preferred method of watering. Keep the top 12 inches moist, but avoid overwatering. Avoid frequent, shallow watering. Make sure surface water drains away from the tree. Proper irrigation may do more to help trees recover from construction stress than anything else you could do.

If a drainage problem has developed due to soil compaction or grade change, the trees will decline rapidly. Improper drainage must be corrected if the trees are to be saved.

Drilling Holes/Vertical Mulching. Both compaction of soil and increases in grade have the effect of depleting the oxygen supply to tree roots. If soil aeration can be improved, root growth and water uptake can be enhanced.

A common method of aeration of the root zone involves drilling holes in the ground. Holes are usually 2 to 4 inches in diameter and are made about 3 feet on center throughout the root zone of the tree. The depth should be at least 12 inches but may need to be deeper if the soil grade has been raised. Sometimes the holes are filled with peat moss, wood chips, pea gravel, or other materials that maintain aeration and support root growth. This process is called **vertical mulching**.

Radial Aeration. Some research has shown promising results with another method called **radial aeration**, in which narrow trenches are cut with a compressed air gun in a radial pattern throughout the root zone. These trenches are placed like the spokes of a wheel, with the tree trunk as the hub. It is important to begin the trenches 4 to 8 feet out from the trunk of the tree to avoid cutting any major support roots. Trenches should extend at least as far as the drip line of the tree. If the primary goal is to reduce compaction, the trenches should be about 8 to 12 inches in depth. They may need to be deeper if the soil grade has been raised.

The narrow trenches can be backfilled with topsoil or compost. Root growth will be greater in the trenched area than in the surrounding soil. This treatment can give a tree the added boost it needs to adapt to the compacted soil or new grade.

Vertical mulching and radial aeration are techniques that may improve conditions for root growth. If construction-damaged trees are to survive the injuries and stresses they have suffered, they must replace the roots that have been lost.

Fertilizing

Most experts recommend not fertilizing trees the first year after construction damage. Water and mineral uptake may be reduced because of root damage, so excessive soil salts (from fertilizer) can

draw water out of the roots and into the soil. In addition, nitrogen fertilization may stimulate top growth at the expense of root growth.

It is a common misconception that applying fertilizer gives a stressed tree a much-needed shot in the arm. Fertilization should be based on the nutritional needs of trees on a site. Soils should be tested to determine whether any of the essential minerals are deficient. If soil nutrients are deficient, supplemental fertilization may be indicated. It is advisable to keep application rates low until the root system has had time to adjust.

Monitoring for Decline and Hazards

Despite your best efforts, you may lose some trees from construction or other damage. Symptoms of decline include smaller and fewer leaves, dieback in the crown of the tree, and premature fall color. If a tree dies as a result of root damage, it may be an immediate falling hazard and should be removed right away.

Examine trees regularly for signs of possible hazards. Look for cracks in the trunk, split or broken branches, and dead limbs. Watch for indications of internal decay such as cavities, carpenter ants, soft wood, and mushroom-like structures growing on the trunk, root crown, or along the major roots. If you detect any defects or suspect decay, consult an arborist for a professional assessment.

Landscape Plant Values

Almost everyone knows that trees and other living plants are valuable for all the things they do. Many people don't realize, however, that plants have a dollar value of their own that can be measured by competent plant appraisers in a process known as **tree valuation**.

Valuating Trees and Shrubs

Professionals in this industry have developed a set of guidelines for valuation. Such guidelines have been widely adopted in the field and are recognized by insurance companies, the courts, and, in some cases, the Internal Revenue Service (IRS).

A casualty loss is defined by the IRS as "… a loss resulting from an identifiable event of sudden, unexpected, or unusual nature." This definition can include such events as vehicular accidents, storms, floods, lightning, vandalism, or even air and soil pollution.

If you incur damage to trees or landscaping from any type of casualty, first consult your home owner's insurance policy to

determine the amount and kind of coverage in place. Contact the insurance company to have an appraisal made by a competent tree and landscape professional who is experienced in plant appraisal. Have the appraisal made right after your loss or damage.

The appraiser will establish the amount of your loss in financial terms, including the costs of removing debris and making repairs as well as replacements. All of these steps are wise investments and well worth the cost you may incur for the inspection.

Value Factors

Size. Sometimes the size and age of a tree are such that it cannot be replaced. Trees that are too large to be replaced should be assessed by professionals who use a specialized appraisal formula.

