ITHACA'S TREES:

Master Plan, Inventory, & Arboricultural Guidelines for the Public Trees of the City of Ithaca, New York

Created by

The City of Ithaca Shade Tree Advisory Committee

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"Ithaca, almost concealed by the tops of trees by which its every street is lined, and to the superabundance of which it is indebted for the title of 'Forest City."

1. Introduction

A century ago Ithaca, New York was referred to as "Forest City" because travelers entering the city from one of the surrounding hills could see only the tallest buildings rising above the solid canopy of trees (Forest City was also the name of one of Ithaca's neighborhood post offices at the time). This wealth of trees continues into the present, with attractive tree-lined streets present throughout the city, even in the densely developed central business district.

Today's traveler will see an amazing diversity of tree species ranging from native maples and sycamores to flowering cherries and Japanese scholar trees, from the ancient dawn redwoods and ginkgos to the newest elm cultivars, and from the hardiest hornbeams and hackberries to the seemingly tender southern magnolias and willow oaks. There are 10,700 street and park trees in Ithaca, comprised of 73 genera and 190 species. This rich variety is extraordinary among city tree plantings in the United States. The species diversification seen here not only delights the eye but also helps protect Ithaca's trees from epidemics that could wipe out less diverse plantings. It is notable that the tree inventory keeps track of all ash trees on city streets and parks (364 ash trees as of 2014), so when the Emerald Ash Borer arrives in Ithaca, we will be able to readily manage the damage through removals, treatment, and replanting.

Ithaca is located in central New York and has a population of about 30,331 people (2012); the greater Ithaca area has about 101,564 residents. Its primary industry is education, being the home of Cornell University and Ithaca College, with high-tech industry and tourism contributing to the vibrant economy.

Ithaca is situated at the head of Cayuga Lake, one of eleven Finger Lakes created by the retreat of the last continental glacier. The downtown area sits on an alluvial flood plain with glacial till underneath, and the surrounding hills have Devonian shale as bedrock with occasional outcroppings of Tully and Onondaga limestone. The soil pH varies, and is usually alkaline (as high as pH 8.2) next to Ithaca's sidewalks. Downtown Ithaca is about 390 feet above sea level, and the hills rise to about 900 feet above sea level.

Ithaca falls within the USDA hardiness zones 5b and 6a. This means that our average lowest temperature is –10 to –15 degrees Fahrenheit. The downtown area is slightly warmer (zone 6a), with –5 to –10 degrees Fahrenheit average minimum temperatures. We receive an average annual precipitation consisting of 35 inches of rain, with 67.3 inches of snowfall. Most of our weather is influenced by the prevailing westerly winds. Cayuga Lake moderates the downtown weather; the hills often being 5 to 10 degrees cooler.

The native vegetation in and around Ithaca is a mixture of eastern deciduous hardwood and northern conifer forests. This shifting mosaic forest is typical of central New York and

represents the last phase of vegetative succession. Some of the species found in this forest are: red, sugar, and silver maples, paper birch, quaking and eastern cottonwood, black cherry, black walnut, pignut and shagbark hickories, northern red oak, white, bur and black oaks, serviceberry, hackberry, dogwood, American hornbeam, hop hornbeam, hawthorn, tulip tree, black locust, white and green ashes, boxelder, eastern white pine, Norway spruce, American sycamore, redbud, mulberry, basswood, black willow, and eastern hemlock. Ithaca's urban forest interfaces with and becomes a part of this natural setting, sharing many of the same species.

Benefits of Trees

We benefit from the presence of trees in many ways.

1. Trees provide privacy.
2. Trees screen unsightly areas.
3. Trees protect pedestrians from vehicular traffic.
4. Trees remove particulate matter from the air.
5. Trees remove harmful gases such as carbon dioxide, carbon monoxide, sulfur dioxide and ozone.
6. Trees produce oxygen.
7. Soil and tree roots capture storm-water runoff.
8. Leaves attenuate storm-water runoff.
9. Trees provide habitat for wildlife.
10. Trees save on fuel and air-conditioning costs in winter and summer.
11. Trees increase property values.
12. Trees beautify the city.

For more about the benefits of trees, visit the International Society of Arboriculture site treesaregood.org

Our Vision Statement

By the year 2020, Ithaca's community forest will be multi-aged, diverse, fully stocked, healthy, and safe. It will contain a wide variety of appropriate species and be maintained on a regularly scheduled basis. It will contribute to the general welfare of our residents by reducing energy costs, increasing property values, providing homes for wildlife, beautifying all neighborhoods, and projecting an image of quality to visitors and prospective businesses. Care of public trees will be used as a means to educate and inspire residents to care for trees on private property.

The City of Ithaca will cooperate in urban forestry research with Cornell University and other agencies to ensure that we will lead the nation in developing and utilizing better methods in our urban forestry program. The citizens of Ithaca will have an important role in community forestry by participating in programs such as Citizen Pruners, a volunteer-based small tree maintenance program, or by serving on the Shade Tree Advisory Committee. The City of

Ithaca Urban Forestry Program will be accredited by the Society of Municipal Arborists and will be an annual recipient of the National Arbor Day 'Tree City' and 'Growth Awards'.

Shade Tree Advisory Committee

The Shade Tree Advisory Committee, reestablished in 1985 by Mayor John Gutenberger, advises the City of Ithaca Parks and Forestry Section. There are twelve members of the Shade Tree Advisory Committee (STAC). Nine people are members-at-large, one is the Common Council liaison, and one is the City Forester. A utility forester is traditionally a member of the STAC. The ex-officio members are the City Forester and the Common Council liaison. The general charge of the Shade Tree Advisory Committee is to:

1. Oversee the development of plans and the planting of City street trees and open spaces, the purpose of which will be to strengthen existing streetscape images, create identifiable images for particular types of streets (such as city entranceways, major thoroughfares and commercial strips) and to create a more pleasant urban environment.
2. Oversee the preparation of a plan that identifies areas to be inventoried and planted on an annual basis.
3. Oversee the preparation of an inventory of existing trees in selected areas of the city and make tree planting recommendations for the selected areas.
4. Prepare and update a list of trees suitable for street tree planting in the City of Ithaca. The Shade Tree Advisory Committee shall review the approved list at least once every year to determine which are to be removed or added.
5. Make recommendations to the Department of Public Works and Board of Public Works relating to the planting, maintenance, and removal of city shade trees as deemed necessary.
6. Help to create greater community awareness regarding the value and care of the city's trees.

Citizen Pruner Volunteers

Citizen Pruners is a group of volunteers who meet regularly during the spring, summer, and fall seasons to prune small-statured city trees. The program is a joint partnership among the City, Cornell Cooperative Extension of Tompkins County, and Cornell University's Urban Horticulture Institute. Organization, support, and volunteer recruitment are provided by Cornell Cooperative Extension, training is done by Cornell faculty, Extension staff and the City Forester, and projects and supervision are arranged by the City Forester.

Volunteers receive training about Ithaca's street and park trees; correct planting and maintenance procedures, and the pruning and training of trees and shrubs. The Citizen Pruners' work augments that of the Department of Public Works and encourages citizens to respect and enjoy the trees and shrubs of our city.

The main tasks of Citizen Pruners are to remove suckers, damaged, dead or poorly formed branches, to train young trees, and to prune overgrown shrubs.

Awards, Arbor Day, & Tree City Designation

Ithaca has an active Arbor Day program. Every Arbor Day the City distributes Arbor Day posters to schools and public buildings and encourages bookstores to display material about trees. In addition, the City celebrates Arbor Day with a supporting proclamation from the Mayor and the Department of Environmental Conservation State Forestry representative along with publicity in the media.

The City of Ithaca has been designated "Tree City USA" for every year since 1987. A Tree City designation calls for the city to spend $2.00 per capita on tree work, have a tree ordinance in place, and celebrate Arbor Day. Since 1995 Ithaca has received many 'Growth Awards" from the National Arbor Day Foundation, which is a much higher standard to achieve. In 1996, 1998, and 2000 Ithaca received the New York Conference of Mayors Local Government Achievement Awards for its urban forestry program.

2. Policies and Guidelines

Policies and guidelines regarding Ithaca's Urban Forest have been formulated and approved by the Shade Tree Advisory Committee in consultation with the City Forester

Site Selection for Tree Planting

- Tree lawns must be equal to or greater than 4 feet wide.
- Tree pits shall have a porous opening at least 50 square feet (e.g.5' x10', 8' x 8', etc.).
- Trees **shall not be planted** (see also Minimum Spacing for Street Trees in Appendix II) :
  - within 20' from the corner of intersecting streets
  - within 35' in front of a stop sign
  - within 15' from hydrants
  - within 15' from a utility or street light pole
  - within 15' of a driveway
  - within 4' of the street curb (additionally, trees should be planted as far from the sidewalk as possible)
- Breakout underground soil paths between tree lawns and adjacent private green space should be considered when tree lawns are less than or equal to 8 feet wide. Two sidewalk slabs, each typically 5' x 5' in size, should be removed where the tree is planted and no less than 24", preferably 36", of structural soil placed under the replacement sidewalk slabs. This provides a deep path for tree roots to grow into the adjacent private property while minimizing sidewalk damage as the tree grows (see also Structural Soil Break-out Zone from Narrow Tree Lawn to Adjacent Property in Appendix II).
- No tree is to be planted directly under or in competition with a large tree on private property
- All planting locations must be approved by the City Forester

Tree Selection

- Only trees that mature at 30' tall or less shall be planted under single or triple phase utility wires.
- These smaller trees shall be spaced no less than 25 feet apart, with a minimum of 240 cubic feet of soil (e.g.8 x 10 x 3=240 cubic feet) per tree, unless there is opportunity for the tree to grow into adjacent green space.
- When possible, small trees should have a mature shape and stature so that pedestrians may eventually walk under them.
- Medium-large trees (>30' at maturity) shall be spaced no less than 30' apart, with a minimum of 720 cubic feet of soil (e.g. 60' x 6' x 2'=720 cubic feet) per tree, unless there is opportunity for the tree to grow into adjacent green space on the other side of the sidewalk. See appendix for more information on soil volumes.

