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Urban Forest Inventory and Judgment
802-804,806 East Baltimore Pike
East Marlborough & Kennett Township

Prepared for:

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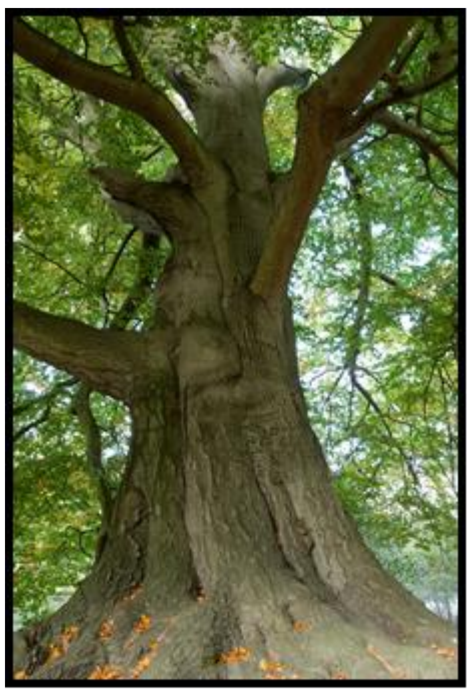

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Executive Summary

On June 15, 2017, I visited the proposed development site located at 802-804, 806 East Baltimore Pike in East Marlborough & Kennett Townships. Our objective was to examine and opine on the species outlined in the survey report (proposed removals) for their current condition, structurally and general health. During the inspection, which was initiated at 9:00 am, we reviewed the current landscape amenity trees and forested parcels throughout the entire property that would be disturbed during the developmental Stage. Lastly, I performed a risk assessment and condition inspection of the nine alleged trees over 36" in DBH.

The site consisted of secondary succession growth of a mixed aged palate which ranged from 7 - 52 years of age for the forested stand. The condition of these trees was observed as being in poor to fair condition, which is common for these species in an un-maintained environment. Invasive vines were a dominant tribulation throughout the entire parcel.

The condition of the trees reviewed as in poor condition, were deemed below standards of suitability and should not remain in the landscape during the design phase. Our objective and assignment included the review and inspection of all trees 36" or greater that exhibited a defect or trait not suitable for mitigation practices.

These included;

I. Decay cavity's
II. Root plate decay
III. Declined beyond recovery
IV. Storm damaged trees
V. Poor structure that will result in future failure along with longevity

Assignment

I was retained by Joseph S. Russella, to provide a site visit. This assignment was to include:

1. Condition of the nine 36" or greater trees.
2. General review of the trees.

After submission of this report, I will be available for follow-up discussions and to support my findings and recommendations with interested parties.

Limits of the Assignment or Scope

At no time was I provided with past management practices of the trees inspected.

Testing and Analysis

Use of a the RESISTOGRAPH® which confirms decay throughout the area being tested was employed for decay detection. This tool exposes this condition using electronically controlled drill resistance measurement. In addition, we utilized standard formulas to determine strength loss. All trees with a greater strength loss than 30% percent were deemed a risk.

Observations

The subject trees have been introduced into the urban forested at this subject parcel through natural secondary succession. Secondary succession is one of the two types of ecological succession of plant life. As opposed to the first, primary succession, secondary succession is a process started by an event (e.g. forest fire, harvesting, storm, clearing) that reduces an already established ecosystem (e.g. a forest or an agricultural field) to a smaller population of species, and as such secondary succession occurs on preexisting soil whereas primary succession usually occurs in a place lacking soil.

Simply put, secondary succession is the succession that occurs after the initial succession has been disrupted and some plants still exist. It is usually faster than primary succession as:

1 Soil is already present, so there is no need for pioneer species;
2 Seeds, roots and underground vegetative organs of plants may still survive in the soil.

The dominate species inhabiting the site are maple, oak, tulip poplar, cherry, were the co-dominate species.

In addition, the trees that were not considered hazardous are of woodland quality and longevity can range from 10-25 years before tribulations can develop.

It is of my professional opinion that the urban forest throughout this parcel has not been maintained to a standard level of care over the past 40 years. Through best management practices and replanting, you will be able to develop a salubrious landscape to compliment the proposed development that will recreate the distinguished appearance of maturity over several years.