Species or Classification. Trees that are hardy, durable, highly adaptable, and free from objectionable characteristics are most valuable. They require less maintenance and they have sturdy, well-shaped branches and pleasing foliage. Tree values vary according to your region, the "hardiness" zone, and even state and local conditions.

Condition. Obviously, a healthy, well-maintained plant has a higher value. Roots, trunk, branches, and buds all need to be inspected.

Location. Functional considerations are important. A tree in your yard may be worth more than one growing in the woods. A tree standing alone often has a higher value than one in a group. A tree near your house or one that is a focal point in your landscape tends to have greater value. The site, placement, and contribution of a tree to the overall landscape help determine the total value of the plant attributable to location.

All of these factors can be measured in dollars and cents by professional plant appraisers. They can determine the value of a tree, specimen shrubs, or evergreens, whether for insurance purposes, court testimony in lawsuits, or tax deductions.

Value Checklist

You can improve the value of your landscape investment and prevent financial loss should it be damaged by taking these steps:

- Plan your landscaping for both beauty and functional value.
- Protect and preserve landscape elements to maintain the total value.
- Take pictures of trees and other landscape plants now while they are healthy and vigorous. Pictures make before-

and-after comparisons easier and expedite the processing of insurance claims or deductions for losses on federal tax forms.

- Check your insurance. In most cases, the amount of an allowable claim for any one tree or shrub is a maximum of $500.
- For insurance, legal, and income tax purposes, keep accurate records of your landscape and real estate appraisals on any losses.

Certified Arborists

Generally, an arborist is a specialist in the care of individual trees. An arborist by definition is an individual who is trained in the art and science of planting, caring for, and maintaining individual trees.

ISA arborist certification is a nongovernmental, voluntary process by which individuals can document their base of knowledge. It operates without mandate of law and is an internal, self-regulating device administered by the International Society of Arboriculture. Certification provides a measurable assessment of an individual's knowledge and competence required to provide proper tree care. Certification is not a measure of standards of practice. Certification can attest to the tree knowledge of an individual but cannot guarantee or ensure quality performance.

Certified Arborists are individuals who have achieved a level of knowledge in the art and science of tree care through experience and by passing a comprehensive examination developed by some of the nation's leading experts on tree care. Certified Arborists must also continue their education to maintain their certification. Therefore, they are more likely to be up to date on the latest techniques in arboriculture.

Arborist Services

An arborist can determine the type of pruning necessary to maintain or improve the health, appearance, and safety of trees. These techniques include

- eliminating branches that rub each other
- removing limbs that interfere with wires, building facades, gutters, roofs, chimneys, or windows, or that obstruct streets or sidewalks
- removing dead or weak limbs that pose a hazard or may lead to decay
- removing diseased or insect-infested limbs

- creating better structure to lessen wind resistance and reduce the potential for storm damage
- training young trees
- removing limbs damaged by adverse weather conditions
- removing branches, or thinning, to increase light penetration
- improving the shape or silhouette of the tree

Tree Removal. Although tree removal is a last resort, there are circumstances when it is necessary. An arborist can help decide whether a tree should be removed. Arborists have the skills and equipment to safely and efficiently remove trees (Figure 12).

Figure 12. Special tools and skills are important for safely and effectively working in, or removing, trees.

Emergency Tree Care. Storms may cause limbs or entire trees to fall, often landing on other trees, homes and other structures, or cars. The weight of storm-damaged trees is great, and they can be dangerous to remove or trim. An arborist can assist in performing the job in a safe manner, while reducing further risk of damage to property.

Other Services. Many arborists also provide a variety of other tree care services, including

- recommending and planting trees
- Plant Health Care, a concept of preventive maintenance to keep trees in good health, which will help the tree better defend itself against insects, disease, and site problems
- fertilization
- cabling or bracing for added support to branches with weak attachment
- aeration to improve root growth
- installation of lightning protection systems
- spraying or injecting to control certain insect and disease problems

When selecting an arborist, ask for these 5 conditions:

1. ISA certification
2. Licensed in the state
3. Has evidence of liability insurance
4. Current list of references
5. If spraying or injecting materials to control insect and disease problems, evidence of a current Washington State pesticide license

Further Reading

WSU Extension Publications available at: http://cru84.cahe.wsu.edu/

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