- Entrances and main thoroughfares should be planted in such a way as to create visual compatibility among trees.
- The Recommended Tree List for Ithaca should be updated periodically as new information becomes available. See current Recommended Urban Trees list at: http://www.hort.cornell.edu/uhi/outreach/recurbtree/index.html
- Tree specifications shall adhere to the American Nursery and Landscape Association ANSI Z60.1 nursery standards. Available at: http://americanhort.org/documents/nursery_stock_standards_AmericanHort_2004.pdf

Tree Planting

1. Open planting sites in areas with little or no shade shall be given priority over shaded streets.
2. Where feasible, pavement should be removed to make spaces for trees in areas lacking shade.
3. On main thoroughfares, large trees maturing at a height greater than 30' should be planted in all sites unless there are primary electric lines overhead. Where primary wires are present, trees maturing at a height of 30' or less should be planted.
4. If a property owner doesn't want a tree in front of his or her property, an effort should be made to change his or her mind if the site is a high-priority location. However, if this fails, the tree should not be planted, and the site should be revisited at a later date.
5. All property owners should be given notification of planned planting, so that there is ample time for reaction.
6. Based on research, planting of bare-root trees in the fall should continue to be the main method of planting. Evergreens or large trees should be planted balled and burlapped in the spring.
7. All newly planted trees should have irrigation bags and mulch during their first growing season.
8. After the first year, the mulch should be renewed and/or low expandable tree trunk guards placed around the bases of young trees until they reach 6" caliper.
9. Species should not be over-planted. As a rule, no one species should make up more than 5% of the total population.
10. Species should be used that:

    a. Are tolerant of site conditions and not invasive
    b. Have few management problems
    c. Meet functional and aesthetic needs
    d. Are resistant to pests

11. Tree staking and guying should be used only where tree size and location warrant it at the discretion of the City Forester and then removed after 1-2 growing seasons. See tree protection details in the appendix.

Tree Maintenance

1. Watering of new trees and pruning of trees of all ages are the two highest-priority maintenance activities.

2. Pruning shall take place in accordance with the priorities identified by the tree inventory or through observation by the City Forester and crew. Every attempt shall be made to correct hazardous conditions first.
3. Tree Trimmers shall maintain qualification for line clearance. This will enhance safety in daily operations, provide for compliance with national standards (ANSI Z133.1), and allow for mutually beneficial municipal-utility operations.
4. The Parks and Forestry Division must show preference to Tree Care Industry Association (TCIA) accredited tree care companies when private arborists are contracted.
5. Parks and Forestry shall incorporate ANSI Z133.1 safety standards in daily operations.
6. Parks and Forestry shall incorporate ANSI A300 tree care performance standards in daily operations.
7. Citizen Pruners volunteers should train young trees to develop sound branching structure and good overall form.

Tree Protection during Construction

Tree protection shall be strictly enforced in accordance with the City Tree Ordinance and ANSI A300 Standards. See appendix for tree protection details.

Tree Removal

1. Trees shall be removed on the basis of safety first and foremost. Hazardous trees shall be the highest priority and shall not require notification to be given prior to their removal.
2. Dead trees, trees with greater than 50% of the crown dead, or those that are a significant nuisance (as defined by the City Forester in consultation with the Shade Tree Advisory Committee) should also be removed.
3. If the tree is not an imminent hazard, notice of its removal should be given prior to removal. The properties in front of and adjacent to the tree and the tree itself should be posted.
4. Replanting after removal should take place within a year if replacement is warranted. Every effort shall be made to explain the need for a tree's removal when questioned by the property owner or neighbors.
5. The removal of any tree for the installation of solar panels shall not be done until reviewed by the City Forester. The cost of any removal shall be borne by the property owner.

Solar Panel Policy

It has recently been brought to our attention that citizens of Ithaca may sometimes request city street trees to be removed near their homes for the purpose of optimizing solar panel installation. While we recognize that solar panels may provide energy cost savings for homeowners, we feel that such benefits do not substantiate the removal of mature, healthy street trees, which not only reduce energy costs through passive cooling, but also provide significant air filtration, storm water attenuation, and aesthetic and wildlife value. We are sensitive to the fact that requests for tree removal should be reviewed on a case by case

basis since exceptions may be made for trees whose health is compromised, whose canopies are already severely altered (such as those in utility wire right-of -ways), or for trees that block safety signs or infringe on public safety.

Requests for city tree removal for any reason must be made to the City Forester through a request for a tree work permit that can be accessed from the Forms and Permits section at: http://www.cityofithaca.org/

Inventory

The computerized inventory is now complete for all street and park trees in the City of Ithaca. To assist in the effort for keeping this inventory current, the City is divided into eight management areas, each area more or less delineated by geographic boundaries. The inventory should be kept current by re-inventorying at least two management areas per year.

3. Tree Inventories

In 1996, the City of Ithaca's Shade Tree Advisory Committee recommended the funding of a street tree inventory. Tree inventories are not an innovation for Ithaca. Starting in the 1920s, then City Forester Richard Baker took a complete street tree inventory, which was maintained through the 1940s. Using maps of the city streets, he drew each individual tree where it was located, and for each recorded the common name, trunk diameter, condition, as well as occasional notes about safety concerns or the year the tree was removed. In this respect, Ithaca was ahead of its time by having one of the first complete street tree inventories. According to an incomplete review of the records from that inventory, the City of Ithaca had an estimated 5000 trees. About half of these trees were maples (the inventory rarely identifies which species of maple), and one-third were elms (most likely entirely American elms, which were later decimated by Dutch Elm Disease). The remaining one-third was a mix of a very limited number of species—mainly catalpa, sycamore, poplar, ash, cherry, and apple. Oaks and lindens were extremely rare. Clearly, during these decades Ithaca's urban forest was much less diverse than the arboreal melting pot of today.

More recently, a computerized inventory was taken in 1987 and again in 1996, and kept up to date to the present. Ithaca's computerized tree inventory has been fully integrated with the city's geographic information system with the help of the City's Planning Department.

The urban forest is a dynamic macro-organism that constantly changes. Healthy trees are growing; diseased and older trees are declining. The numbers and types of street trees change as old trees are removed and young trees of different types are planted to take their place. Before the last tree is inventoried, the condition and composition of the forest has already changed. Therefore, a tree inventory can be thought of as a snapshot that captures the urban forest at a given time.

Key Concepts and Definitions

Street Trees

A street tree is defined as any tree or shrub growing in the public right-of-way. These trees usually occupy the area of lawn between the sidewalk and the street. Occasionally, a street tree is planted behind the sidewalk because there is not enough room to plant between the sidewalk and street. All street trees are the property of the City of Ithaca and must be maintained by the City. Therefore, it is useful to know the number and species of trees, and their conditions and maintenance needs. Trees outside of the right-of-way are inventoried only when they pose a problem. Wooded areas are inventoried for sign clearance only. The off right-of-way trees and wooded areas are not discussed in this report.

Planting Sites

Planting sites are designated based on available space, the existence of overhead wires, adjacent vegetation, and proximity to driveways, sidewalks, utility poles, and intersections.

Stocking

Stocking is determined by the number of existing trees divided by the number of existing trees plus the number of unfilled planting sites (*Stocking*= [*Trees*] / [*Trees* + *Unfilled Planting Sites*]). If one considers all available planting sites in Ithaca, there is currently 99% stocking. If one considers only high priority planting sites, there is 99.9% stocking. The Vision Statement calls for 100% stocking, and we have functionally reached that point now. Recently updated planting site selection standards will likely eliminate some of the few remaining open planting sites as the inventory is updated with these new standards over the next few years. Planting sites located too close to street signs, driveways, street intersections and other trees will be removed from the list.

New Plantings

In the past the City of Ithaca has planted several hundred trees each year. These plantings were aimed at achieving full stocking as described in the Vision Statement, to replace trees that have been removed, and to offer an opportunity to evaluate different species and methods of planting. Since approaching near full stocking levels, the city has been mainly focusing on planting to replace removed trees, so the number of trees planted each year has been decreasing.

Species Diversity

Ithaca's urban forest currently has 72 genera and 190 species. Approximately 22 genera comprise 1% or more of the total population. Of these, maples (*Acer*) represent 27.5% of the population. Oaks (*Quercus*), crabapples (*Malus*) and honey locusts (*Gleditisa*) comprise the next greatest proportions at 9%, 7% and 6% respectively. There are 45 species comprising 0.5% or more of the total population in the urban forest. The species that comprises the highest percent of the population is Norway maple at about 12% of the population. The next greatest proportions are crabapple, honey locust and sugar maple at 7%, 6% and 5%, respectively.

