*Chapter 19*

# Tree Appraisal: The Goal Is Equity

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## 1. Introduction

What do you think of when you hear the words "tree appraisal?" The replies of most professional arborists, consulting foresters, or any horticultural appraiser would probably include words such as "storms," "damage," "destruction," and "failure," and with good reason, these are the times when horticultural experts are most often contacted for their appraisal services. Unfortunately, these are the worst times to try to establish an accurate estimate of a tree's worth. The tree may be so heavily damaged or totally destroyed, so that it is difficult to assess its former positive and negative qualities and how it appeared prior to the damaging event. If an entire site has been damaged or destroyed, the problem becomes many times more difficult.

Given these drawbacks, it is more equitable to evaluate and appraise a landscape and its supporting plants before any damage occurs (Ingram, 1993). This is especially critical for such urban forest properties as arboreta, botanical gardens, public parks, and other sites whose total value is heavily or exclusively dependent on such natural features. An existing appraisal can be important to have not only in the event of a natural disaster; man-made events, such as construction, may heavily damage or destroy plants and landscapes as well. Knowing the work of such features in advance can be a powerful incentive to protect and preserve them from such predictable harm.

There are other, equally valid reasons that argue for the use of appraisals as a proactive measure, performed on a routine basis. More and more municipalities are conducting tree inventories in order to quantify the contribution that trees make to the quality of life in a community and to help them make provisions for protection of this resource. One component of such inventories is to place a value on each tree and

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on the community forest as a whole. These values are then used to establish and justify budget requests for maintenance, removals, and new plantings, in order to ensure the continuance of a healthy community forest.

Care of the community forest depends on more than just municipalities, since the definition of such a forest is that it includes "all trees in the community, regardless of ownership," and it is estimated that "60%–90% of the trees in urban forests in the United States are found on privately owned land" (Clark *et al*., 1997). Just as knowing tree values can aid cities and towns in budgeting for maintenance, knowing the appraised value of a landscape in the urban environment also can be a convincing argument to private owners to take care of their tree resources and to budget adequate funds for that purpose.

There are other reasons for performing appraisals of trees, shrubs, and the community forest. Insurance companies may require appraisals on either public or private properties, in order to both establish coverage levels before any damage occurs and assess the amount of damage in the event of a claim (Ingram, 1993). Appraisals may be needed for tax purposes in the event of a loss. Liability issues may become significant in the event of injury to persons or property caused by tree failure or loss of tree or vegetation on a site. Tort cases involving a wrongful act or a failure to act may require appraisals as evidence in courts of law.

In the plant appraisal process, values of individual plants and the landscape as a whole are reasonably and closely dependent on the value of the land they occupy (Bartlett, 1982). A major ingredient for the professional horticultural appraiser, that is, consulting arborists, consulting forester, or any other horticultural consultant to consider when making an appraisal is the need to ascertain some estimate of a property's total value, a process that may require assistance from a qualified real estate professional. A corollary to support this fact is the number of research studies that have proven trees and other landscape features contribute substantially to both assessed value and selling price of a property and have quantified the actual percentages of value added by attractive landscaping. The potential for horticultural appraisers to offer appraisal services for this purpose is substantial and as yet largely untapped [American Society of Consulting Arborists (ASCA), 1997]. Adopting a proactive approach to tree appraisal before damage occurs, rather than a reactive stance after the fact, offers yet another advantage; when horticultural appraisers systematically take the time to develop reasonable values to aid them, they are able to establish even more accurate and thoughtful appraisals.

While the proactive approach represents the ideal case, it is not always the realistic one. Sudden and unexpected disasters, both natural and man-made, do occur. After a catastrophic loss or any other unforeseen detrimental event, they require the professional appraisal expertise of an experienced horticultural appraiser on an emergency basis. However, the more the appraisals are performed ahead of time, the more the public will be educated to understand that plants can have substantial value and that it is best established before disaster strikes. There are many factors to consider in plant appraisal and there are various appraisal techniques we have to employ given a specific situation. We have designed a format to help the beginning consulting arborist, consulting forester, or any consulting horticultural appraiser learn about the accepted industry procedures and techniques to follow.

## 2. Appraisal Procedures

The process of tree and plant appraisal is a complicated one, involving many factors and many possible variables within each factor. Part of the process consists of procedures, a set of established methods that can be learned on a step-by-step basis (Council of Tree and Landscape Appraisers, 1992). The other part of the process, not so easily quantified, requires a mature ability to exercise sound judgment through forensic fact finding while maintaining ethical standards.

### 2.1. Qualifications of the Tree and Plant Appraiser

An appraiser must have a core of practical knowledge about plant structure and maintenance, as well as familiarity with appraisal procedures and record-keeping. A competent appraiser also needs to have confidence, gained from both education and experience, to be able to support and validate the conclusions and the final appraised values (ASCA, 1997). Personal integrity is of utmost importance, since clients and courts of law rely heavily on the honesty and professionalism of the consulting arborist or any other horticultural appraiser to help them establish values that are just, impartial, and fair for all parties concerned. The credibility of the horticultural consultant profession depends on the public perception that each appraiser will establish values that are both reasonable and equitable. If a client wants an appraiser to misrepresent a situation, to decrease or increase plant values for personal gain, or to adjust true value in any way, the appraiser should refuse to work with that client. The ability to weigh the ethical considerations and uphold the highest standards are critically important qualifications for a horticultural appraiser.

### 2.2. Diagnostic Instruments and Tools

One of the basic tasks in plant appraisal is to diagnose the condition of the plant. This is done by a thorough inspection of the leaves, twigs, branches, trunk, root collar, and roots. The appraiser will need a variety of instruments and tools to accomplish this task. Some tools, such as a trowel and a shovel, are simple to use; other more sophisticated instruments, such as increment borers and Shigometers (which measure resistance of tissue to direct current and help differentiate healthy from decayed wood), require some training and experience. Table 1 provides a list of scientific equipment often used in plant appraisal; they are widely available from horticultural and forestry supply companies.

Because of the complicated and sometimes subjective nature of the plant valuation process, it is essential that the horticultural appraiser follow a systematic procedure. Accurate field notes and photographs are important in recording a professional appraisal or diagnosis. The Council of Tree and Landscape Appraisers (CTLA) is composed of six trade and professional organizations whose members are often required to appraise plants and landscapes. These organizations include American Association of Nurserymen, American Society of Consulting Arborists, Associated Landscape Contractors of America, Association of Consulting Foresters of America, International Society of Arboriculture, and National Arborist Association. In addition

**Table 1. Diagnostic Instruments, Tools, and Supplies[a]**

| | |
|---|---|
| Recording | Collecting and examining specimens |
| Clipboard* | Disinfectant |
| Compass* | Labels* |
| Distance meter* | Microscope |
| Engineer's pocket scale | Plastic, glassine bags* |
| Photography equipment* | Vials for insects* |
| Pocket calculator | Tree problem diagnosis |
| Report forms | Battery-operated drill |
| Tape recorder | Binoculars* |
| Size of plant | Chisel gouge* |
| Diameter tape measure* | Entrenching tool* |
| Height meter* | Hand lens* |
| Mallet* | Ice pick* |
| Pole pruner* | Increment borer |
| Pruning knife* | Diagnosing soil problems |
| Pruning shears* | Gas detector |
| Shigometer, PIRM | pH meter |
| Shovel, spade* | Soil auger, profile tube* |
| Small saw | Soil moisture meter |
| Trowel* | |
| Trunk calipers | |

[a]From Council of Tree and Landscape Appraisers (1992).
* Denotes equipment most critically needed.

to the *Guide for Plant Appraisal* (CTLA, 1992), the CTLA has developed two reporting forms designed to aid professional appraisers with essential record-keeping and calculations as they make their observations. Printed in a manila file for convenience in filing and easy reference, both the "Field Report Guide for Trunk Formula" and the "Field Form Report for Cost of Cure" provide a format to record the steps followed in the appraisal process. The result is a clear and accurate representation.