Inventory

<u>* Refer to Urban Forest matrix attachment*</u>

The subject nine trees, as reviewed during my inspection, ranged from poor to fair. Coincidentally, during the survey phase, three of the nine trees were measured incorrectly and their DBH was below the 36” DBH demarcation.

The subject **Chinese chestnut #1, Flowering Cherry #5, Tulip Poplar #9** were the only trees that obtained a fair condition. The Chinese Chestnut, however in fair condition, has reached its useful life expectancy and will begin to fail within ten years.

The subject maples were Norway maples, which are very invasive and should be eradicated from the urban forest. The subject Ash will be prone to Emerald Ash borer. This tree does not warrant treatment do to its poor structure. The Tulip Poplar was in fair condition and no defects were noted. The flowering Cherries did not reveal any significant defect. My only concern is the longevity and trying to plan around these species. I strongly recommend that these trees be looked at for longevity by the landscape architect. I estimate <15 years to reach its useful life expectancy. It is of my opinion that these trees should be removed and a new palate of ornamentals be selected.

Future Tree Planting / Mitigation

In the forthcoming proposed development, it is imperative that the future planting be installed with best management practices.

All plants should be protected from mechanical and deer damage. Protective guides should be put on the trunk of the larger caliper trees and the smaller trees should be protected with tubes such as TUBEX®.

Warranties should be created to protect these trees for a minimum of 2 years. This will ensure that the trees receive the optimal chance for survival. Please discuss your options with your contractor/supplier.

Planting Guidelines (Best Management Practices)

Preparing the Planting Hole

The planting hole should be of sufficient size for rapid initial root development during the first year. The planting hole shape should not restrict root spread beyond the planting hole. Ideally, these objectives should be achieved with a minimum of cost and effort.

Size and Shape

On sites with poor-quality soil (compacted, clayey, or poorly drained), trees benefit from larger planting holes. A larger hole, or loosened, cultivated surrounding soil, means a greater volume of friable soil for rapid initial root growth. For B&B and container-grown trees, the planting hole should be slightly shallower than the root ball. In many poor-quality urban soils face, root growth from the bottom half of the root ball will be minimal due to inadequate drainage and aeration. If the structural roots are more than a few inches below the root ball surface, the planting hole depth will have to be adjusted, or the tree may have to be rejected.

Digging a wide hole with sloped or stepped sides uses the majority of the digging effort to excavate surface soils where the roots will grow most vigorously. If the roots are unable to grow into the compacted subsoil, a hole with sloped sides will allow them to gradually grow back up toward the better-quality surface soils and continue to spread beyond the planting hole.

A hole with vertical sides can take more effort to dig. Species with very aggressive root growth, such as Elm (Ulmus spp.) and Poplar (Populus spp.), may be able to establish on poor-quality sites without the planting hole being enlarged. Remember, the same characteristics that help these species grow well under difficult conditions also make them the species most likely to have root conflicts with infrastructure, especially if planted too close to pavements and structures.

When preparing the wide planting hole, it may not be necessary to remove all the soil from the hole and then put it back again. It may be more efficient to first dig a planting hole at least half again as wide as the root ball. Then, after the tree has been set, but before the hole is backfilled, use a spade to slope the edges to about half the depth and allow the soil to fall in the hole.

Glazing and Drying

Mechanical digging sometimes results in glazing the soil of the planting hole wall. Clay soils will glaze most readily. Roots may have difficulty growing through the glazed surface. It is best to eliminate the potential for trouble by using a hand tool to break up glazed surfaces before planting.

If holes are dug in advance and left exposed, the soil may become dry and very hard on the sides of the hole. Break up the dry surface to expose moist soil before planting.

Drainage

Poor drainage accounts for high losses of new trees. When soil permeability is slow, the soil in the planting hole can remain saturated for long periods. Even short periods of saturation can kill roots of many species. Irrigation systems designed to provide large amounts of water to lawns often over irrigate trees. Excess water can easily accumulate in planting holes, even during severe droughts, saturating the soil and driving out oxygen needed by the roots.

Solving drainage problems may be expensive, but doing so is essential for acceptable tree performance. A simple test can be conducted before planting to identify potential problem areas. Auger a 4-inch diameter hole as deep as the expected root ball. Put a handful of gravel in the bottom and fill the hole with water to presaturate the soil. For one hour, refill as needed to maintain the water level, then stop adding water.