State of Ithaca's Urban Forest

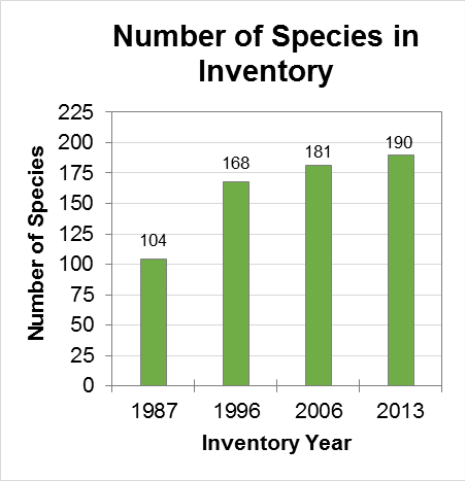
The inventory of 1987 considered only street trees, whereas the 1996, 2006, and 2013 inventories considered all publicly managed trees. The 1987 inventory assessed trees by different criteria than did the 1996, 2006 and 2013 inventories. As a result, few direct comparisons can be made. For instance, one can compare numbers of trees, number of species, and diameters, but cannot compare trunk damage, planting sites, or maintenance needs because the methods of assessment were different. For example, in 1987, trees

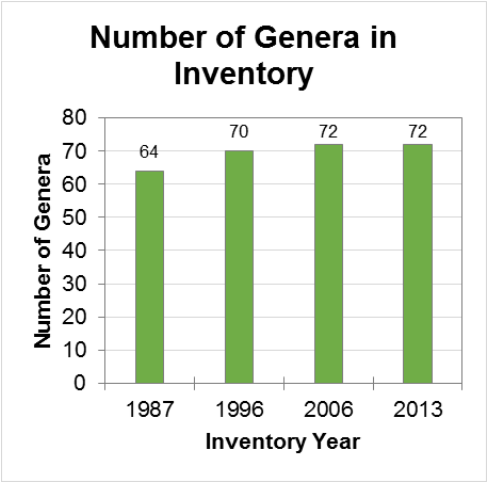
were assessed by various categories of trunk damage such as trunk rot, bark splitting, wounding, girdling, vandalism, disease, and insect infestation. However, in 1996 only fresh trunk damage was considered.

There were 10,700 public trees in the most recent inventory (2013). In 2006 there were 8,433 street trees in the inventory, in 1996 there were 7,293 street trees and in 1987 there were 5,541 street trees. In 1987 there were 104 species of street trees. In 1996 there were 168 species, in 2006 there were 181 species, and in 2013 there were 190 species of public trees.

In 1987, the top ten trees comprised 82.9% of the street trees. In 1996, the top ten street trees made up 59.6% of total street trees and in 2006 the top ten street trees comprised 41.1% and in 2013 the top ten comprised 45.6%. Rather than using the top ten street trees when replanting, different species are used in an effort to diversify the urban forest. Recently we have seen a significant increase in two species in particular, hybrid elm (*Ulmus x hybrida*) and Swamp white oak (*Quercus bicolor*). While these species have been excellent performers, we should take this rise in proportion relative to other species into consideration when deciding which species we will plant in the near future.

Because of the problems caused by monocultures, in 1987, the Shade Tree Advisory Committee called for a moratorium on species exceeding 5.0% of the total population of trees. The moratorium included *Acer platanoides, Acer saccharum*, and *Gleditsia triacanthos.* Tracking the diameters of these trees over twenty years shows a continuing shift to the right representing a continually aging population. Exceptions to this policy are the planting of low-growing Sugar Maples (cultivar, ‘Sugar Cone’) and low growing Honeylocusts (cultivar, ‘Imperial’) to plant under utility wires. These trees do well in difficult areas such as tree pits. We will not plant Norway maples because of their invasive tendencies and because they are currently such a large percentage of the population.





Composition of Street Trees

1996: There were 7,293 street trees and shrubs in the city. There were 70 genera of street trees, 168 species of street trees and shrubs (136 species of street trees, and 43 species of shrubs). Seventeen genera of street trees comprised 1.0% or more of the street tree population, and 34 species comprised 0.5% or more of the street tree population. The most frequently occurring street tree species are discussed in Conditions of Prevalent Species.

2006: There were 8,433 street trees and shrubs in the city. There were 72 genera of street trees, and 181 species of street trees. Twenty genera of street trees comprised 1.0% or more of the street tree population, and 38 species comprised 0.5% or more of the street tree population.

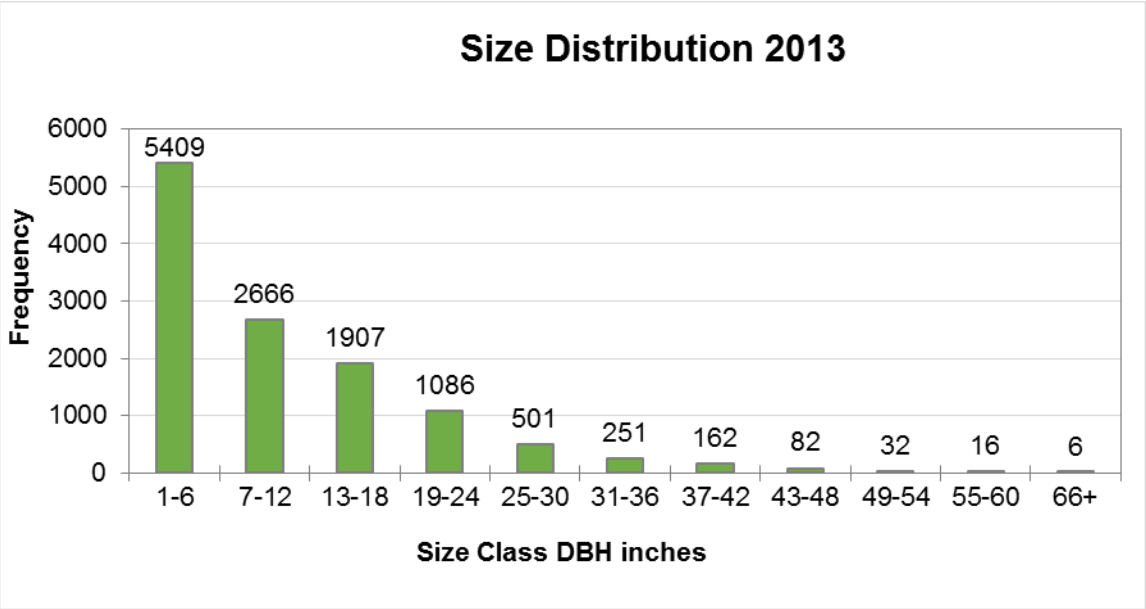
2013: There were 10,700 street trees in the city. There were 72 genera of street trees, and 190 species of street trees. Twenty-two genera of street trees comprised 1.0% or more of the street tree population and 45 species comprised 0.5% or more of the street tree population. Shrubs were excluded from this analysis.

Age Distribution of Street Trees

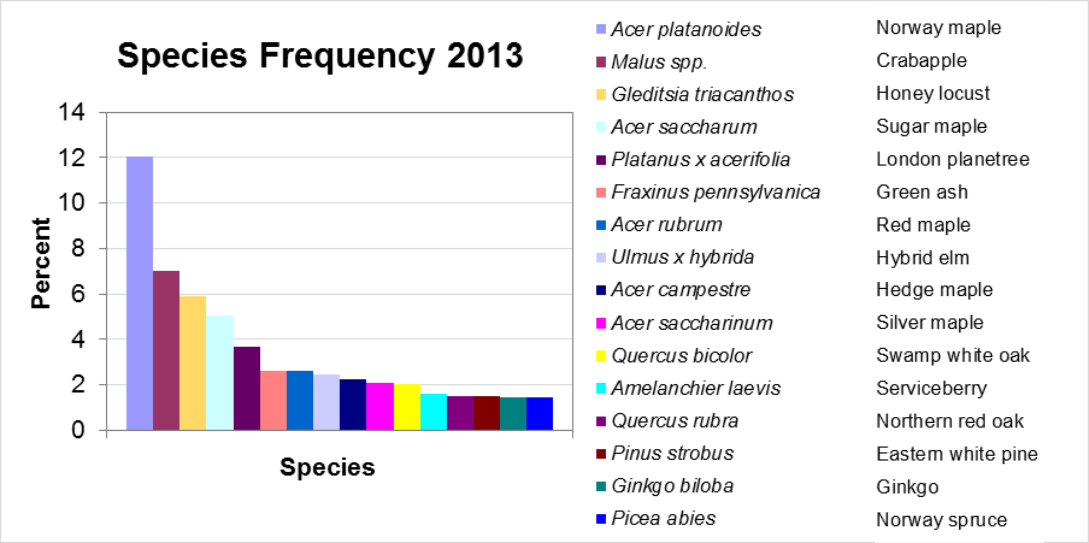
1996: Ithaca's urban forest was relatively young. Of the 7,293 street trees, 4,804 of them, or 66% had diameters of less than 13 inches. There were almost 1,200 street trees with a two-inch diameter. These figures reflect the intensive spring and fall plantings of the prior three years and the plantings by the New York State Department of Transportation during Ithaca's West End realignment in 1996 and 1997. Otherwise the 1996 street tree population distribution shows the normal J-shaped curve consistent with a young forest. Ideally, the urban forest should have a majority of its population in the small DBH categories as these represent the mature forest of the future.