## 3. Two Basic Methods of Plant Appraisal

There are several methods for establishing the monetary value of a plant (ASCA, 1997). One of the appraiser's tasks is to select the appropriate one given the particular situation; sometimes a second method may be used to confirm the findings from the first one. The two methods most often used by appraisers are replacement cost and trunk formula.

### 3.1. Replacement Cost

The replacement cost method is used when a tree or shrub or other vegetation being appraised is small enough that it can be replaced by one of similar size. This method is based on the cost of the largest transplantable, survivable plant that is com-

monly available from growers or suppliers in a particular region. The appraisal plant, and hence its replacement also must be of a size that can be legally transported on public roads without special permits (CTLA, 1992). The replacement cost may be adjusted mathematically after evaluation of the condition and location (see Sections 4.1 and 4.2) of the plant being replaced. However, each situation is different and must be carefully assessed to determine which, if either, of these adjustments are applicable.

## 3.2. Trunk Formula

The trunk formula is based on replacement cost and generally is used to appraise trees considered too large or unreasonable to replace with nursery or field stock. The trunk formula is composed of a number of specialized terms, all of the factors that affect the appraised tree value. Definitions of these terms are provided below, since many of them may be unfamiliar.

1. The formula for the trunk formula method is: *appraised value* = *basic value* × *condition* × *location*
2. The definition of basic value is also a formula: *basic value* = *replacement cost* + (*basic price* × $[TA_A - TA_R]$) × *species* (%)
3. Definitions
   - *Condition*: A percent rating based on structural integrity and plant health.
   - *Location*: A percent rating that is the average of the percent ratings assigned for each of three categories, *site, contribution*, and *placement*.
   - *Replacement cost*: The cost to buy and install the largest normally available, transplantable, survivable tree; varies according to region.
   - *Basic price*: The cost per unit trunk area (measured in square inches or square centimeters) of a replacement tree; figured from diameter measured at the height prescribed by the American Nursery Standards. The cost may be wholesale, retail, or installed, depending on how the tree is grown, marketed, and transplanted. These factors and hence basic price will vary according to region.
   - $TA_A$: Size of *trunk area* of an existing tree whose diameter is 30 inches (75 cm) or less, using diameter measured at 4.5 feet (1.4 m) above ground.
   - $TA_R$: Size of *trunk area* of a replacement tree (the largest normally available, transplantable, survivable tree) using diameter measured at either 6 or 12 inches (15 or 30 cm) above ground.
   - *Species*: Species rating of the appraised tree; a percent rating that varies according to region as well as species.

# 4. Factors That Affect Tree Value

## 4.1. Condition

As a factor in tree appraisal, condition can be quantified and expressed as a percentage that is multiplied into the trunk formula. Two principal attributes define the

overall condition of a landscape tree: (1) the structural integrity of the tree and (2) its general health.

### 4.1.1. Structural Integrity

Assessing a tree's structure should include careful examination of the roots, the trunk, and the branches (Fraedrich, 1993). The root system should be evaluated for general soundness, stability, and signs of potential problems such as broken or dead roots, large areas of missing roots, raised soil around the tree, and leaning of the trunk. Indications of trunk problems include longitudinal seams, externally visible cavities, and outward signs of inner cavities, such as bracts of wood-decaying fungi. Obvious branch problems are codominant stems, a weak V-crotch with included bark, several branches arising close together on the trunk, and dead limbs. Lightning scars, hangers, cankers, frost cracks from wounds (Shigo, 1989), sharp bends, and deadwood also may be signs of branch problems and possible hazards. The presence of one or more of these problems will affect and lower a tree's condition rating.

It may happen that one or more of the above problems is so severe that the tree is in danger of failing and constitutes a hazard or an unreasonable risk to persons or property (See Chapter 16). If this is the case, it should be removed before it causes harm. Such a tree may actually have a negative value, if the cost of removal and cleanup exceeds any value of the wood gained from its sale for timber or firewood (CTLA, 1992).

### 4.1.2. Plant Health

An important skill required of the professional plant appraiser is the ability to diagnose plant health. Often such diagnosis involves detective work, to uncover past causes of current ills or even to determine the health and history of a plant that is no longer there.

The general vigor of an existing plant can be assessed by examining the comparative amounts of annual shoot growth for the 3 to 4 preceding years. Progressively less growth for each of the past several years may indicate a tree suffering from stress. In addition, signs of declining or poor health are often exhibited in the foliage: leaves may be smaller than is normal for the species or cultivar; they may be distorted, withered, or scorched-looking; they may be off-color or yellowed, or may change to fall colors earlier than normal; they may show signs of insect or disease attack; and the leaf buds may exhibit decreased size, texture change, discoloration, or distortion. Other visible symptoms of a plant's poor health include dieback, insect frass, fungi or conks, and disfigured stems or roots.

If any symptoms of problems are identified as part of the observation or an existing plant's general appearance, the appraiser's challenge is to try to find the cause, in order to rate the current condition and help establish the plant's dollar value. When a plant has been destroyed or damaged beyond recognition, the detective work intensifies. In addition to careful examination of any remaining parts of the plant in question and of the environment around it, the appraiser may want to ask the property owner about the previous appearance of the plant before the final damage occurred,

whether the owner remembers seeing any of the above symptoms, and whether any pictures or tree inventories are available that include the plant in question. Neighbors and local officials may sometimes be sources of information. The appraiser also may want to investigate whether recently there was any construction in the area and whether any chemical treatments were applied on the property or on a neighboring property.

When seeking out causes of damage to plant health, an appraiser can look to three principal sources: diseases caused by biotic (living) agents, noninfectious disorders caused by abiotic agents, and direct mechanical injury.

**4.1.2.1. Disease-Causing Biotic Agents.** Fungi, viruses, bacteria, mycoplasmas, nematodes, and insects invade, infect, and affect plants, causing poor health (Harris, 1992). In addition to causing disease directly, insects may weaken a plant by defoliating it or otherwise physically damaging it, and thus may cause it to be more vulnerable to diseases from other sources.

Knowing the appraised worth of existing plants and being aware of the value they add to their real estate can be incentives to owners to care for those plants on a regular basis. Many of the problems caused by biotic agents can be limited or prevented with a plant health care (PHC) program. A PHC program will include general plant maintenance, such as fertilization and pruning, regular inspection and monitoring of insect and disease problems, and treatment of those problems before they become severe. A landscape insurance study (Ingram, 1993) of properties where maintenance included a regularly scheduled PHC program showed that when vegetative loss was monitored on a yearly basis, the percentage of plant losses relative to the overall value of landscape plants was extremely low.

A PHC program actually may increase plant and landscape value as it improves health and general landscape tree and shrub appearances; it may also diminish the risk of harm, since healthy plants tend to be more resistant to damage from natural causes. Establishing dollar value thus creates opportunity for the professional arborist or practicing landscaper to offer and provide the service of a regular PHC program as an aspect of general property maintenance, another argument for the proactive approach to plant appraisal before any possible damage may occur.