After 24 hours, fill with water to 12 inches from the bottom and measure the rate of fall of the water surface. A drainage rate of less than ¼ inch per hour is cause for concern and indicates that drainage from the planting hole may be needed.

On many sites, improving the drainage on the entire site may be a better approach. Selecting species more tolerant of poor drainage is another option when drainage cannot be improved.

Drainage for individual trees can be improved in several ways. Occasionally, a well-drained layer of soil exists underneath a poorly drained layer. Drainage can be improved in these cases if the bottom of the hole is filled with gravel or coarse sand to provide a path for the water to flow down to the well-drained layer.

Perforated plastic pipe or products manufactured specifically to create drainage channels can be used to discharge water from the bottom of the planting hole to a lower level. A 3-inch fall per 100 feet of pipe is the minimal slope to obtain adequate water flow. This approach works well for trees planted on slopes. If the ground is level, permission sometimes can be obtained to connect the pipe into a nearby storm sewer. If the water cannot be drained away to a lower area or a deeper soil layer, the site may not be suitable for planting many tree species.

A layer of gravel in the bottom of the planting hole will not improve drainage and can, in fact, make drainage worse.

Water accumulates in the finer-textured soil above this layer of coarse gravel until the soil is completely saturated. This situation is known as a perched water table.

Planting high, with the top of the root ball above the surrounding grade, is sometimes recommended for poorly drained sites. If trees are planted high, no more than one-fourth to one-third of the root ball should be above grade, and the soil should be sloped gradually between the top of the root ball and original grade. This method may use excess soil from the planting hole or even require additional soil. In extreme cases, berms may have to be created in order to plant trees even higher.

An important drawback of raising trees up is that the soil in the upper part of the root ball and the backfill may dry out quickly during dry periods. An application of an inch or two of mulch would be very desirable.

Proper Planting Depth

In most cases, the top of the root ball at planting should be an inch or two higher than the surrounding grade to correct for expected settling of backfill soil and flattening of the root ball.

Before placing the heavy root ball in the hole, be sure that the depth of each hole is the same as, or slightly less than, the distance between the topmost structural roots and the bottom of the root ball. Planting with the roots too deep is very difficult to correct when discovered several months or years later. Structural root depth should be checked, and rechecked, starting when selecting trees from the nursery and one final time just before backfilling the planting hole. If the structural roots are deeper than 3 inches below the top surface of the root ball, when 4 inches from the trunk measured, the planting hole should be shallower to account for it.

Ideally, evidence of the structural roots will be visible just at the point where they emerge from the trunk. However, on some species and on very young trees, no root flare may have formed yet.

If there is extra soil over the structural roots, it is probably best to leave the root ball intact until it is placed in the planting hole rather than to unwrap it and strip the soil off the top before placing the ball in the hole.

[A300 Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Transplanting) uses the following wording to address planting depth: "The bottom of the trunk flare shall be at or above the finished grade."

It is clear that both the A300 standard and ISA's Best Management Practices set forth to address the importance of not planting too deeply. However, ISA seeks to avoid any confusion concerning the location of the bottom of the trunk flare.

Many young trees lack a well-defined trunk flare, and structural roots may emerge from the vertical trunk/root tissue over a significant distance. Attempting to place the bottom of the trunk flare of a young tree above grade increases the danger of exposing too much of the root system. ISA has endeavored to describe how to determine the depth of the structural roots, even when no trunk flare is visible, and how to guard against planting too deeply.

Structural Root Depth

Depth of roots at planting time is critical. Do not assume roots are near the top of the B&B or container root ball.

Probe the root ball for structural roots with a surveyor's chaining pin or similar tool to check for structural root depth. Generally, uppermost structural roots should be within 1 to 3 inches of the soil surface, measured 4 inches from the trunk, but there may be exceptions, such as steeply angled roots. Ideally, the structural roots will be visible just at the point where they emerge from the trunk. However, on some species and on very young trees, no root flare may have formed yet.

According to the American Standard for Nursery Stock (ANSI Z60.1-2004), "Soil above the root flare shall not be included in the root ball depth measurement." If the resulting depth measurement of the root ball does meet the minimum, the tree should be rejected.

Plant the root ball so that the uppermost structural roots are 1 to 3 inches below surrounding grade when measured 4 inches from the trunk.