2006: Ithaca's urban forest remained relatively young as of 2006. Of the 8,433 street trees, 5,661, or 67.1% had diameters of less than 13 inches. There were 1,698 street trees with a DBH of less than 3 inches.

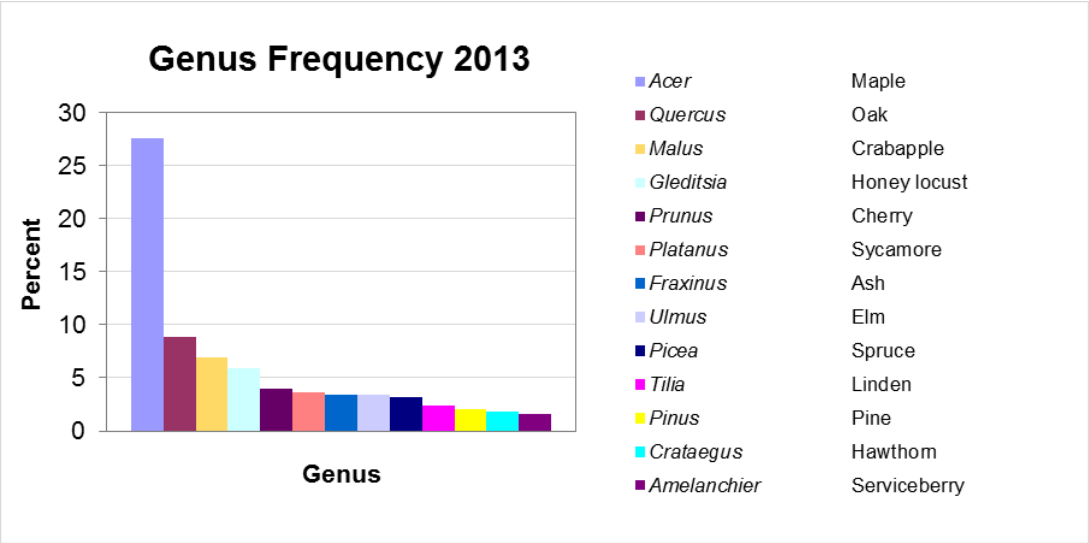
2013: As of the 2013 inventory, Ithaca's urban forest still remained relatively young. Of the 10,700 street trees, 8,075, or 75.5% had diameters of less than 13 inches. There were 5,400 trees with a DBH of less than 6 inches. As larger old trees are removed they are replaced with young trees, resulting in an urban forest composed of many young trees.



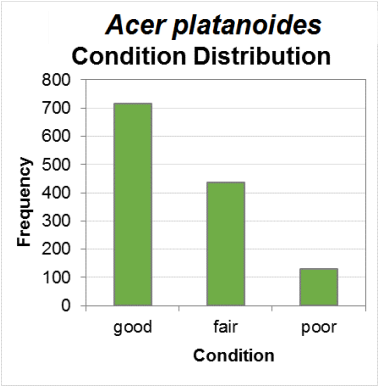
Species Distribution, 2013

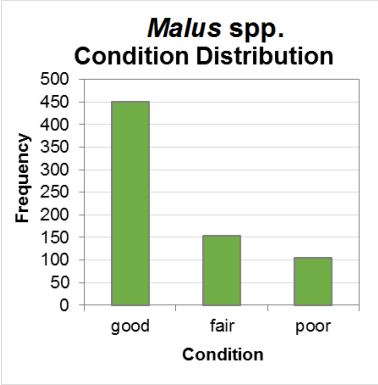


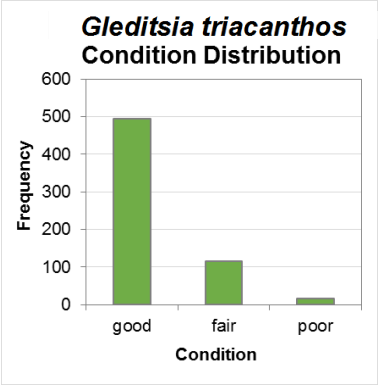
Genus Distribution, 2013

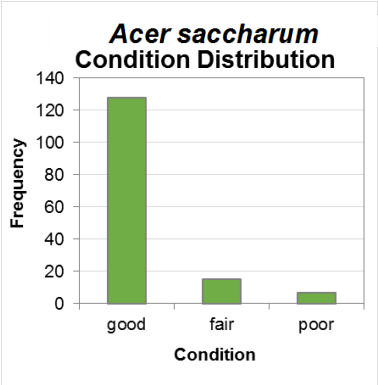


Condition of Prevalent Species, 2013









As of the most recent inventory, sixty eight percent of Ithaca's street trees were in 'good' condition, 21% in 'fair' condition and only 11% in 'poor' condition. This can be attributed to the on-going street tree plantings and to the maintenance done by the Department of Public Work's tree crew. The most prevalent species were Norway maple (*Acer platanoides*), crabapple (*Malus* spp.) and honey locust (*Gleditsia triacanthos*).

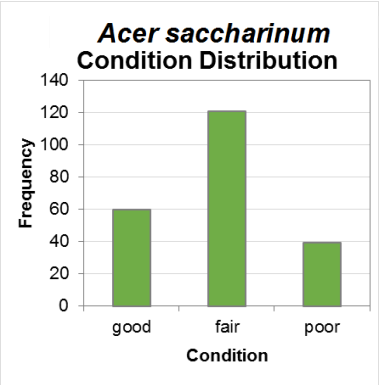
Norway maples had a 'good' rating of 56%, 'fair' rating of 34%, and 'poor' rating of 10%. Historically, Norway maple has been over-planted in Ithaca and elsewhere. It also has issues with disease (*Verticillium* wilt), over-shading and an invasive nature, and this species is no longer being planted by the city.

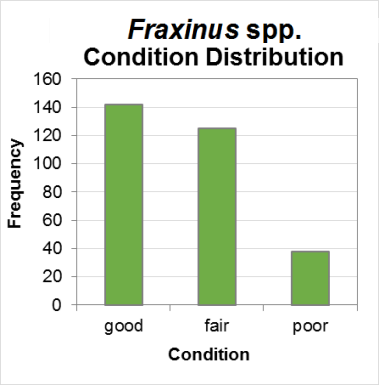
Crabapple, the second most prevalent tree as of 2013, had a 'good' rating of 63%, 'fair' rating of 22% and a "poor" rating of 15%. Older varieties of crabapple are highly susceptible to a variety of diseases and insect problems; however, the newer cultivars have been bred for disease resistance and perform much better.

Honey locusts (*Gleditsia triacanthos*) had a 'good' rating of 79%, a 'fair' rating of 18% and 'poor' rating of 3%. This is a very commonly planted species, however, this tree is very tolerant of urban stresses, provides light shade, and is beautiful to see.

The sugar maples (*Acer saccharum*), the fourth most common trees, had a 'good' rating of 85%, a 'fair' rating of 10%, and a 'poor' rating of 5%. Despite the large proportion in 'good' condition, this species is in a state of decline for a number of reasons: intolerance of restricted growing areas such as tree lawns, leaf scorch, salt intolerance, and *Verticillium* wilt. Many large sugar maples are removed each year due to decline.

Another species of interest is silver maple. This species is prone to storm damage and rapid decay, and therefore poses safety concerns. It is no longer planted and thus the majority of trees are very large and not in very good condition. The silver maples (*Acer saccharinum*) showed a 'good' rating of only 27%, a 'fair' rating of 55% and a 'poor' rating of 15%. The City of Ithaca has removed the worst of these trees and continues to monitor the health and structure of the remaining trees, removing several each year.





Maintenance of Street Trees

Ithaca's Parks and Forestry Division is primarily responsible for pruning, removals, and stump grinding. Its other duties include tree planting, mulching, and watering. Three Tree Trimmers are responsible for 8,433 street trees. That is 2811 street trees for each person. They have a bucket truck, dump trucks, and one stump grinder at their disposal.

In 2006 Parks and Forestry removed 122 trees, pruned 278 trees, ground 105 stumps, planted 197 trees and trained 78 trees. The most frequently removed species were silver maple, Norway maple and sugar maple.

In 2013 Parks and Forestry removed 100 trees, pruned 1000 trees, ground 95 stumps, and planted 100 trees. The most frequently removed species were still silver maple, Norway maple and sugar maple.

Ithaca is divided into eight management areas, each area more or less delineated by geographic boundaries. This makes maintenance much easier. For instance, one can list all trees determined to be high priority prunes in the Fall Creek management area and send the tree crew there to do the pruning. This cuts down on unnecessary travel and saves the city money in terms of vehicle maintenance, gasoline, and hours spent on the job.