**4.1.2.2. Noninfectious Disorders Caused by Abiotic Agents.** Aside from biotic concerns, abiotic agents can inhibit growth and also may cause significant harm to plants. Abiotic agents include poor soil, high alkaline or high acid levels in soil, insufficient soil volume, natural or landfill gases leaking into the soil or air, polluted air or water, prolonged drought or excessive rainfall and flooding, spray or runoff from salt used to deice roads and sidewalks, girdling roots, and competition from other plants. Another type of abiotic damage occurs when trees whose root areas are covered by pavement or blocked in by buildings suffer from lack of access to moisture, oxygen, and nutrients. Soil compaction, a frequent problem in heavily trafficked areas of the urban forest, is also an abiotic cause of poor soil drainage, oxygen deprivation, and limited nutrient access. Finally one of the biggest culprits among the abiotic causes of damage to trees is planting too deeply. This all-too-common mistake buries the root collar, causing plants to suffocate (Fraedrich, 1993).

When plants are stressed or weakened by one or more of these abiotic agents, they become more susceptible to attack by secondary biotic agents. The regular

monitoring provided by a PHC program can be useful to alleviate or correct problems that may be initiated by abiotic agents such as soil compaction and root collar suffocation.

**4.1.2.3. Direct Mechanical Injury**. While biotic and abiotic agents may affect plants over a period of time before any damage is actually incurred, the third source of plant damage—mechanical injury—occurs during a short time span (usually less than a few minutes). Although it may be possible to pinpoint the exact minute of injury, damage from the injury may not be visible for some time afterward. A common (and preventable) source of injury to trees is new construction projects and renovations, which often cause large-scale cutting of roots, or injury to the trunk's bark and cambium layer. Either type of injury will cause decline over time. Other causes of injury are weed whackers, lawn mowers, vehicles, vandals, lightning, and storms in general.

Chemicals, such as herbicides, pesticides, fertilizers, and air or water pollutants, also have the capability of injuring plants and causing visible harm and death, either immediately after an application, on a delayed basis, or with frequent exposure over time. When a chemical overshoots a target area, accidentally or intentionally, this infringement is termed `chemical trespass.' Such trespass may have legal ramifications if it causes injury to plants on another's property.

Injuries may occur to the roots, the trunk, or the crown of a tree. It is obviously most difficult for the appraiser to discover and assess root damage and easier to assign a percentage loss for extent of crown injury. The reduction in condition rating due to trunk injury is more complicated and depends on the extent of bark damage, the general health, the species, and whether it is a vertical or horizontal injury. If a tree is completely girdled and the cambium layer destroyed all the way around the circumference, the water and nutrient flow interruption will almost always kill the tree. Table 2 lists percentage guidelines for adjusting the condition rating based on the amount of bark injury and whether the tree is healthy or in a weakened state. It can be seen from this table that

> … if a vigorous, healthy tree were to lose less than 20% of its bark around its trunk circumference, the main effect would be primarily visual .... A tree may be considered a total loss if bark and cambium on more than 50% of the trunk circumference were lost on a weak tree, or more than 80% on a healthy tree (CTLA, 1992).

**Table 2. Influence of Trunk Bark and Cambium Injury/Loss on the Diminution in Tree Value[a]**

| | Diminution in tree value (%) | |
|---|---|---|
| Bark and cambium injury loss percent circumference | Weak tree | Healthy tree |
| Up to 20 | At least 20 | 10–20 |
| 25 | 25 | 21–25 |
| 30 | 35 | 26–30 |
| 40 | 70 | 31–45 |
| 50 | 100 | 46–65 |
| 65 | — | 66–85 |
| 80–100 | — | 86–100 |

[a]From Council of Tree and Landscape Appraisers (1992).

### 4.1.3. Calculating the Condition Rating

The two condition attributes—structural integrity and plant health—can be further defined using five condition factors and then referring to a list of specific items created to help evaluate each factor. The CTLA has developed a systematic and workable procedure for assessing condition in this manner and for calculating its percentage factor in large tree valuation. The process is well explained in Table 3, in an easy-to-use worksheet (CTLA, 1995).

**4.1.3.1. The Five Condition Factors.** The condition rating of a plant is determined by the sum of the rating scores for each of five general categories, called factors: (1) roots, (2) trunk, (3) scaffold branches, (4) small branches and twigs, and (5) foliage and/or buds. The appraiser is expected to perform a root collar inspection when evaluating the roots factor and is expected to do a climbing inspection when evaluating the trunk and scaffold branches factors if a score of 100% or five of a total possible of five is attainable.

Each of the five general factors includes up to nine specific items to be considered in the appraiser's inspection of that factor. Each factor is to be given a rating on a scale of 0 to 5; a rating of 5 indicates no problems while a 0 indicates major problems. There are 25 total possible points. The percentage rating for condition is calculated by dividing the number of designated points by the number of possible points. For example, if a plant was assigned 19 points through the five aspects of the tree, its condition rating would be $19 \div 25 = 76\%$. The CTLA encourages the appraiser to take good notes on the present condition of the tree for future documentation.

Checklists help appraisers with both the assessment of plant values and the accurate documentation of the findings. Plant appraisers are often called on to testify in court cases as expert witnesses, and the CTLA field reports are designed so that, as noted at the bottom of each cover page, "Information entered on this form may be admissible as evidence." When the goal is equity, the standardization of plant appraisal practices and record keeping made possible by the CTLA (1995) "Field Report Guide for Trunk Formula" represents a large step forward in the continuing effort to assign fair and reasonable values to landscape plantings.

## 4.2. Location

Location is the second of three items for which a percentage rating is determined for use with the trunk formula of the plant appraisal process. Used together with the percentage ratings for species and condition, the location percentage allows the appraiser to adjust and modify tree value based on the unique situation of a particular plant.

Three factors are used to determine location values: the *site* of a property or landscape, the plant's functional and aesthetic *contribution* to the landscape, and the *placement* of that plant in the landscape. The location value is calculated by assigning a separate percentage to each of these three factors and then averaging them to calculate percentage for location overall.

**Table 3. Guide for Judging the Condition of Landscape Trees[a]**

Note: A separate hazard tree evaluation may be required for trees in poor condition.

Scoring System

No problem[c] . . . . . 5
No apparent problem(s) . . . . . 4
Minor problem(s) . . . . . 3
Major problem(s) . . . . . 2
Extreme problem(s) . . . . . 0 or 1

