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REDUCING CONFLICTS BETWEEN URBAN INFRASTRUCTURE AND TREES

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Florida's population was about 529,000 in 1900 and by 2000 it had increased to just less than 16 million people. The U.S. Census Bureau population projections estimate Florida's 2030 population will be 29 million. Most of these new residents will look to live within the existing metropolitan regions of the state. Urban cores will be redeveloped to allow higher densities and adjacent urban-rural interface forestlands will be annexed. Redevelopment and expansion of our cities will require more open land for roads, residencies, schools, shopping centers, industrial parks, hospitals, etc. The extent of urban open space and vegetation, forests, woodlands, scrub habitat, streams, rivers, ponds, and lakes will diminish.

This is happening as a broad and growing body of scientific literature is documenting the basic ecological services and associated economic values provided by urban trees and woodlands and urban-rural interface forests. It is becoming increasingly clear with each passing day that these services are critical to the health and well-being of our expanding urban population. In light of these findings, the conservation and restoration of these urban and interface forests must now be seen as a fundamental goal of any viable public works program or land-use planning process.

Damage to sidewalk

Existing urban infrastructure that can be potentially damaged by tree roots include sewer and septic lines, storm water drains, water supply lines, building foundations, sidewalks, streets, parking lots, curbs, and swimming pools (Coder 1998). The remedial repair of infrastructure is expensive. California alone spends approximately $70 million a year repairing damage to sidewalks, curbs and gutters (McPherson and Peper 2000). This figure does not include repairs that need to be made but were not, or damage to driveways, building foundations and sewer lines found on private property. In Hillsborough County, Florida it is estimated that annual sidewalk and curb repairs -- simply to meet the Americans with Disability Act guidelines -- could exceed $9 million per year. The City of Tampa estimates a cost of $1 million per year to meet these same guidelines. Maintenance costs for trees that are damaging infrastructure can exceed the dollar value of the ecological, economic and psychological benefits that they provide to residents (McPherson and Peper, 1995 and Nicoll and Armstrong, 1998). Attempts to protect existing infrastructure have led to a greater acceptance of removing the large older trees that provide the greatest benefits. The young replacement trees used to mitigate this loss are a net cost for at least the first 5 to 10 years due to high establishment costs (McPherson et al., 1999b). Clearly this is not a sustainable situation for residents or municipal governments and fuels the debate over the value of trees in an urban environment.

Experience and science have demonstrated that the best time to prevent potential infrastructure and tree conflicts is long before a tree is planted. Much cost and damage to both infrastructure and trees can be avoided if site requirements for long-term growth and vigor of trees are made an integral part of the original plans for urban streetscapes or development projects. In pre-existing sections of our cities, species selection is the key element in any strategy to reduce infrastructure and tree damage (Costello et al. 1997). Species selection should be directly focused on the specific tree species' ability to thrive in a specific urban site with its limited space and altered soil conditions (Nicoll and Coutts, 1997). The concept of right tree, right place has been too loosely interpreted and applied without attention to the often-narrow range of environmental factors that define a given tree species' habitat needs. Bringing arborists and urban foresters into the early stages of streetscape design and landscape plans can lead to economic efficiency and greater success in maintaining longer-lived large trees within our cities.

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INFRASTRUCTURE AND EMINENT DOMAIN - APPRAISING TREES WHEN DAMAGED OR REMOVED FOR UTILITIES OR ROADWAYS

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Over the years, we have all read or seen first-hand the damage trees can cause when a conflict arises with infrastructure – lifted sidewalks and driveways, topped trees under powerlines, crushed roofs, etc. We are all familiar with the "First Commandment" in urban forestry management, "Thou shall plant the right tree in the right place."

Oftentimes, however, trees must be trimmed or removed when infrastructure is being built or expanded such as in the case of a new or widened roadway or a new or expanded utility easement. Removing or trimming the trees removes the conflict, but creates a monetary loss to the property owner. Determining the value of the loss is necessary to allow for adequate compensation to the owner of the trees.

I am fortunate, that as both a Certified Forester and Certified Arborist, I have the background and knowledge to be able to determine the value of trees in both a commercial timber situation, as well as in an urban or ornamental situation. This article will examine the approach taken as a tree appraiser to determine the value of trees removed or trimmed in three different scenarios.

Scenario #1: Commercial Timber

I was asked by an attorney to determine the market value of timber which was to be removed on a 55,000 acre property in the Panhandle of Florida due to the expansion of an existing two-lane highway to four lanes. This property contained thousands of acres of pine timber and the growing and selling of timber was a major part of this landowner's business. The widening of the highway through approximately eleven miles of timber would result in the loss of approximately 185 acres of planted pine timber of varying species and ages.

When dealing with thousands of trees over many acres, it is impossible to measure every tree and assign an individual value to each tree. As a forester, I am familiar with the process of sampling a large population of trees by establishing a number of sample plots, measuring the trees within each plot, assigning the measured trees to a "product class" of timber (pulpwood, sawtimber, poles, etc.), determining the market value for each product, and then determining the value to a "stand" of timber based on the results of the sample plots.

A number of sample plots were established within each species and age of planted pine. Each of these different ages and species is known as a timber stand. Enough plots must be established within each stand to establish a statistically reasonable result. The stands were determined from a timber stand map provided by the landowner. Plots were placed within each of these stands within the boundaries of the proposed right-of-way expansion. Trees were measured for diameter, height and assigned a product class as described above. The data were entered into a software program which provides per acre averages for each product along with statistical accuracy by stand and product.