When soil is removed from the base of the trunk, the newly exposed tissue may be more susceptible to cold and sunscald damage. Exercise caution until more is known.

Mulch should be no more than 2 inches deep over the root ball.

Of course, it will be necessary to determine the root depth in the ball so that the hole can be dug to the appropriate depth. Although planting too deeply is a serious problem, exposure of the roots is not desirable, either.

At this point, a decision must be made whether to strip off the excess soil or to leave it to erode. If there are few or no roots in the excess soil, stripping it to the appropriate depth may be the best alternative. However, the extra soil over the structural roots could also be filled with fibrous roots, which, if removed suddenly, could cause extra stress.

In some situations, it may be preferable to leave the extra soil remaining above grade. If the soil is left in place, it should erode over time as the root system becomes established in the new site. Some experience has shown that suddenly removing extra soil from the base of the trunk and exposing the roots may lead to damage from cold temperatures or sunscald in certain climates. There also may be consequences to leaving soil in contact with the trunk. Certain disease problems have been associated with prolonged moisture on the trunks of trees that were planted too deeply, and the incidence of girdling root formation may be correlated with planting depth. More research is needed on each if these issues.

Directional Orientation

Root systems and crowns may develop asymmetrically in response to sun and prevailing wind exposure. If possible, mark the tree in the nursery and orient the tree so that it faces the same compass direction as it did when it was growing in the nursery. Turning the tree may expose less-acclimatized bark from the shaded north side to direct sun, which is suspected of increasing the chances of sun injury (winter and summer), especially on thin, smooth-barked species. If the tree cannot be oriented as before, perhaps because of crown form, it may be necessary to protect the trunk of thin-barked trees from sunscald, as discussed later.

Root Ball Wrappings

Materials used to cover and support the root ball serve a very useful purpose during transport of the trees, but they serve little purpose once the root balls are in their planting holes. The need to remove plastic pots and wooden boxes should be obvious. Removing burlap, ropes, and wire baskets is more controversial. Contractors often do not remove such materials, believing that they better help to hold the root ball together and to keep the tree from leaning without staking. Thoroughly stabilizing the lower part of the root ball with backfill soil at planting usually keeps firm root balls from shifting, and they usually will not have to be straightened later.

Natural burlap and twine usually, but not always, decompose rapidly after planting. Chemically treated burlap decomposes more slime. Color is the only visible sign that burlap has been chemically treated. If the burlap does not decompose rapidly, which is more likely in cool, dry climates, roots growing through the burlap can become girdled.

Exposed, dry burlap over the root ball can repel water and cause the root ball to dry out. To eliminate any chance of problems later, cut off and remove the burlap and twine from the top and upper sides of the root ball after the soil ball has been placed in the hole and stabilized by tamping soil firmly around the lower quarter of the root ball. A contractor who insists on leaving the root ball wrappings in place should be made responsible for returning after the first growing season to remove any remaining burlap and twine on top of the root ball. Synthetic (plastic) burlap and twine are not acceptable. If trees arrive with synthetic burlap, it should be completely removed at the time of planting.

Experience shows that wire baskets will not rust away for 30 years or more. The damage caused by them is controversial. Usually, the top sides of the buttress roots thicken more rapidly to form the root flare and grow into the upper horizontal wires, partially girdling the buttress roots over the years.

Not all roots are girdled simultaneously (and resulting in death), but stress is likely to develop. If the basket is cut 6 inches below the shoulder of the root ball before backfilling, the potential for problems is virtually eliminated.

Thinner-gauge wire may rust away faster. Thin-gauge wire netting is more commonly used in Europe. It rusts away quickly after planting and usually is not removed at planting time, but this practice is becoming more frequently questioned.

Improved basket designs can help reduce girdling by the basket wires. Low-profile baskets do not have wire on the upper part of the root ball to girdle roots so if not properly installed, can protrude above ground.

Disrupting Circling and Matted Roots

Though many techniques have been developed to reduce root circling in containers, the problem is still frequently encountered in the landscape community. Circling roots should be loosened and spread out- or cut if necessary. Excessive cutting of the roots can lead to serious root loss and could lead to increased stress after planting, but moderate stress is preferable to allowing circling roots to persist.

Be aware that additional circling roots also may be present deep within the root ball if the tree was grown in smaller pots during earlier stages of production.