| | TREE NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Factors[b] | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| ROOTS | POINTS | | | | | | | | | |
| Root anchorage S. | | | | | | | | | | |
| Confined relative to top S. | | | | | | | | | | |
| Collar soundness S.H. | | | | | | | | | | |
| Mechanical injury S.H. | | | | | | | | | | |
| Girdling & kinked roots S. H. | | | | | | | | | | |
| Compaction or water-logged roots H. | | | | | | | | | | |
| Toxic gases & chemical symptoms H. | | | | | | | | | | |
| Presence of insects or disease H. | | | | | | | | | | |
| TRUNK | POINTS | | | | | | | | | |
| Sound bark & wood, no cavities S.H. | | | | | | | | | | |
| Upright trunk (well tapered) S. | | | | | | | | | | |
| Mechanical or fire injury S.H. | | | | | | | | | | |
| Cracks—frost, etc. S.H. | | | | | | | | | | |
| Swollen or sunken areas S.H. | | | | | | | | | | |
| Presence of insects or disease H. | | | | | | | | | | |
| SCAFFOLD BRANCHES | POINTS | | | | | | | | | |
| Strong attachments S. | | | | | | | | | | |
| Small diameter than trunk | | | | | | | | | | |
| Vertical branch distribution | | | | | | | | | | |
| Free of included bark | | | | | | | | | | |
| Free of decay and cavities S.H. | | | | | | | | | | |
| Well-pruned, no severe heading back S.H. | | | | | | | | | | |
| Well-proportioned—tapered, laterals along branches S. | | | | | | | | | | |
| Wound closure H. | | | | | | | | | | |
| Amount of dead wood or fire injury S.H. | | | | | | | | | | |
| Presence of decay, insects, or diseases H. | | | | | | | | | | |
| SMALLER BRANCHES & TWIGS | POINTS | | | | | | | | | |
| Vigor or current shoots, compared to that of 3–5 previous years H. | | | | | | | | | | |
| Well-distributed through canopy H. | | | | | | | | | | |
| Normal appearance of buds—color, shape, & size for species | | | | | | | | | | |
| Presence of weak or dead twigs H. | | | | | | | | | | |
| Presence of insects or diseases H. | | | | | | | | | | |
| FOLIAGE AND/OR BUDS | POINTS | | | | | | | | | |
| Normal appearance—size & color H. | | | | | | | | | | |
| Nutrient deficiencies H. | | | | | | | | | | |
| Herbicide, chemical or pollutant injury symptoms H. | | | | | | | | | | |
| Wilted or dead leaves H. | | | | | | | | | | |
| Presence of insect or diseases H. | | | | | | | | | | |
| Total points | | | | | | | | | | |
| Condition % | | | | | | | | | | |

[a]From Council of Tree and Landscape Appraisers (1995), with permission.

[b]Give one rating for each factor. The items listed under each factor are to be considered in arriving at a rating for that factor.

S. = item is primarily structural; H. = item is primarily health; S.H. = item may involve both structure and health

[c]A rating of "5" indicates no apparent problems found having done a root-collar inspection and/or climbing the tree to inspect the trunks and major limbs.

Condition % = total points divided by 25 possible points.

### 4.2.1. Site

Rating a site involves assessing it on the basis of several criteria, including the quality of development and the prosperity and general appearance of the area. Site rating also will be affected by the design and quality of the structures on the site and in the surroundings and by the landscape design and healthy appearance of the plants on the site and on other landscapes in the area. The level of maintenance on both structures and landscape and the intensity of site use are additional factors to be considered.

A site may be residential, commercial, industrial, or agricultural. The type of site does not influence the site rating; any site may earn a high or low rating as compared to other sites of the same type. For example, a strip mall whose paint is peeling and whose parking lot has no plantings except for being overgrown with weeds will merit a low site percentage rating. In contrast, a relatively high rating will be awarded to a similar mall property where the buildings are well maintained and there are trees, shrubs, and annual plantings in good condition that complement the parking areas.

### 4.2.2. Contribution

Contribution refers to how the attributes and characteristics of a particular plant enhance or detract from its position on a specific landscaped site. "Attributes" are generic functions that the plant fulfills in the landscape. An attribute indicates the purpose that the plant serves in the landscape. That purpose may be to help solve an environmental or engineering problem on the site, such as a planting of junipers to prevent erosion on a steep bank. It may be to play an architectural role, such as planting a hedge of evergreens to form a wall screening of an unsightly view. It may be to attract wildlife to conservation land or to welcome birds to a private backyard. A rare, unusual, or historically significant plant also may be an important attribute to a landscape or community.

"Characteristics" are factors that are unique to a particular species or cultivar but which only have implications when considered relative to the plant's position in the landscape. Some of these characteristics can be categorized into four groups: growth characteristics, resistance or tolerance, maintenance requirements, and aesthetic values. For example, a tree such as honey locust, with large, twisted seed pods, is a litter nuisance when it is placed next to a walkway or a driveway; the pods become a decorative feature and contribute seasonal interest when the tree is located away from traffic patterns. Similarly, a tree such as European beech, which typically has a low branching habit, is undesirable when it is planted where the lower branches interfere with pedestrian or vehicular traffic; but it becomes an asset when planted as a focal tree in an expansive lawn area. A white pine has a moderate tolerance for salt and will be stressed if planted near a roadside or near the salty air of the seashore; but it thrives on a large scale in the inland areas of the Northeast.

### 4.2.3. Placement

The placement of the plant being appraised will determine whether it serves its intended purpose. If a row of trees is planted specifically for a windbreak, it will only

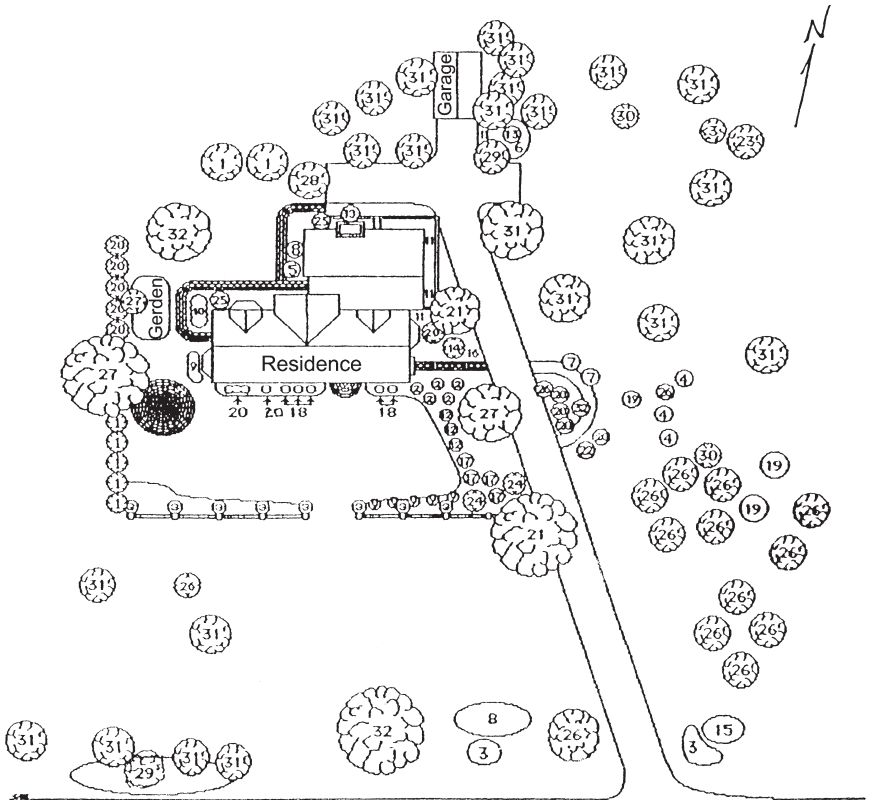
be effective if it is planted where it will intercept and protect the site from the prevailing winds. If a tree is needed for summer cooling of a house and patio, planting the tree on the north side of the house will not fulfill that need; it will never cast shade on that house. If a large-growing shade tree is planted under utility wires, frequent improper pruning employed to contain it will probably result in a misshapen tree with unreasonable risk rather than a specimen. If a plant fulfills the intended purpose, it is more valuable than one that is planted for a reason but not in the right place.

There are other aesthetic considerations in plant placement that will affect the value of a plant. A single tree, such as a specimen quality Colorado blue spruce, at the end of a walk is worth more than one blue spruce of similar size growing crowded among several in a woods. One white oak in a row of white oaks lining a driveway would probably have a greater value if it were lost than the entire row if it were lost, due to the gaping hole left and the difficulty of replacing the lost plant with one that matched the remaining ones. In these cases, the placement of a plant adds to its value. The placement of a plant also may detract from its value; a Norway maple tree intended for shade but planted too close to a driveway poses a potential risk to a car (Fig. 1).