Appendix I: Specifications

Nursery Stock Quality Guideline Specifications for Deciduous Street Trees

See also the latest version of ANZI Z60.1 (American Standard for Nursery Stock, Available at: http://americanhort.org/documents/nursery_stock_standards_AmericanHort_2004.pdf)

Compliance

- All trees shall comply with federal and state laws and regulations regarding plant disease, pests and weeds. Any inspection certificates required by law shall accompany each shipment of plants.

Proper Identification

- The genus, species, cultivar, and size of all trees shall be as indicated on the plant list. Tree species and cultivar should be approved by the City Forester in consultation with the Shade Tree Advisory Committee using Recommended Urban Trees as guidelines: (http://www.hort.cornell.edu/uhi/outreach/recurbtree/index.html)
- The genus, species and cultivar or trademark name and size of all trees should be clearly and legibly labeled in weather-resistant ink or embossed tag on each plant.

Tree Growing and Digging

- All trees should be grown under climatic conditions similar to those in Central New York State for at least 2 years to insure appropriate dormancy in the fall and bud break in the spring.
- Trees should be freshly dug during the season of planting, March 15th-May 1st for spring planting and October 15th-December 1st for fall planting. No heeled in or cold storage trees will be accepted. Trees should not have growing buds at time of planting in the spring and will have dormant buds in the fall. All trees shall be guaranteed for shipment when dormant in November or April.
- The City of Ithaca reserves the right to select and tag trees at the nursery prior to the digging of any trees. Selection at the nursery shall not impair the right of inspection and rejection upon delivery for size and condition of balls, diseases, insects, defects or injuries.

Tree Characteristics at the Time of Delivery

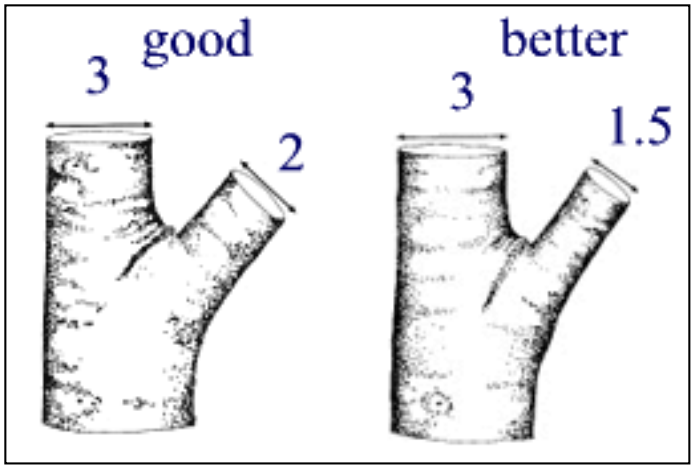
- Tree and root ball size should conform to the latest version of ANZI Z60.1 (American Standard for Nursery Stock, Available at: http://americanhort.org/documents/nursery_stock_standards_AmericanHort_2004.pdf)

Tree Health

- All trees should be free of insects and diseases. New shoot growth should be greater than 12 inches unless the tree is a dwarf, slow-growing type, or receives special approval from the City Forester. The size, color and appearance of leaves should be typical for the time of year. Leaves should not be tattered, misshapen, stunted or off-color (chlorotic or necrotic).

Trunk and Crown

- Tree caliper should be 1.5 - 3.0 inches measured on the trunk 6” up from the root flare. Tree sizes between 1.0 inches up to 4 inches may be acceptable at the discretion of the City Forester.
- There should be one dominant leader more-or-less straight to the top of the tree with the largest branches spaced at least 6 inches apart. There can be a double leader only in the top 10% of the tree and only in primarily decurrent trees. In excurrent trees or those trees that start out excurrent and then become decurrent, there should be only one central leader to the top of the trees (see list of excurrent and decurrent trees).
- Branching on all deciduous street trees shall begin no lower than 48 inches.
- The tree canopy should be symmetrical, free of large voids, and typical of the species or cultivar. Live crown ratio (distance from bottom of canopy to tree top/tree height) should be at least 50%.
- All branches shall be less than 2/3 the trunk diameter, free of bark inclusions, and more-or-less radially distributed around the trunk.

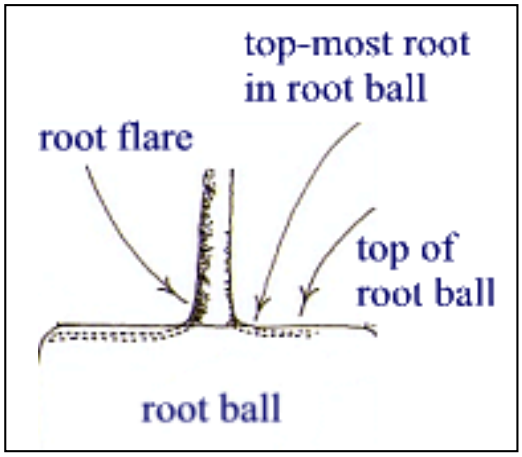


- Trees greater than 1.5 inches caliper should be able to stand erect without a supporting stake.
- The trunk and main branches shall be free of physical damage such as scrapes, broken or split branches, unhealed scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, bleeding, signs of insects or disease, or other defects. Trees shall not be pruned immediately prior to delivery.

Roots

- Trees indicated as “B&B” shall be balled and burlapped. Only natural biodegradable burlap and jute twine should be used. Wire baskets are acceptable. Broken, soft or re-balled root balls will be rejected. Root balls should not be allowed to dry out after digging.
- Trees shall have a well-developed fibrous root system. There should be no roots greater than 1/10 diameter of the trunk circling more than one-third the way around in the top of the root ball. Roots larger than this may be cut provided they are smaller than one-third the trunk diameter. There should be no kinked roots greater than 1/5 the trunk diameter. Roots larger than this can be cut provided they are less than one-third the trunk diameter. The tops of several tree balls may be randomly inspected to insure that root systems meet the specification.

- Trees should be rooted into the root ball so that soil remains intact and trunk and root ball move as one when lifted. The trunk should bend when gently pushed, not pivot at or below soil line.
- The point where the top-most root in the root ball emerges from the trunk should be visible at the soil surface. No excess soil will be piled on top of the root flare during the digging process.



- At the time of delivery, the root ball shall be moist throughout. No signs of moisture stress should be present in the crown, such as wilted or dead leaves or branch dieback. Signs of excess soil moisture should not be present in the roots, such as foul odor, poor growth, discoloration, or death.

Delivery and Inspection

- The City of Ithaca should stipulate how many days prior to delivery that notification is required.
- The City of Ithaca reserves the right to reject trees that do not meet the specifications set forth in these guidelines or as otherwise specified by the City.

Excurrent trees *are those that have a strong central leader as a young tree and at maturity. Examples of strongly excurrent trees are:*

- *Corylus colurna*
- *Liquidambar styraciflua*
- *Liriodendron tulipifera*
- *Quercus acutissima*
- *Quercus imbricaria*
- *Quercus palustris*
- *Metasequoia glyptostroboides*
- *Nyssa sylvatica*
- *Taxodium distichum*

Decurrent trees *are those that may or may not start out with a dominant leader but have several leaders at maturity. Examples of strongly decurrent trees are:*

- *Cercis canadensis*
- *Cladrastis kentuckea*
- *Crataegus* spp.
- *Gleditsia triacanthos*
- *Gymnocladus dioicus*
- *Koelreuteria paniculata*
- *Malus* spp.
- *Phellodendron amurense*
- *Styphnolobium japonicum*
- *Zelkova serrata*

Trees that are neither strongly excurrent nor decurrent. *These trees generally start off being excurrent (strong central leader) and eventually become decurrent (many leaders). Examples of these trees are:*

- *Acer* spp.
- *Aeculus* spp.
- *Catalpa speciosa*
- *Celtis occidentalis*
- *Eucommia ulmoides*
- *Fraxinus* spp.
- *Platanus* x *acerifolia.*
- *Pyrus calleryana*
- *Quercus coccinea*
- *Quercus macrocarpa*
- *Quercus muehlenbergii*
- *Quercus rubra*
- *Tilia* spp.

Planting Soils Specification

PART 1- SOIL MATERIALS

1.1 GENERAL

A. All plant mix material shall fulfill the requirements as specified and be tested to confirm the specified characteristics.

B. Samples of plant mixes shall be submitted by the contractor for testing and analysis to the approved testing laboratory. Include verification testing of on-site sub soils. Comply with specific materials requirements specified.

1. No base component material or soil components for plant mixes shall be used until certified test reports by an approved agricultural chemist have been received and approved by the City Forester.
2. As necessary, make any and all soil mix amendments and resubmit test reports indicating amendments until approved.

C. The City Forester may request additional testing from the contractor for confirmation of mix quality and/or soil mix amendments at any time until completion.

D. Suppliers

1. Organic Matter: May be obtained from one of the following sources, provided that the test requirements are met:
   a. Cornell Waste Management Institute, Ithaca, NY: 607-255-1187
   b. Cayuga Compost, Trumansburg, NY: 607-387-6826
   c. We Care Organics, Jordan, NY: 315-689-1937
   d. Sensenig's, Geneva, NY: 800-789-0095

E. In the event that any of the above materials are not available from the supplier or are not in compliance with specifications herein, the contractor shall obtain material from other suppliers and conduct tests specified herein to provide materials in compliance with these specifications.