Backfilling

When refilling the planting hole, the backfill soil should be free of clumps. While holding the bare-root tree in the correct position, shake the tree while adding loose soil around the roots to allow the soil to settle in between the roots. Periodically tamp the soil lightly until no air pockets remain, without causing the tree to settle deeper in the hole.

Add water to settle the soil around the roots, and then add more soil if necessary. Check again to be sure that the structural roots are just below the soil surface.

Firmly tamp the backfill soil around the base of the root ball. The rest of the soil should be tamped only lightly or left to settle on its own. Watering will assist in settling the soil naturally. Excessive tamping can compact soil and slow water penetration and root growth. The soil can be mounded lightly between the root ball and the edge of the planting hole to allow for settling, but do not cover the root ball with soil. If water is expected to percolate slowly into the soil, or if the planting site is not level, a raised ring of soil can be formed around the edge of the root ball to create a shallow basin that can be filled with water.

Root Loss and New Root Growth

Newly planted B&B and bare-root trees experience water stress as a result of root loss. Bare-root trees may lose much of their fine root system during transplanting but may retain most of their woody roots. Root balls of field grown trees contain approximately 10 percent of the fine, absorbing roots. Root pruning in the nursery can increase this percentage somewhat, but many roots are still lost. Container trees do not suffer similar root loss during the planting process, but the roots have access to only very limit moisture in the container substrate. All trees experience high levels of post-planting stress from lack of water until the roots can grow into the surrounding soil and access moisture.

The rate at which new roots are initiated and grow out of the root ball is influenced by species, as well as by soil temperature, soil oxygen levels, and soil moisture conditions. New roots will be initiated in one week to two months in warm soils. No new root growth may occur for many months in cold soils. Maximum root growth in most tree species occurs in summer when soils are warm, as long as moisture is adequate.

In colder regions, root growth may be minimal from late fall through early spring. In warmer regions, active root growth may continue all winter if soils are warm and moist.

The level of soil compaction that will inhibit root growth depends on soil type, soil moisture content, and tree species. Bulk density is not easily determined in the field. Experience is often the best tool to use to determine whether compaction is present.

Many products have been marketed as root stimulants. Claims usually refer to “better” or “improved” root growth without reference to specific effects on the root system or to how they promote faster establishment after planting.

Contents of root stimulant products may include growth hormones, nutrients, vitamins, sugars, amino acids, humic acids, extracts of plants, and inoculum of beneficial rhizosphere fungi and bacteria. Very little research information from studies on landscape trees and shrubs has been published on these products. What is available is inconsistent. Given the wide variety of species and site conditions encountered in urban landscapes, it is not possible to predict whether these products will be beneficial in any one particular situation if added at planting time. The most reliable way to increase root development is to manage soil moisture and aeration to provide a high-quality soil environment in which the roots can grow.

Pruning

If pruning was done correctly during production in the nursery, the tree should require very little pruning at planting except for removing broken twigs.

It is best not to make large pruning wounds on the stem; the tree's defense systems against decay can be weakened from stress. Removal of large branches and co-dominant stems may have to be delayed until reduction pruning has reduced their relative size. Pruning to completely compensate for root loss is not possible. It is possible to prune too much. Over pruning reduces photosynthesis and production of rootstimulating auxins to such an extent that all growth is greatly reduced. It also can destroy the tree's structure and introduce decay.

Making Proper Pruning Cuts

When a live branch is being removed, pruning cuts should be made just outside the branch collar. If no collar is visible, the angle of the cut should approximate the angle formed by the branch bark ridge and the trunk. Flush cuts make larger wounds and increase decay and therefore should always be avoided. Tearing the bark on large limbs can be avoided by using a standard three-cut procedure.

Wound Dressings

Wound dressings and tree paints have not been shown to be effective in preventing or reducing decay. They usually are not recommended for routine use on pruning cuts unless specified for control of disease, borers, or mistletoe.

Pruning Deciduous Trees and Broad-Leaved Evergreen Shade Trees

Broken, weak, or interfering branches should be removed. Branches with included bark should be removed or reduced in length, but do not over prune at one time if there are many. Prune to develop a strong structure. Trees of excurrent growth habit (having a prominent central leader) usually need little or no training. If the terminal has been accidentally broken, a new central leader should be developed.