### 4.2.4. Calculating the Location Rating

The location percentage is an average of the ratings determined by the appraiser for site, contribution, and placement. The following example adapted from the CTLA (1992) *Guide for Plant Appraisal* illustrates how this percentage is computed: the plant in question is a solitary, 14-inch diameter, 25-foot tall Norway maple tree (see Fig. 1). It is located, in the direction of the morning sun, 25 feet from the front corner of a five-bedroom Cape style home in a moderately affluent neighborhood. The tree shades the drive. It also screens a view, otherwise visible from the kitchen and from the living area inside the house, of industrial smokestacks located 1000 yards to the southeast. An extensive lawn is bordered by well-kept shrubs, bedding plants, and small trees.

1. Site rating
   Well-maintained suburban residence.
   General area is moderately high quality.
   Residences and landscapes are attractive.
   Site rating selected: 85%
2. Contribution rating
   Tree has interesting structure.
   Tree has a well-thinned crown that allows summer breezes and winter sunshine.
   Contribution rating selected: 90%
3. Placement rating
   Tree protects house from unsightly view.
   House receives some winter morning sun.
   Placement rating selected: 80%
4. Location rating
   Average of the tree ratings: $85 + 90 + 80 = 255 \div 3 = 85\%$




**Shrubs:**

1. Arborvitae
2. Azalea
3. Rosa Ragosa
4. Eastern Red Cedar
5. Clethra
6. Virginia Creeper
7. Hanoki Cypress
8. Honeysuckle
9. Hydrangea
10. Japanese Ilex
11. English Ivy
12. Leucothoe
13. Lilac
14. Cutleaf Japanese Red Maple]
15. Mulberry
16. Periwinkle
17. Rhododendron
18. PJM Rhododendron
19. Spirea
20. Enlish Yew

**Trees:**

21. Ash
22. Birch
23. Cherry
24. Dogwood
25. American Holly
26. Locust
27. Norway Maple
28. Red Maple
29. Black Oak
30. English Oak
31. Pitch Pine
32. White Spruce

**FIGURE 1.** #27 Norway Maple Near Drive.

Another example, taken from the `Field Report Guide for Trunk Formula' (CTLA, 1995), is helpful to contrast with the above case and to illustrate how the placement factor is distinguished from site and contribution. The plant in question is a tree that screens the view of a local landfill (dump) from an abutting neighborhood. The ratings would be represented the following way:

1. Site rating
   Quality, appearance, and use are unattractive and therefore merit low rating.
   Site rating selected: 20%
2. Contribution rating
   Tree screens undesirable views (moderate rating).
   Contribution rating selected: 70%
3. Placement rating
   Tree is planted on dump property line (high rating).
   Tree provides dust reduction for neighbors (high rating).
   Placement rating selected: 90%
4. Location rating
   Average of the three ratings: 20 + 70 + 90 = 180 ÷ 3 = 60%

In this example, although the tree rates a moderately high contribution percentage (moderately high because it is a single tree and therefore provides only partial screening), it merits a high placement percentage because it is planted in exactly the right place to accomplish its purpose. These two relatively high ratings balance out the extremely low site rating, resulting in a 60% overall location rating and graphically illustrating that a tree may be deemed important even to a landfill.

These two examples illustrate how the "Location Chart," which is page 3 of the CTLA's (1995) "Field Report Guide for Trunk Formula," is available to assist the appraiser in evaluating the location factor. It represents another step in completing this standardized form, resulting in a professional document that supports the credence and credibility of the valuations with property owners as well as courts of law (see Table 4).

## 4.3. Species

The species rating is one of three factors in large-tree appraisal that the CTLA has advised should be determined on a regional basis by a regional committee of tree professionals. The other two factors—replacement cost and basic price (the square inch value of a tree's cross-section)—are derived from species rating and therefore are dependent on it. A number of regional supplements are now available to help appraisers with the assignment of percentage ratings to each species and with the ensuing steps of determining replacement cost and basic price in their particular region. For the Northeast area of the United States (the scope of this volume), species rating guides are available for the regions including Pennsylvania and Delaware, mid-Atlantic states, New England, New York, and New Jersey.

The three factors are considered specialized according to region because the value of a particular species often varies geographically, depending on its relationship to a particular environment (CTLA, 1992). Differences in species value may be attributable to hardiness zone, soil type, and climatic tolerances. For example, a tree such as blue atlas cedar will thrive in the warmer areas of southern Connecticut and near the southeastern Massachusetts shoreline, but the same species will struggle and may not survive when planted farther north on the edge of or beyond its hardiness zone. Other considerations not necessarily regional in character but which may affect a species rating include longevity, structural integrity, and susceptibility to insects and diseases. There are other characteristics, such as branching habit, foliage color,

**Table 4. Location Chart: Site/Contribution/Placement Factors to Consider in Determining Location Values[a]**

| Functional and aesthetic contribution factors suggested rating range 10% to 100% | |
|---|---|
| Functional attributes | Aesthetic attributes |
| Environmental and engineering | Architectural and plant characteristics |
| Sun radiation and reflection control | Attractive bark, flowers, foliage, fruit, fragrance |
| Wind control | Accents structures |
| Drifting snow | Screens undesirable views |
| Safety barrier | Frames view |
| Light and glare shield | Defines space |
| Privacy | Creates vistas |
| Erosion control | Attracts wildlife |
| Dirt and dust absorption | |
| Traffic control | Other considerations |
| Noise attenuation | Historic, rare, or unusual specimen |
| Air purification | Unusual site situation |
| Transpiration cooling | |

[a] *Location:* The location rating considers the site of a property, the plant's functional and aesthetic contribution, and the placement of the plant in the landscape. *Site:* The rating of a site is determined primarily by: (1) The quality of development, the general appearance and the intensity of use of the area in which the site is situated; (2) The design and quality of structures and landscapes in the area; and the landscape design and quality of the planting and maintenance of the site; and (3) The type of area (residential, mall, etc.) is not particularly helpful in rating a site. *Contribution:* The functional and aesthetic contribution of a plant influences its value in a landscape. Tree characteristics largely determine contribution and value. *Placement:* The position of a tree in relation to how effectively it provides its functional and aesthetic attributes determines the placement rating of the tree. A single specimen tree has greater value than would the same tree as one of many. The placement of a tree can also have an unfavorable as well as a favorable effect on its contribution, such as proximity to overhead wires, street lights, and buildings.

production of fruit litter, and intolerance of salt residue, that once were considered species factors but now are used in appraisal to help determine the contribution adjustment for location (see Section 4.2.2). The positive or negative aspects of the latter characteristics are relative to the plant's location in the landscape; a plant that is a positive addition in one place may be a serious liability in another.

Like the ratings for condition and location, species rating is expressed as a percentage that is multiplied into the trunk formula. The appraiser may not elect to use a species rating if it is already included as part of the replacement cost from the grower. In this case, the species value is a reflection of current market value that determines basic price or the square inch value of a specific species.

## 4.4. Size

The size of a transplantable tree is normally expressed by its trunk diameter at a specified distance above the ground. This distance is either 6 inches (15 cm) above the ground for trunk diameters up to and including 4 inches (10 cm), or 12 inches (30 cm) above the ground for larger trees still considered to be transplantable. These heights are prescribed by the American Nursery Standards, and diameter at these heights above ground is generally referred to as "caliper."