1.2 DRY SCREENED SAND

A. Dry Screened Sand: Sand for amending loam shall be uniformly graded coarse sand consisting of clean, inert, rounded grains of quartz or other durable rock free from loam or clay, surface coatings, mica, and other deleterious materials with the following gradation for material passing a Number 10 Sieve for washed sieving.

U.S. Sieve Size No.	% Passing Minimum	% Passing Maximum
10	100	
18	85	90
35	40	60
60	12	18
140	0	5
270	0	3
0.002 mm	0	1

1. Maximum size particle shall be one half-inch largest dimension. The maximum retained on the #4 sieve shall be 5% by weight of the total sample. The ratio of the particle size for 80% passing (D_{80}) to the particle size for 30% passing (D_{30}) shall be 3.0 or less. ($D_{80}/D_{30} < 3.0$) Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422.

1.3 SOIL LOAM

A. Soil Loam shall be free of sub-soil, earth clods, sticks, stumps, clay lumps, roots and stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth. Soil shall also be free of Quack-grass rhizomes (*Argrpyron reptans*), and the nut-like tubers of Nutgrass (*Cyperus esculentus*) and all other primary noxious weeds. Soil shall conform to the following grain size distribution for material passing the #10 sieve. Material shall be tested to confirm the following characteristics:

U.S. Sieve Size No.	% Passing Minimum	% Passing Maximum
10	100	
18	90	100
35	85	95
60	70	85
140	45	55
270	35	45
0.002 mm	12	18

1. Maximum size shall be one half-inch largest dimension. The maximum retained on the #4 sieve shall be 5% by weight of the total sample.
2. The ratio of the particle size for 80% passing (D_{80}) to the particle size for 30% passing (D_{30}) shall be 4.5 or less. ($D_{80}/D_{30} < 4.5$)
3. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422.
4. Loam shall have an organic content between 5.0 and 8.0 percent on a dry weight basis.

1.4 SCREENED EXISTING SOILS

A. All existing soil stripped from the site shall be screened to be free of earth clods, sticks, stumps, clay lumps, roots and stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth. Soil shall also be free of Quack-grass rhizomes, *Argrpyron reptans*, and the nut-like tubers of Nutgrass, *Cyperus esculentus* and all other primary noxious weeds.

B. Existing soils shall be combined with any soil loams obtained from off-site sources to create a uniform soil material suitable for incorporation into planting soil mix.

C. All existing soils shall be tested in the same manner as soil loam.

1.5 ORGANIC MATTER

A. Organic Matter for amending planting media shall be a stable, humus-like material produced from the aerobic decomposition and curing of organic biosolids residues. The compost shall be a dark brown to black in color and be capable of supporting plant growth with appropriate management practices in conjunction with addition of fertilizer and other amendments as applicable, with no visible free water or dust, with no unpleasant odor, and meeting the following criteria as reported by laboratory tests.

1. The ratio of carbon to nitrogen shall be in the range of 10:1 to 25:1.
2. Organic Content shall be at least 40 percent (dry weight). One hundred percent of the material shall pass a 3/8-inch (or smaller) screen. Debris such as metal, glass, plastic, wood (other than residual chips), asphalt or masonry shall not be visible and shall not exceed one percent dry weight. Organic content shall be determined by weight loss on ignition for particles passing a number 10 sieve as follows. A 50-cc sub-sample of the screened and mixed compost is ground to pass the number 60 sieve. Two to three grams ($\pm$ 0.001g) of ground sample, dried to a constant weight at 105 degrees C is placed into a muffle furnace. The temperature is slowly raised (5C/minute) to 450C and maintained for three hours. The sample is removed to an oven to equilibrate at 105C and the weight is taken. Organic matter is calculated as loss on ignition.
3. pH: The pH shall be between 5.5 to 7.5 as determined from a 1:1 soil-distilled water suspension using a glass electrode pH meter. (American Society of Agronomy *Methods of Soil Analysis*, Part 2, 1986).
4. Salinity: Electrical conductivity of a one to two soil to water ratio extract shall not exceed 2.0 mmhos/cm (dS/m).

5. The compost shall be screened to 3/8 inch maximum particle size and shall contain not more that 3 percent material finer than 0.002mm, as determined by hydrometer test on ashed material.
6. Heavy metal contents shall conform to state and federal regulations.
7. Nutrient content shall be determined by the Cornell University Soil Testing Laboratory or equivalent laboratory and utilized to evaluate soil required amendments for the mixed soils. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Iron, Manganese, Boron, Lead, Soluble Salts, Cation Exchange Capacity, soil reaction (pH), and buffer pH.

1.6 STRUCTURAL SOIL

A. Structural Soil shall be CU-Soil™, provided by a producer licensed by Amereq, Inc., 800-832-8788.

1.7 SOIL AMENDMENTS

A. Mulch: Single hammer milled, coarse, from hardwood bark mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants. A contractor must submit samples to the City Forester for approval.

B. Commercial Fertilizer: The City Forester should determine the need for fertilization based on a soil test. Complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients:

1. For trees and shrubs, provide fertilizer with not less than 5% total nitrogen, 10% available phosphoric acid and 5% soluble potash.

C. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Nitrogen, phosphorous and potassium in amounts recommended in soil reports from a qualified soil testing agency.

PART 2- EXECUTION

1.8 COORDINATION

A. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

B. Pre-Installation Examination Required: The contractor shall examine previous work, related work, and conditions under which this work is to be performed and shall notify City Forester in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means Contractor accepts substrates, previous work, and conditions. The contractor shall not place any planting soil until all work in adjacent areas is complete and approved by the City Forester.

C. Planting Soil Preparation: Examine soil and remove foreign materials, stones over 1/2”, and organic debris over 2” in length. Mix-in fertilizers and amendments as required by tests and as approved by the City Forester. All preparation and mixing shall be accomplished when the soil moisture content is less than field capacity. If lime is to be added, it shall be mixed with dry soil before fertilizer is added and mixed.

1.9 MIXING OF PLANTING SOIL

A. Adequate quantities of mixed planting soil materials shall be provided to attain, after compaction and natural settlement, all design finish grades.

B. Planting soil shall be produced with equipment that blends together each component in a thorough and uniform manner.

C. Uniformly mix ingredients by windrowing/tilling on an approved hard surface area. Organic matter shall be maintained moist, not wet, during mixing.

1. Test all soil components prior to mixing. After soil component tests have been accepted, planting soil may be mixed.
2. Amendments shall not be added unless approved to extent and quantity by the City Forester and additional tests have been conducted to verify type and quantity of amendment is acceptable.
3. Percentages of components, unless otherwise noted, will be established upon completion of individual test results for components of the various mixes.

D. Planting soil shall be created from combinations of existing soil, soil loam, sand and organic matter. All organic matter contents shall be determined on a dry weight basis.

1. Sand: 70 – 75% by weight.
2. Organic Matter: 5 – 8% by weight.
3. Silt and Clay: 20 – 40% by weight. Silt content must be less than 3 times the clay content.

E. After component percentages are determined by a soil lab, each planting soil mix shall be tested for physical and chemical analysis.

1. Retest mixed planting soil and adjust mix as necessary to meet project requirements.
2. Test every 100 cubic yards of planting soil mix delivered to the job site for consistency.

1.10 BACKFILLING OF SOIL LAYERS

A. Soil Placement Preparation:

1. Verify that the underdrainage system has been installed and accepted.
2. Notify the City Forester of soil placement operations at least seven calendar days prior to the beginning of work.
3. The plant stock shall be placed simultaneously with the planting soil.

B. Examination of Subgrade

1. The subgrade shall be inspected prior to the start of soil placement for conformance with the drawings for elevations of subgrade relative to finish grade. Subgrade shall be graded smooth and parallel to the finish grades.
2. Percolation tests shall be performed on a minimum of 10% of tree pits and 20% of shrub beds, and on any areas of questionable drainage or as required by City Forester. Percolation tests shall be measured in inches per hour of drainage at the base of the plant root level. The test should be done at a depth of the base of the root ball with the soil surrounding the hole pre-saturated to minimize lateral movement of water.
    a. Should any planting areas yield a percolation test result of less than 4” of drainage per hour, subgrade shall be further prepared by tilling to a minimum depth of 4”.

C. Placement of Planting Soil:

1. Placement of planting soil and plant stock shall be carried out simultaneously to prevent excessive traffic over soil lifts and the final grade so as to prevent the creation of undesirable soil compaction. The contractor shall install plants simultaneously with the installation of the lower soil lifts. The upper soil lifts shall not be installed before all plants are installed and before the acceptance by the City Forester.
2. The soil shall be placed in lifts not to exceed 8 inches in thickness and only moderately hand-tamped not to exceed between 80 and 84% Standard Proctor with the following exceptions:
    a. In those cases where the final soil profile depth exceeds the height of the plant root ball, the entire soil depth beneath the root ball shall be compacted to between 88 and 92% Standard Proctor to create a firm pedestal and prevent settlement of the root ball.
    b. Between 83 and 86 percent Standard Proctor for turf with heavy traffic,
    c. Between 84 and 87 percent Standard Proctor for trees in paved areas.
    d. In all cases, the soil being placed shall be in dry to damp conditions. No wet soils shall be placed. All testing of in-place density for Topsoil materials shall be made according to ASTM D1556.
3. Prevention of compacted soils can be accomplished by beginning the work in corners, against walls, or the center of isolated beds, and progressing outwards towards the borders.
4. Planting soils shall never be moved or worked when wet or frozen.
5. The contractor shall place barricades as required to prevent any unnecessary compaction of planting soil from vehicles, equipment, or pedestrian traffic.