Branch structure of large-growing decurrent (round-headed) trees can be improved by pruning when they are young. Remove co-dominant leaders or reduce their length. The permanent branches should be evenly distributed around the trunk and widely spaced, though reaching proper distributed around the trunk and widely spaced, though reaching proper separation may take decades.

After Planting

Support Systems

Staking, guying, and bracing are methods for mechanically supporting the trunk of a planted tree to keep it in an upright position. Staking is expensive and time consuming and may present a hazard because people could trip on the supports and fall.
Staking too rigidly can reduce trunk taper development on very small trees. The trunk taper of larger-sized trees typically planted in landscapes, however, is not often affected by staking.

Bare-root trees, as well as fabric-bag and container-grown trees with small, lightweight root balls, may require support until lateral or anchor roots develop. Large evergreens may need to be guyed because of the high wind resistance of the foliage and extra weight of snow and ice accumulation during the winter.
Locations with persistent or strong winds or other unusual circumstances may require more frequent use of stakes. Do not use a support system unless it is necessary, and in most cases, supports should be removed after one year to avoid trunk girdling.

Low guying can keep the tree in place while permitting the top to move freely. Attaching the guys above two thirds the height of the tree can cause the trunk to break where the trunk bends sharply in the wind at the attachment point.

Two stakes, with separate flexible ties, usually are recommended. It is often easier to install stakes before the hole is backfilled. Guy wires and ground anchors are used on larger trees. Turnbuckles can be installed to make adjustments and length as needed. Compression springs can provide flexibility for trunk movement.

The traditional material for guying trees to stakes is a wire slipped through a piece of garden hose, but this method can sometimes cause damage. Guying material should be wide, smooth nonabrasive, flexible, and, if possible, photodegradable.

To prevent injury to the bark, the guying should be examined at least once during the growing season and adjusted if necessary.

Underground anchoring systems are sometimes necessary for aesthetic or safety reasons. An untreated wood frame held in place with underground guys will rot away in a few years after it is no longer needed. Other homemade and commercially manufactured root ball anchor systems also are available.

Care should be taken not to use a system that requires additional soil to be placed over the root ball to cover it. All trees eventually have to be removed; therefore, the possibility of future damage to grinding machines and injury to operators should be considered when using steel ground anchors or cables.

Specially designed trunk guards and grates often are installed to prevent vandalism and to cover planting pits. Both can eventually interfere with tree growth. While they may be necessary in high-traffic areas, enlargement or removal of guards and grates may be necessary as the tree grows. Alternatives included pavers and open planters surround by a low fence.

Trunk Protection

Where sunscald or frost cracks are common, trunks of thin-and/or smooth barked trees are wrapped to prevent injury from winter sun. Trunk temperatures may rise well above freezing on cold but sunny days. Sunset or sudden shade from cloud cover can cause the bark to refreeze rapidly, resulting in possible injury to the cambium. Damage appears several months later as dead bark that sloughs off in a long, narrow strip, usually on the south or southwest side. Wraps sometimes are used to protect trunks from the hot summer sun.

There are not enough research data to completely support or reject the use of any trunk wrap material. However, progressive wraps are light in color and biodegradable. Paper wrap continues to be the most widely accepted standard, and users consider it to be effective in preventing sunscald. Maintaining directional orientation and proper watering ay help minimize the stress that leads to trunk injury.

Trunks should be wrapped starting from the bottom to the top so that layers overlap and shed water. At the top, secure the wrap with light twine or biodegradable weatherproof tape that will stretch slightly as the trunk grows. Never use nylon cord, wire, or fiber-reinforced tape.

Plastic guards sometimes are used as protection against damage from sun, equipment, and animals. These guards can prevent small mammals from feeding on the bark at the tree base, girdling the stem. Guards protect against mechanical injury from lawn mowers and string trimmers. Thin barked trees and palms are most susceptible to such damage. In trees stressed from transplanting, small wounds can enlarge to become a serious problem. If used, such guards must be removed before the trunk grows large enough to be constricted.

Mulching

Organic mulches can be used to conserve soil moisture, to buffer soil temperature extremes, to control weeds and other competing vegetation, and to replenish organic matter and nutrients in the soil.

These benefits lead to improved root growth in the soil beneath the mulch as well as in the well-established organic mulch layer itself.