To measure size for appraisal purposes of a tree considered too large to replace with a transplantable, survivable equivalent, accepted industry practice uses the area of a cross-section of the trunk as calculated from its diameter or circumference. In this case, diameter is measured at 4.5 feet (1.4 m) above the ground. This diameter often has been referred to as diameter at breast height (DBH) through the years because of the forestry profession's quest to determine merchantable tree wood fiber value. The horticultural appraiser may take measurements that may include aspects of a tree that a conventional forester would deem undesirable.

### 4.4.1. Trunk Area and Adjusted Trunk Area

The cross-section of the trunk is assumed to be a circle; therefore, the formula for calculating the area of a circle is used to determine cross-section area. This formula can be expressed using the radius ($r$): area = $r^2$.

It can also be expressed using the diameter of ($d$ or $2r$):

Since $\pi = 3.14$ and $r = (d \div 2)$
Area also = $(d^2 \div 2^2) = 3.14(d^2) \div 2^2 = 3.14(d^2) \div 4 = 0.785(d^2)$

In order to simplify the process, horticultural appraisers, including consulting foresters and arborists alike, generally use diameter to calculate cross-sectional area. The diameter is easily obtained with a special measuring tape that converts the circumference (the distance around the outside trunk) to diameter. A "diameter tape," as it is called, has standard English or metric units on one side and those units divided by 3.14 (called pi) on the other. When the above formula is solved, the result is trunk area (TA), the cross-sectional area expressed in square inches.

The TA for a tree with a trunk diameter over 30 inches (75 cm) can be but is not dictated to be calculated somewhat differently. This is called adjusted trunk area (ATA) and is based on the premise that a large mature tree will not increase in value as rapidly as its trunk area will increase, and on the general experience that such larger trees are more likely to fail (CTLA, 1992). Formulas for ATA have been developed based on increase in tree size, expected longevity, anticipated maintenance, and structural safety. Detailed information on calculating TA and ATA and tables with specific values may be found in the *Guide for Plant Appraisal* (CTLA, 1992).

### 4.4.2. Other Factors in Determining Tree Size

There are certain variables that may need to be considered in calculating TA. In some cases, the circle formula will not yield a precise enough measurement of cross-section area. Tree trunks are often elliptical (oval) rather than circular, a particularly common occurrence on leaning trees, closely planted trees in a windrow, and those subject to prevailing winds. In these cases the formula is adjusted by using both the largest diameter and the smallest diameter, measurements that can be obtained using a caliper.

Another consideration in TA calculation is bark thickness, which varies according to species and age and can account for a significant percentage of trunk diameter in a larger tree. An appraiser may choose to reduce the trunk measurement by one-third to

one-half the bark thickness in order to obtain a more accurate true size for valuation purposes. Conversely, an appraiser may not choose to reduce bark thickness because they may want to give maximum credit to an unusual species with aesthetically pleasing bark. An example of such a tree would be a feature redwood found in someone's yard in Mill Valley, north of San Francisco.

### 4.4.3. Accurate Measurement of Diameter at 4.5 Feet (1.4 m)

Because the accuracy of TA and ATA (and the resultant tree value, as one can see later) depend on the accurate measurement of the diameter, it is important that this measurement be as precise as possible. If a tree has even a slight trunk taper, measuring the diameter slightly above or below the usual 4.5-feet (1.4-m) height will alter the trunk area calculation.

If a tree is leaning or is growing on a slope, the diameter measurement should be made 4.5 feet (1.4 m) along the center of the trunk axis, so that the distance is the average of the shortest and longest sides of the trunk. The measurement is made at right angles to the trunk. This method of measuring, generally used by consulting arborists, takes the whole tree into consideration, including the flare. Traditional foresters, on the other hand, whose concern is the amount of harvestable timber, usually measure DBH from the uphill side. The latter method reduces the amount of root flare area and therefore the overall tree size and value as well. Regional differences in forestry become readily apparent in the terminology; the wedge that is cut out below and opposite the backcut in a tree's root flare when felling a tree is variously referred to as a scarf, a wedge, a notch in parts of New England, and in Pennsylvania, New Jersey, and New York, an undercut.

If a tree has large, trunklike branches close to the ground, it may not be possible to measure diameter at 4.5 feet (1.4 m). In this case there are several solutions. One is to measure the smallest trunk diameter below the lowest branch (CTLA, 1992). Another is to determine the sum of the cross-sectional areas of the two branches measured about 12 inches (30 cm) above the crotch, then to average the sum of the two branch areas plus the smallest cross-sectional area of trunk below the crotch. A third possibility is to use the trunk measurements of nearby trees of the same species and similar crown volume, either in place of the measurement of the tree in question or as a check of its measurement.

There are other special problems that may be encountered in accurately determining tree size. Excessive trunk flare, trees cut off below 4.5 feet, and multistem trees all present challenges and require the appraiser's careful assessment and judgment. As these cases illustrate, different trees develop different growth peculiarities, and it may take many years of experience for a horticultural appraiser to become skilled at assessing size and all the other elements that contribute to tree value.

## 4.5. Replacement Cost and Basic Price

Replacement cost is the second of the three factors that are calculated using regional information. It is the median price for purchasing and installing the most

commonly available, transplantable, survivable tree. Information detailing and documenting the most common-size trees sold to the layperson is easily understood and makes realistic and believable evidence to the laypersons who serve on juries in courts of law. Reasonable values are continuously stressed by judges in the courts and are perceived as being fair for all concerned.

In order to establish the median price (replacement cost) of a given species, the appraiser will contact professionals at three reputable nurseries in the region to ask what is the common-size tree available for that species and what is the cost of that size. After choosing the most commonly available size for the species, the appraiser will list the three prices in the region for that size and species, and from that will determine the median (middle) value. The appraiser will document the name of the specific plant supplier or nursery representing the median size and the price for that size, as well as the name of the contact person from whom the information was obtained. The appraiser now has one documented source and one expert witness (the contact person at the nursery) to call if a particular valuation is called for question in court. This value, because it is the middle or median price and not an average, is judged to be a reasonable and real price that one would actually pay to purchase a replacement tree. In a court of law, most judges appreciate only taking time with one expert instead of three or four experts.

Most of the regions represented in the International Society of Arboriculture (ISA) have developed these figures and published them for use by appraisers in the region. In New England, based on data provided by the ISA chapter, a 3-inch caliper has been established as the median size for the most commonly available, transplantable, survivable tree. Using the formula in Section 4.4.1 for cross-sectional trunk area results in a median square inch figure of 7 square inches for New England:

$$r = d \div 2 = 3 \div 2 = 1.5 \text{ and}$$
$$A = r^2 = 3.14(15^2) = 7.065$$

In New England, research has determined that the average most commonly sold 3-inch tree found in the nursery costs $252.00—this leads to an average basic price per square inch of $252.00 ÷ 7 square inches = $36.00 per square inch.

The cost may be wholesale, retail, or installed; practices vary by region as to which cost is used. In New England, the median landscaper cost of installation is figured into the replacement cost, using a multiplying factor of 2.5 times the average retail price: $252.00 × 2.5 = $630.00.

Thus, in New England, the median price or replacement cost is $630.00, the amount it costs to buy and install an average 3-inch caliper tree, using a retail purchase price derived from price information given by independent plant growers or suppliers and landscapers. Basic prices throughout the Northeast are established and reviewed in this manner on an ongoing basis.