Determining the value of each product is the next step. Landowners are paid different prices for each product; this price paid for standing timber is called stumpage.

Determining what a timber buyer will pay for timber on a particular tract is determined by studying the local timber markets and determining the prevailing price for each product. The prices paid for the various timber products on the "subject tract" must be adjusted based on size of the tract, access, timber volume, haul distance to the mills, seasonality of logging, and other factors.

Once all of this data have been collected and analyzed, the anticipated timber prices for the subject tract are reconciled and a price for each product is determined. The total volume for each product is then multiplied by the reconciled stumpage value for each product and a total timber value is determined.

However, the above procedure is suitable only for timber which is considered as currently merchantable. In other words, is the timber of sufficient size and volume to attract one or more timber buyers? What happens in a situation where the timber is too young to harvest, or in forestry jargon, pre-merchantable? Such was the situation for several of the stands on the subject tract.

In this case, the timber must be "grown out" to a merchantable size, the value determined when merchantable based on stumpage prices, and then "discounted back" to the present to determine a Net Present Value (NPV). This process is based on utilizing many assumptions such as determining a reasonable discount rate, determining management costs during the life of the timber, assuming an after-tax rate, etc. Fortunately, software programs do the hard part – such as growing out the timber and calculating NPV, but the inputs are still done by the appraiser. Data taken in the field, to include average height of the stand and number of trees per acre, must be utilized in the calculations.

The final value in this case was fairly substantial. The Panhandle of Florida is a major timber growing region and several mills are within a short distance of this tract. The property was large enough where timber was almost constantly being harvested and numerous timber buyers are present in the area. The process described above is typical for determining the value of timber. The timber value determined in the appraisal was used to compensate the property owner in addition to the value of the real estate taken in the road widening. For smaller tracts, the timber value would not be as substantial as in this case; however, where present, timber value should be considered and a determination made as to whether the value is sufficient

enough to be included in the final appraisal of the property.

Scenario #2: Trees within a proposed gas line R-O-W

I have been involved in the appraisal of trees where a proposed gas line would result in the removal of a substantial number of trees through a landowner's property. In some cases, the property was a large ranch and quite rural in nature. In another case, the tract was in a more urban setting. How does one determine the value of trees in these cases?

The approach to the appraisal is based on both the types of trees being removed and the location of the tract. In the case where the trees being removed can be considered as merchantable timber, such as pine, cypress and some hardwood species, I would appraise these trees in a similar fashion as described in Scenario #1 above. If the trees being removed are non-timber species, such as live oaks or red cedars, I would appraise the trees as ornamental or non-timber and utilize the approaches as described in the "Guide to Plant Appraisal, 9th Edition."

The "Guide" provides for detailed approaches for trees of replacement size as can be found in a nursery or trees of larger size which can be appraised utilizing the Trunk Formula Method (TFM) wherein the value of a tree is assigned a "per square inch value" based on the cross-sectional area of the trunk. The Basic Value, based on the per square inch value, is then depreciated by the species, condition and location values assigned by the appraiser. This method requires substantial subjectivity on the part of the appraiser. Other types of trees, such as palms, may be appraised by height where a dollar value is assigned per foot of height and then depreciated by species, condition, and location.

What happens in the case where a large number of trees are involved or a "hybrid" scenario where the property is rural but contains non-timber species? The appraiser must use caution here as the tree value cannot exceed the land value. One cannot use timber value for species not considered as timber and utilizing the TFM or replacement value may result in very high values. That is where the experience of the appraiser must reconcile the tree/plant value with the overall property value. The appraiser must use caution and keep his/her values reasonable and defensible. Utilizing reasonable condition and location ratings will serve to moderate values.

Scenario #3: Trees trimmed but not removed along a power line R-O-W

I was asked by a homeowner recently to determine the value of trees damaged when trimmed back approximately 10 feet when a utility expanded the "air rights" without seeking the permission of the property owner. Three large live and laurel oaks were substantially pruned back to accommodate the utility's expansion. The trees were pruned to the "property line" so proper pruning methods were not employed. In one case, much of one side of the tree was removed, resulting in a substantial loss of canopy, as well as pruning stubs and subsequent sprouting from the improper cuts.

In this situation, I appraised the total value of the trees utilizing the Trunk Formula Method (TFM) as described in the "Guide to Plant Appraisal, 9th Edition." I then determined the percentage loss of canopy by measuring the area of the canopy of each tree after the pruning versus the area of canopy before pruning. I then determined the dollar value loss of each tree by multiplying the percent canopy loss by the total tree value as determined by the TFM. I then added an additional dollar value loss due to the improper pruning and the long-term effects on the trees. While this latter dollar determination was strictly subjective, I made it conservative and defensible enough to where the utility accepted my appraisal without argument or modification.

We all have experienced these types of infrastructure/tree conflicts. As long as we desire the benefits from utilities (I don't want to go without power!), we will continue to experience the loss or partial

loss of our trees. As arborists, we can only do two things – try to prevent the conflict in the first place when possible and be sure that the owner of the trees is adequately compensated for the loss when conflicts are unavoidable. I hope these above scenarios shed some light on how trees can be appraised in different situations and how we can assist landowners and homeowners when these conflicts arise.

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