Water from light rainfall or irrigation may be absorbed or shed by the mulch layer, causing the root ball soil to be drier, especially in the first few months after planting when the root spread is limited and irrigation is required frequently. Increasing irrigation amount or delaying application of mulch may be necessary in such cases.

The size of the mulched area needed depends somewhat on the size of the tree. For typical-size landscape trees (up to 3-inch caliper), a 6-to 9-foot-diameter circle of mulch is enough. In northern climates, it may be best not to apply mulch to trees installed in the early spring until after the soil has warmed because mulching may delay soil warming. This usually is not a major problem with established mulch areas because the soil is insulated by the mulch and stays warmer during winter.

For small trees, the mulch layer should be 2 to 3 inches deep after settling. Mulch should not be allowed to cover the base of the trunk because contact can lead to bark injury from fungi or rodents. Mulch often is incorrectly piled up to 1-foot-deep in a small circle only about 3 feet wide around the tree trunk. This mulching is of little or no benefit to the roots, sheds water, can be potentially damaging to the trunk, and is aesthetically unpleasing.

Watering

In the first year or two, it is important to keep the root ball moist but not over watered. The root ball soil is the major source of water for the tree until the root system redevelops outside of it. During this time, monitor the moisture in the root ball. Surrounding soils where there are few roots absorbing moisture often stay moist, while the root ball dries out quickly. When the soil is probed with a metal rod, dry soils will give more resistance than wet soils.
With practice, this can be an efficient and effective way to monitor soil moisture. Tensiometers can be used for more precise measurements.

Throughout the warm, summer weather, the tree probably will need water about twice each week, possibly more for container-grown trees. Summer showers usually are not adequate to keep the root ball moist.

Approximately 5 to 10 gallons of water probably will be sufficient to moisten a 10-to 20-inch-diameter root ball once it has dried thoroughly. Products are now available that hold 10 to 20 gallons of water and let the water drip out slowly over several hours when placed at the base of the tree. In hot weather or in well-drained soils, daily watering with just 1 gallon of water per inch of trunk caliper might provide the most even soil moisture for roots, though such a small amount of water may not reach the roots if there is a layer of mulch or soil over them. Monitoring the moisture in the root ball is strongly encouraged to avoid over watering or under watering.

Pest Management

Insect borers often attack newly transplanted trees. To prevent problems on susceptible species such as cherry (Prunus spp.) and maple (Acer spp.), treatments for borers can be applied.

Fungal cankers are another common problem with new transplants. There are no chemical treatments except applying rubbing alcohol to fresh wounds and a tree dressing over the cut surface to prevent entry of pathogens. Avoiding water deficiency is the best way to prevent cankers.

Planting Time

I prefer the mitigation planting to be completed in the fall where we will experience optimal climatic conditions. However, if watering and monitoring can take place in the spring and summer, this may be an option. This should be completed at your discretion and resources. The warranty will still be required and monitored.

Tree Preservation

Trees face three offenders when it comes to their survival during construction:

Compaction. The main killer of trees, both during and after the construction of a home or building, is soil compaction. Soil compaction is caused by these culprits: 1) construction vehicles driving over the root zone; 2) construction materials being set down on the roots; 3) soil being piled onto the root zone, which compacts the soil and suffocates the tree by cutting off the exchange of gases in and out of the soil; and 4) continuous walking over the root system. The most common, yet overlooked, cause of compaction is foot traffic—in fact, compaction from foot traffic is the main killer of trees on a construction site. Sadly, people just don't think it matters.

Root damage. Root damage can come from a variety of activities, but generally it is due to digging for foundations, swimming pools, landscaping, irrigation systems, drainage systems and landscape lighting.

Soil Contamination. Soil contamination is normally due to construction materials, such as paint, turpentine, lime, cement, or acid, being left or dispensed on and near trees. Over time, these materials leach into the soil, infect it and kill the trees.

Tree Preservation: How to Lessen the Damage

There are many pro-active moves that can be made before and during construction to mitigate the damage to the existing trees on a site.

Pre-construction

- One of the most commonsensical action items in tree preservation is to fence off the root zone to force people, trucks and materials away from the trees. Be sure to install a fence that cannot be easily taken down or breached.

- Do a deep root fertilization to the trees so that they have as much nutrition as possible during construction. It is important to start this feeding early because the feeding process takes time.