## 5. Summary of Trunk Formula Method

Section 4 has provided a detailed discussion of the factors that affect tree value, all the individual elements needed to solve the equations of the trunk formula

Figure 2

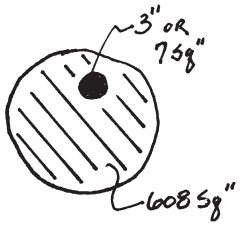
European beech 28" diameter at 4.5' from grade. Largest commonly available transplantable tree that will survive or replacement tree = 3" caliper or 7 square inches. Cost of replacement tree = $252.00

Council Of Tree & Landscape Appraisers

## TRUNK FORMULA METHOD FORM

*Appraised Value = Basic Value x Condition % x Location %*
*Basic Value + Replacement Cost x (Basic Price x [$TA_A$-$TA_R$] Species %)*

1. **Replacement Cost:** largest transplantable tree* $630
2. **Basic Price** of replacement tree* $36 /in²(cm²)
3. Difference in trunk areas of appraised & replacement trees
   - A. Appraised tree trunk area ($TA_A$ or $ATA_A$)** 615 in²
   - B Replacement tree trunk area ($TA_R$)* — 7 in²
   - C. Difference in trunk areas 608 in²
4. Multiply **Basic Price** difference in trunk areas
   $36 /in²(cm²) (Line 2) x 608 in²(cm²) (Line 3C) = $ 21,888
5. Adjust Line 4 by **Species** rating* 90 % = $ 19,699
6. **Basic Value** = $ 630 (Line 1) + $ 19,699 (Line 5) = $ 20,329
7. Adjust Line 6 by **Condition** 72 % = $ 14,637
8. Adjust Line 7 for **Location:**
   **Location = (Site + Contribution + Placement) ÷ 3**
   =( 95 % + 60 % + 40 %) ÷ 3 = 65 % = $ 9,514
9. **Appraised Value** = Round Line 8 to nearest $100 = $ 9,500




**Replacement cost*** = Cost to buy & install largest-commonly-available-replacement tree but with no adjustments.
**Basic Price*** = Cost per unit trunk area of replacement tree. Can be based on the wholesale, retail or installed cost or cost of tree ÷ unit trunk area of replacement tree.
$TA_A$ = Trunk Area of appraised tree (diam. 30" [75 cm] for less). See Table 4-1, 4-2, 4-3 or 4-4 or use the equation below:
TAA = $0.785d^2$ or $0.080c^2$
$ATA_A$ = Adjusted Trunk Area of appraised tree more than 30" in diameter. See Table 4-1, 4-2, 4-3, or 4-4 or use the equation below:

| English units for diameter > 30": | Metric units for diameter > 75cm: |
|---|---|
| ATA = $0.335d^2$ =69.3d - 1087 | ATA = $0.335d^2$ =69.3d - 1087 |
| for circumferences > 94": | for circumferences > 240cm: |
| ATA + $0.0333C_2$ + 22.1c 1087 | ATA + $0.0333C_2$ + 22.1c 1087 |

$TA_R$* = Trunk Area of largest-commonly-available-replacement tree
**Species*** = Species rating of appraised tree
**Conditions** = Structural integrity and health rating
**Location** = Site, Contribution & Placement rating averaged

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**FIGURE 2.** Trunk formula method form.

method. After evaluating each of these elements, the appraiser is finally ready to calculate the appraised value (Fig. 2).

Once the concepts and the many details and exceptions are learned, all the information required to calculate value is found, exact figures can be entered into the formula. Figure 2 illustrates a completed form for a hypothetical situation using the New England area dollar figures for replacement cost and the basic price.

When the worksheet has been completed, the appraiser can transfer the relevant information on it to the back page of the *Field Report Guide for Trunk Formula* (CTLA, 1995), completing the document. This report then comprises a professional, standardized valuation within an evaluation that is available for use by clients, insurance companies, and so on, and that may be admissible as evidence in a court of law. The CTLA recommends that the appraiser should not use trunk formula methodology for IRS tax valuations; the cost of cure method is more suitable (see Section 7).

## 6. Compounded Replacement Cost

While replacement cost and trunk formula are the two most commonly used methods in plant appraisal, there are often more complicated situations that require a more extensive approach. In these cases, there are additional tools that the professional horticultural appraiser may use in order to formulate more detailed, precise, and accurate estimates. The first of these is compounded replacement cost.

When replacing large plants, a reasonable approach is to plant the most survivable-sized plant and determine the estimated years it will take for the replacement plant to reach an equivalent size (parity). The information needed to figure the compounded replacement cost Method include:

> (1) the replacement cost for the largest plant of the same or comparable species normally available from suppliers for the region; (2) the cost of installing the plant; (3) the number of years estimated for the plant to grow to the same size (or a smaller size if more desirable) as the plant being appraised; (4) the interest rate that would be expected to be earned for investing the replacement cost for the number of years to parity estimated in Step 3 above; and (5) determining the cost of maintaining the replacement plant in the landscape by adding the compounded maintenance cost for each year for the number of years remaining until the plant is expected to be the size of the plant being appraised (CTLA, 1992, Spicer, 1949).

The individual appraiser may be faced with the task of assessing in which areas it is appropriate to apply compounded interest factors in order to obtain a compounded appraised value. Compounded interest methods may be used not only to figure plant replacement costs but to calculate several other aspects of an appraisal situation as well. These include the cost of plant pruning and/or removal, the cost of installation, and the cost of annual maintenance.

## 7. Cost of Repair and Cost of Cure Methods

The cost of repair method is used when a plant is damaged in such a way that repairing it will restore it to a close approximation of its former condition within a reasonable amount of time. Examples of repair procedures include wound treatment, cabling, bracing, pruning, amending soil, stump sprout management, irrigation, insect and disease management, improving compacted soil, and follow-up care. Plant appraisal in this situation consists of determining the specifications and the cost estimates for the recommended repair treatments. There may be instances in which the

cost of repair appraisal also recommends additional compensation for the property owner depending on the nature of the damage, the circumstances under which it occurred, and the anticipated time for recovery.

The cost of cure method is used when extensive damage has occurred, including loss of plants and destruction of ancillary features such as walks, roads, driveways, landscape structures, and shaped terrain. Although the cost of cure method is often used for postdamage assessment, it also may be used to estimate landscape value for the purpose of a routine inventory. Cost of cure determines the cost of replacing and/or repairing plants, as well as all the costs required to restore the property to its precasualty condition. Among the recommendations for site restoration that may be included in a cost of cure appraisal are: posting the area to stop any additional damage; regrading soil that has been displaced; reestablishing damaged plants worth saving; replanting trees, shrubs, flower beds, ground cover, and turf; perhaps replacing a large plant with one or more smaller plants; rebuilding roads, walks, and/or landscape structures; and doing whatever else is needed to restore the property to near its original condition without inflicting more damage.

Cost of cure recommendations always should diminish any future threat to a damaged site. Clearing debris with large heavy machinery such as skidders or bulldozers may disturb an already fragile site well beyond the original scope of damage. In this situation, the CTLA recommends clearing by hand; thus, any planting, restoration, or establishment task should be designed to maximize the chances for physical and ecological renewal.

As it has done for the trunk formula method, the CTLA has developed a user-friendly tool for appraisers for the cost of cure method as well. This form divides the costs of cure into three categories: (1) debris removal and hardscape restoration cost; (2) plant replacement cost; and (3) plant restoration and establishment cost (CTLA, 1997).