1.11 FINE GRADING

A. Prior to fine grading, contractor shall verify that the rough grading, underdrainage system, and planting soil mixes have been accepted.

B. Fine Grading: Set sufficient grade stakes for checking the finished grades. Confer with City Forester to assure that finish grades will meet the design intent and gradient requirements. Review grades on site with City Forester. Stakes must be set at the bottom and top of slopes and the centers of plant beds. Grades shall be established which are accurate to 1/10th of a foot either way. Connect contours and spot elevations with an even slope. All grading will insure drainage away from structures.

1. After planting soil mix has been spread, it shall be carefully prepared by scarifying and hand raking. All large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter, and stones over one inch in diameter shall be removed from the planting soil. Planting soil shall also be free of smaller stones in excessive quantities as determined by the City Forester.
2. Fine grade planted areas to smooth, free draining, even surfaces with fine texture. Roll, rake and drag areas to flatten ridges and fill depressions, except as select areas shown on drawings. Control moisture content to maintain optimum conditions, but do not create a muddy condition.
3. Rolling - Typical: Roll the entire area with a hand roller weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil and the surface shall be regraded and rolled until presenting a smooth and even finish to the required grade or to the shapes and configurations as shown on the details.
4. Maintenance and Restoration: Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to lawn planting.

1.12 PROTECTION

A. Protect newly graded areas from traffic, freezing and erosion. Keep free of trash, debris or construction materials from other work.

B. Repair and re-establish grades to the specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or compacted due to subsequent construction operations or weather conditions. Scarify or remove and replace material to a depth as directed by the City Forester; reshape and re-compact at optimum moisture content to the required density.

C. Where settling occurs, before final acceptance or during the warranty period, remove finish surfacing, backfill with additional approved material, compact to specified rates, and restore any disturbed areas to a condition acceptable to the City Forester.

1.13 COORDINATION AND EXCESS MATERIALS

A. Coordinate activities with other project contractors so that there is no soil disturbance from traffic or other construction activities subsequent to placement.

B. Excess Planting Soil Mixture and Materials: Remove the excess planting soil mixture and materials from the site at no additional cost to the City unless otherwise requested.

1.14 POST-INSTALLATION TESTING

A. In-place density testing is required at the discretion of the City Forester. The standard test for surface and subsurface density shall be ASTM D-1556.

Soil Volume for Trees Surrounded by Pavement

e.g. plazas, parking lots, continuous paved sidewalks

Data determined by methods developed by Lindsey, P. and Bassuk, N. 1991. Specifying Soil Volumes to Meet the Water Needs of Mature Urban Street Trees and Trees in Containers. Journal of Arboriculture. 17(6) 141-149.

Small trees with a height of 20' tall and a canopy spread of 15'

240 cubic feet of sandy loam soil (approx. 9 yards). Possible dimensions:

- Minimum bed depth 24 inches, preferably greater, up to 36 inches.
- Minimum bed width 5 feet, preferably greater.
- Example: 8' X 10' X 3' = 240 cubic feet of sandy loam soil

Medium sized trees with a height of 30' feet tall and a canopy spread of 20'

430 cubic feet of sandy loam soil (approx.16 yards).

- Minimum bed depth and width same as for small tree
- Example: 12' X 12' X 3'= 432 cubic feet of loam soil

Medium to large sized trees with a height of 40' and a canopy spread of 30'

950 cubic feet of sandy loam soil (approx. 35 yards).

- Minimum bed depth and width same as for small tree
- Example: 10' X 32' X 3' = 960 cubic feet of sandy loam soil

Very large trees 50' tall or greater with a canopy spread of 40'

1680 cubic feet of sandy loam soil (approx. 62 yards).

- Minimum bed depth and width same as for small tree
- Example: 35' X 16' X 3' =1680 cubic feet of sandy loam soil

Parking lot plantings

For continuously paved areas such as parking lots where an island planting bed has insufficient soil, CU-Structural Soil may be used under the adjacent paving to increase the soil volume available to the tree without taking up additional parking spaces.

For a 36' x 8' x 3' parking lot island (864 cubic feet of soil), additional structural soil beyond the planting island needed to accommodate various trees:

- Small tree (20' tall): No additional structural soil needed. 2 trees can be accommodated in island

- Medium tree (30’ tall): No additional structural soil needed. 2 trees can be accommodated in island

- Medium-Large tree (40’ tall): +150 cubic feet of structural soil under the pavement contiguous to the planting island needed to accommodate one medium-large tree in island. Example of underground structural soil: 8’ x 7’ x 3’

- Large tree (50’ tall): +1215 cubic feet of structural soil under the pavement contiguous to the planting island needed to accommodate one large tree in island. Example of underground structural soil: 36’ x 12’ x 3’

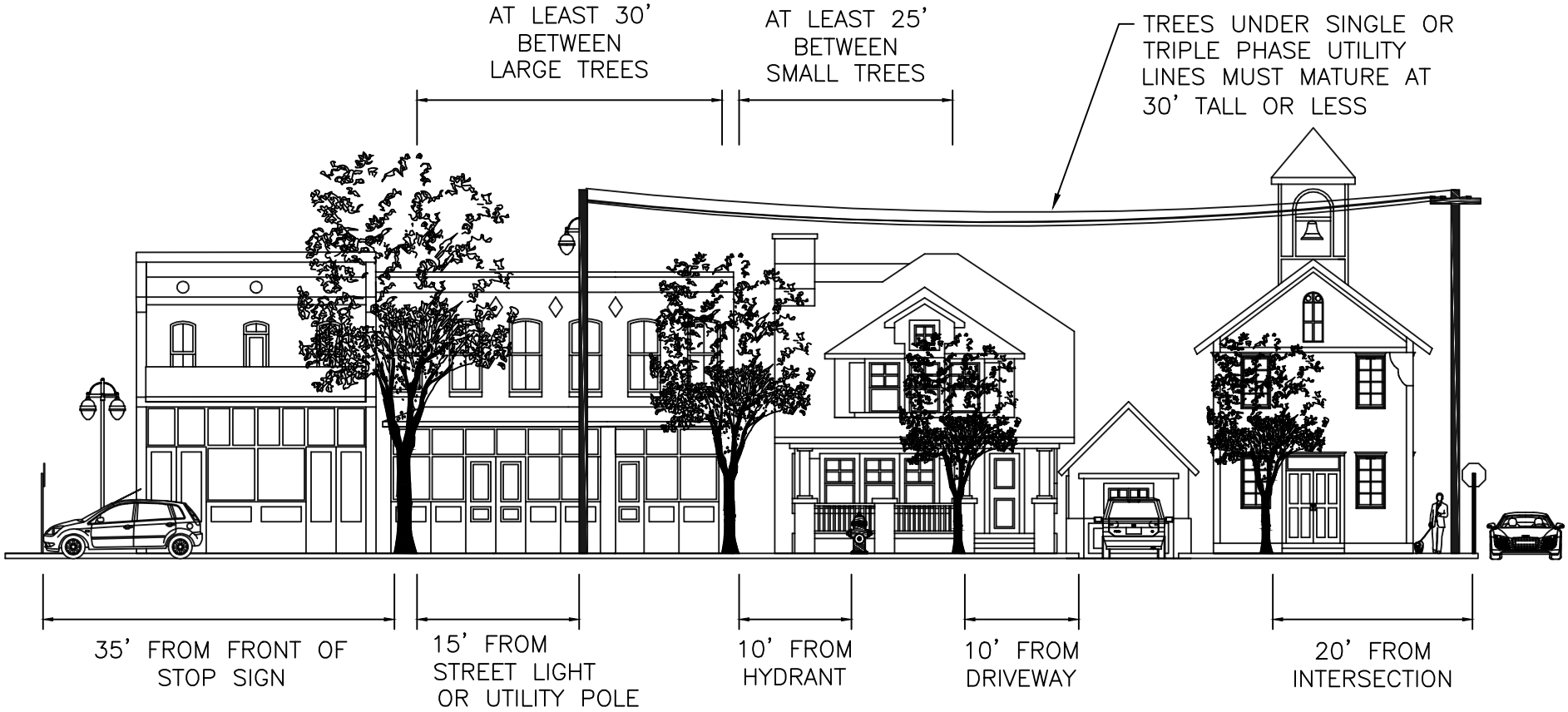
Appendix II: Standard Tree Planting Details

- Minimum Spacing for Street Trees
- Typical Tree Planting in Ordinary Soil
- Typical Tree and Shrub Planting in Continuous Bed
- Typical Tree Lawn Planting Detail
- Structural Soil Break-out Zone from Narrow Tree Lawn to Adjacent Property
- Typical Tree Planting Pit with Structural Soil along Sidewalk
- Typical Tree Planting Island in a Parking Lot with Structural Soil
- Tree Staking and Guying Details- Trees 3” Caliper or Less
- Tree Protection Fencing Detail