- Install a construction irrigation system to ensure tree preservation. If the existing trees had regular irrigation prior to construction, it is important to maintain that irrigation during construction. Many times, construction can go on for a year or more, so changing the irrigation—or not watering at all—can only worsen the impact of the construction process.

• Construct a path or bridge to reduce the impact of the construction. A confined path will minimize impact on the site, soil and root structure. Paths and bridges can be made of such eco-friendly materials as bark mulch, geo-grids or wood.

• Prune the roots to help tree preservation. If you know a tree's roots will be cut or damaged due to the construction, yet you want the tree to remain, go ahead and trim the roots beforehand. This measure is much less stressful on the trees than having the roots ripped and torn.

Construction

• Hand-digging for utilities, electrical, plumbing and irrigation systems goes a long way in tree preservation efforts. All trenches near trees should be dug in a radial pattern to mitigate root damage.

• For areas that are more sensitive, compressed air can be used to blast the soil away from tree roots. This way you can see all of the roots and run your irrigation pipes, landscape lighting conduits, etc. without cutting them.

• Use root barriers in tree preservation. During construction, root barriers can be installed to prevent new and existing trees from damage due to new hardscapes, swimming pools, outdoor water fountains and landscape lighting conduits.

Post-Construction

• Once construction is completed, trees need another deep root fertilization to promote health. This treatment is especially important when you are headed into the hot months.

• Aeration is another important tool in tree preservation as it promotes root growth and combats compaction.

• Inspect the trees for insect infestations, such as pine bark beetles and bores. Apply treatments as needed. Insects can kill quickly when Pennsylvania's weather turns hot and the trees are stressed from construction.

Conclusion

It is of my professional opinion as a Registered Consulting Arborist, that removing the subject trees noted in this report is warranted to manage and recreate a healthy urban landscape and to eradicate the hazards noted. The current state of the remaining trees located at this subject site is on average, poor condition. However, I feel mitigation involving replacement is critical. Management of the new trees will also be essential to ensure the highest success rate and diversity.

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CERTIFICATION OF PERFORMANCE

I, JOHN ROCKWELL HOSBACH, JR., CERTIFY THAT:

- I HAVE PERSONALLY INSPECTED THE TREE(S) AND/OR THE PROPERTY REFERRED TO IN THIS REPORT. THE EXTENT OF THE EVALUATION OR APPRAISAL IS STATED IN THE ATTACHED REPORT AND THE TERMS OF ASSIGNMENT.

- I HAVE NO CURRENT OR PROSPECTIVE INTEREST IN THE VEGETATION OR THE PROPERTY THAT IS THE SUBJECT OF THIS REPORT AND HAVE NO PERSONAL INTEREST OR BIAS WITH RESPECT TO THE PARTIES INVOLVED.

- THE ANALYSIS, OPINIONS AND CONCLUSIONS STATED HEREIN ARE MY OWN AND ARE BASED ON CURRENT SCIENTIFIC PROCEDURES AND FACTS.

- MY ANALYSIS, OPINIONS AND CONCLUSIONS WERE DEVELOPED AND THIS REPORT HAS BEEN PREPARED ACCORDING TO COMMONLY ACCEPTED ARBORICULTURAL PRACTICES.

- NO ONE PROVIDED SIGNIFICANT PROFESSIONAL ASSISTANCE TO ME, EXCEPT AS INDICATED WITHIN THE REPORT.

- MY COMPENSATION IS NOT CONTINGENT UPON THE REPORTING OF A PREDETERMINED CONCLUSION THAT FAVORS THE CAUSE OF THE CLIENT OR ANY OTHER PARTY NOR UPON THE RESULTS OF THE ASSESSMENT, THE ATTAINMENT OF STIPULATED RESULTS, OR THE OCCURRENCE OF ANY SUBSEQUENT EVENTS.

I FURTHER CERTIFY THAT I AM A MEMBER IN GOOD STANDING OF THE AMERICAN SOCIETY OF CONSULTING ARBORISTS AND THE INTERNATIONAL SOCIETY OF ARBORICULTURE. I HAVE BEEN INVOLVED IN THE FIELD OF ARBORICULTURE IN A FULL TIME CAPACITY FOR A PERIOD OF MORE THAN 13 YEARS.

SIGNED,

Notes