Because a landscape appraisal situation that merits using the cost of cure method is generally broad in scope, it requires a high degree of expertise to identify and integrate all the facts needed to determine value in such a complicated situation. The *Field Form Report for Cost of Cure* (CTLA, 1997) provides the knowledgeable, experienced appraiser with a systematic procedure to evaluate each factor needed to develop an accurate estimate. When completed, the field form report constitutes a professional document that is easily understood by clients, insurance representatives, especially tax personnel, and others. Like the *Field Form Report for Trunk Formula*, (CTLA, 1995), the *Field Form Report for Cost of Cure* also may be admissible as evidence in a court of law. The *Manual for Plant Appraisal* (CTLA, 1986) and the two field form reports all contain additional helpful information; the three resources are designed to be complementary tools to assist both beginning and experienced appraisers as they work through the process. Often, many experts collaborate together to determine cost of cure value.

## 8. Plant Appraisals and Property Worth

The use of techniques to value the real estate of the appraisal plants in question represents a relatively new approach that is increasingly recognized as an important one. It is not necessarily a separate method, but another factor that enters into the

overall equation. Since there are guidelines but no hard and fast formulas, it is an area in which the research and judgment of the horticultural appraiser play significant roles with real estate professionals.

## 8.1. Estimating Total Property Value

There are two principal ways that an appraiser may obtain an estimate of the worth of the property. The first is real estate tax assessments. Annual property tax statements contain the value of the property as assessed for tax purposes; such tax records are available from local governments for public inspection. Although an assessed value does not constitute an appraisal, it is a rough indication of property value.

The second way for an appraiser to learn property value estimates is to contact local real estate brokers, real estate appraisers, and others in the local area with knowledge of property sales. Information on specific selling prices will provide an understanding of the market and will help establish the likely range of property value.

In most cases, it will be impractical for the plant appraiser to obtain a precise estimate of overall property value to include as part of the plant estimate. Property estimates from tax statements or market information from brokers and appraisers, however, will provide sufficient data to lend even more credence to a competent valuation report.

## 8.2. Contributory Value of Trees, Shrubs, and Other Vegetation

Studies have established that attractive landscaping adds value to a property; conversely, it has been determined that lack of landscaping or landscaping in poor condition may detract from value.

### 8.2.1. Market Evidence

A number of studies of tree cover as a factor in selling price have supported these findings; some have even quantified the value added with specific percentages. A study of new home construction in Amherst, Massachusetts, showed that the cost of preserving residual trees on building lots was offset by "how fast the homes sold and higher prices for homes on wooded lots" (CTLA, 1992). The US Forest Service estimates that market values for homes increase at rates ranging from 7% to 20%, depending on the presence and extent of the trees (CTLA, 1992). The CTLA guidelines now suggest that well-maintained landscapes and mature, well-placed trees can increase property values by 20% to 30%.

### 8.2.2. Paired Sales Analysis

Another way to establish the market worth of plants on a particular property is by comparing selling prices of lots with trees to selling prices of lots devoid of trees or by looking at prices of comparable homes that differ primarily in the amount and qual-

ity of landscaping around them. Such paired sales analysis can help the appraiser present solid arguments for the value contributed by the amenities of trees and landscaping.

## 8.3. Arboricultural Appraisal Law and Property Value

In contrast to a traditional rural forest, where loss appraisals are usually based on timber value, appraisals of loss or damage in the urban forest are closely tied to property values. The courts have differentiated between the two types of forest properties in their attempts to resolve disputes in a fair and equitable manner. As a result, a body of case law has developed that addresses the unique situations caused by damages to trees in the urban setting (Merullo, 1992).

### 8.3.1. Measures of Damages

A number of legal cases have established precedents for measures of damages that may be available to urban forest property owners when unauthorized destruction occurs (CTLA, 1992). A summary of this case law by legal experts has concluded that "it is quite apparent from the courts' opinions that the prevailing view is to assess damage based on the resulting depreciation in the value of the land on which the trees stood" (Merullo, 1992). These legal conclusions have led to the growing recognition by tree industry professionals of the importance of real estate values as a key element to be considered in plant appraisal practices.

The same legal experts, however, have pointed out that the courts endorse the use of alternative methods to help in determining damages. These methods include the cost of replacing destroyed or injured trees (replacement cost method), the value of the injured or destroyed trees (trunk formula method), the cost of restoring the property on which they stood to its previous condition (cost of cure method), and the resulting loss of aesthetic value or the resulting deprivation of the comfort and convenience that the trees provided the landowner. In a case in Delaware, the court approved using both the costs of restoration and the before and after valuation of the land itself, because "allowing a jury to consider more than one measure of damages would permit flexibility and achieve just and reasonable results" (Merullo, 1992). The phrase "just and reasonable" is the recurring theme in tree appraisal, where the goal is to achieve a fair and equitable settlement for all parties concerned (ASCA, 1997).

### 8.3.2. Reasonableness Testing

One of the most common reasons for doing plant appraisals is that owners can receive partial or full remuneration for the value of trees that become casualties as a result of accidents or alterations to the landscape. The three methods for recovery of casualty losses include insurance coverage, income tax deductions, and civil damage claim. Where claims have resulted in litigation, the courts have established a concept called reasonableness testing to help determine values of landscapes in cases of loss or damage involving trees and other plants, as well as hardscape features such as stone walls and walkways. The concept of "reasonable and practical replacement cost" is

based on two premises: (1) that the replacement should restore the property to approximately its former character and quality and (2) that the cost of such replacement should not be disproportionate to the end results of such restoration (CTLA, 1992). Cost of cure methodology closely mimics IRS qualifications for tax qualification purposes.

### 8.3.3. Appraisers as Expert Witnesses

In the past, monetary appraisals of trees and other plants most often have been tied to damage and litigation. The urban forest is by definition a forest within a populated area, and litigation relating to urban and community trees can be complex, involving private landowners, municipalities, public utility companies, private tree companies, practicing arborists, and highway agencies, among others (Merullo, 1992). Appraisers are often summoned to be expert witnesses in court cases and defend the methods and results of their appraisals. The need for credence and professionalism in court cases is a major reason why appraisers may choose to seek more training and credentials in the field of forensics, including professional certification by the Board of Forensic Examiners.

## 9. Summary: Role of the Appraiser and the Appraisal Process in Urban Forestry

A number of different methods are available to the appraiser in the quest to establish fair and reasonable values. There may be times when it will be advisable to use more than one method, in order to compare and test the validity of a resultant value. It is important, however, for the appraiser to know and remember that a reasonable value is also a real value, not an average. The results of each method used must stand alone and never be combined or averaged together in any way.

Appraisal values are only as good as the data on which they are based. The accuracy of the fact finding is one of two principal factors that will determine the quality and credibility of an appraiser's work. The other is the appraiser's ability to stand by those facts honestly to peers, property owners, and/or courts of law. The appraiser always should be aware of the background where a case originated, where it is at the time when the appraiser is consulted, and what end the client wants to accomplish. Awareness of these three items is necessary to enable the appraiser to weigh the ethical considerations carefully and maintain high-professional standards. Every situation is different, and a competent and qualified appraiser will continue to develop knowledge and skills with every experience.

The traditional approach to the tree appraisal process has been the reactive one, often precipitated by a damaging event. Fair and equitable values are more likely to result, however, if trees and landscape plants can be appraised while they are still whole, before they are damaged or destroyed. The recognition of value is a critical step not only in dispute resolution but also in convincing public and private owners to be responsible stewards of their urban forest resources.

The proactive approach can be a significant tool to help communities place value on their forest resources, to develop understanding and appreciation for the improved quality of life provided by the urban forest, and to educate citizens to be advocates for those valuable resources. When consultant arborists, foresters, or any other horticultural appraisers do appraisal work, they seek not only to achieve the goal of fairness and reasonableness in establishment of plant values; they also are making a contribution for protecting the equity of the community, the growing investment that is the urban forest.

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