MINIMUM SPACING FOR STREET TREES

SCALE: N.T.S

DRAWN BY: BRD



STREET TREES SHALL NOT BE PLANTED:

- WITHIN 20' FROM THE CORNER OF INTERSECTING STREETS
- WITHIN 35' IN FRONT OF A STOP SIGN
- WITHIN 10' FROM HYDRANTS
- WITHIN 15' FROM A UTILITY OR STREET LIGHT POLE
- WITHIN 10' OF A DRIVEWAY

LARGE TREES (>30' TALL AT MATURITY) SHALL BE SPACED NO LESS THAN 30' APART
SMALL TREES (<30' TALL AT MATURITY) SHALL BE SPACED NO LESS THAN 25' APART

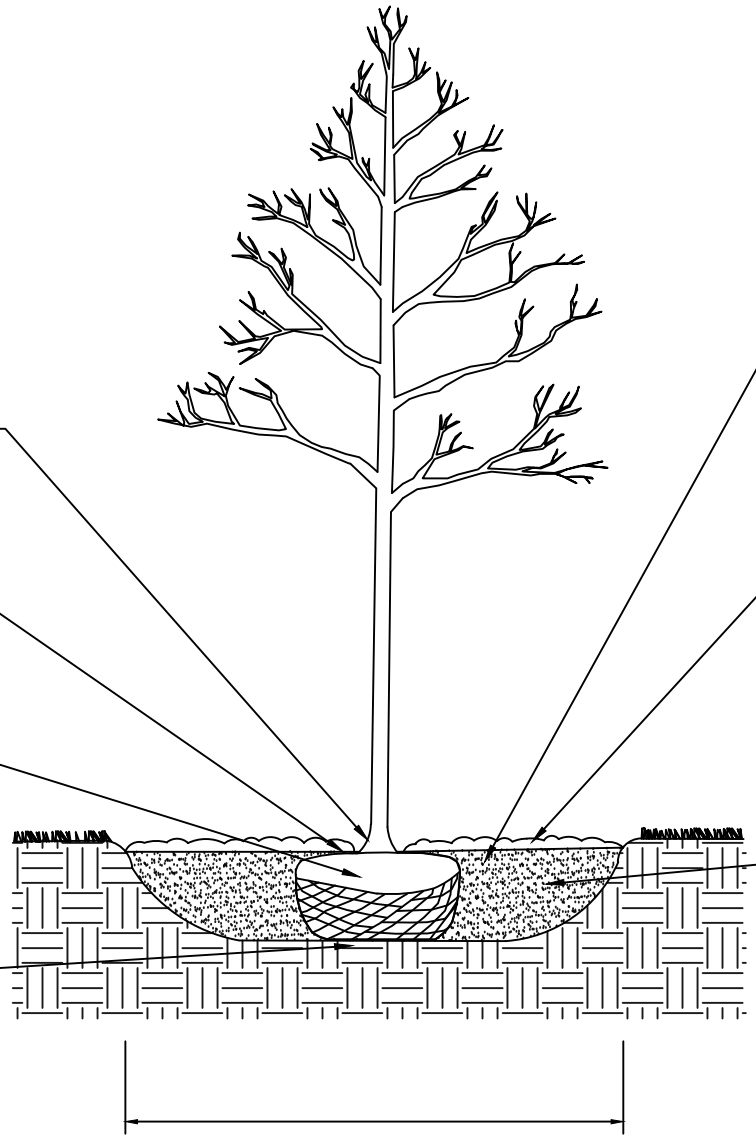
ALL PLANTING SPACES MUST BE APPROVED BY THE CITY FORESTER

TYPICAL TREE PLANTING IN ORDINARY SOIL

SCALE: N.T.S

DRAWN BY: BRD

NOTES:
1. DO NOT PRUNE THE TREE UNLESS DIRECTED BY THE CITY FORESTER.
2. STAKE TREES ONLY UPON APPROVAL OF THE CITY FORESTER. SEE TREE STAKING DETAIL.



EACH TREE MUST BE PLANTED SUCH THAT THE TRUNK FLARE IS VISIBLE AT THE TOP OF THE ROOT BALL. TREES WHERE THE TRUNK FLARE IS NOT VISIBLE SHALL BE REJECTED.

SET TOP OF THE ROOT BALL FLUSH TO GRADE OR 1–2 INCHES HIGHER IN SLOWLY DRAINING SOILS

REMOVE ALL TWINE, ROPE, WIRE, AND BURLAP FROM TOP ⅓ OF ROOT BALL.

PLACE ROOT BALL ON UNEXCAVATED OR TAMPED SOIL TO PREVENT SETTLEMENT

TAMP SOIL AROUND ROOT BALL FIRMLY WITH FOOT PRESSURE, AND WATER IMMEDIATELY FOLLOWING PLANTING TO AVOID AIR POCKETS.

3" MULCH. DO NOT PLACE MULCH IN CONTACT WITH TREE TRUNK. MAINTAIN MULCH WEED FREE FOR THE DURATION OF THE WARRANTY PERIOD.

FOR DIMENSIONS OF PLANTING AREAS, AND TYPES OF SOIL AMENDMENTS OR SOIL REPLACEMENT, SEE SOIL SPECIFICATION GUIDELINES.

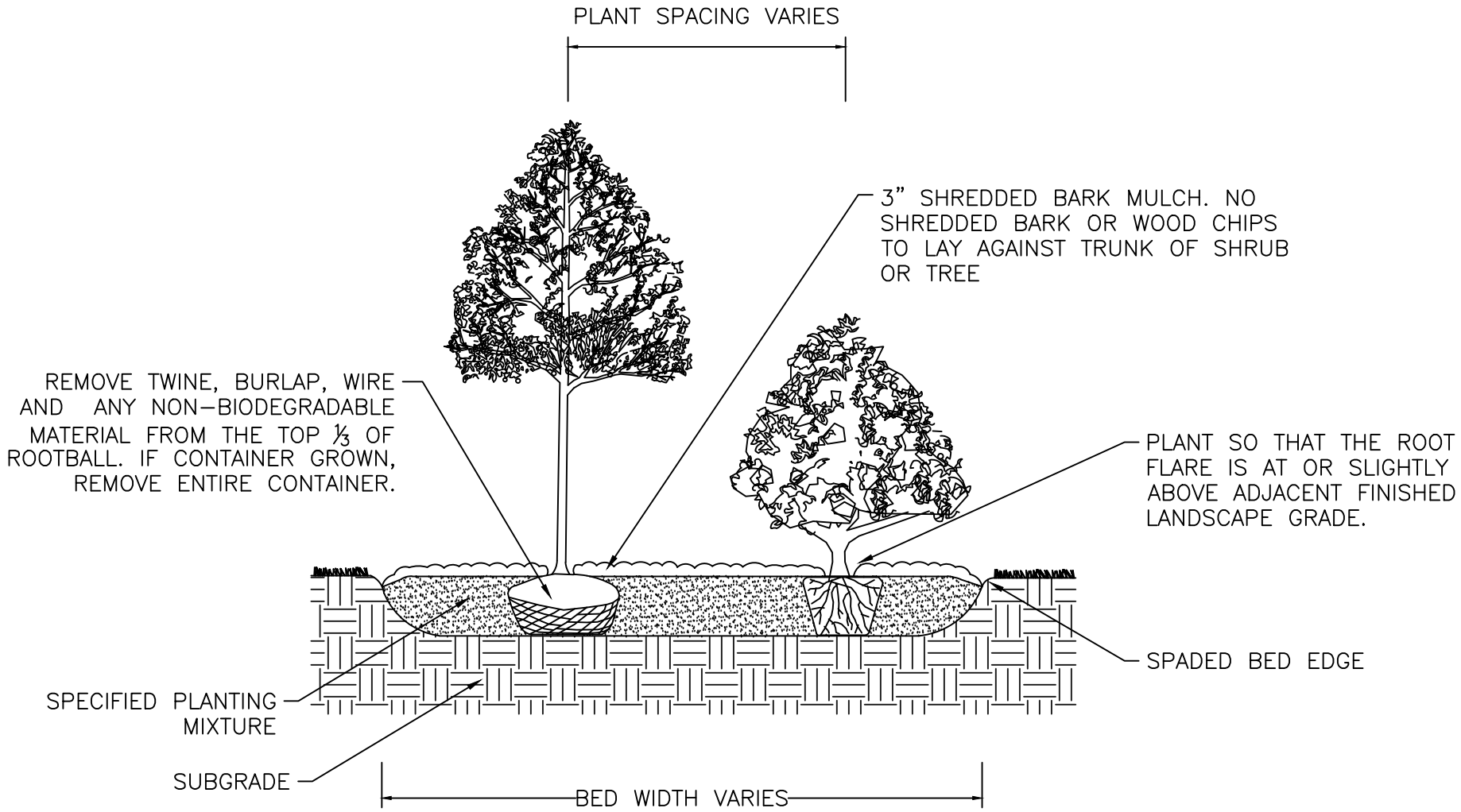
PLANTING HOLE WIDTH AT LEAST 3X WIDTH OF ROOT BALL

TYPICAL TREE AND SHRUB PLANTING IN CONTINUOUS BED

SCALE: N.T.S

DRAWN BY: BRD

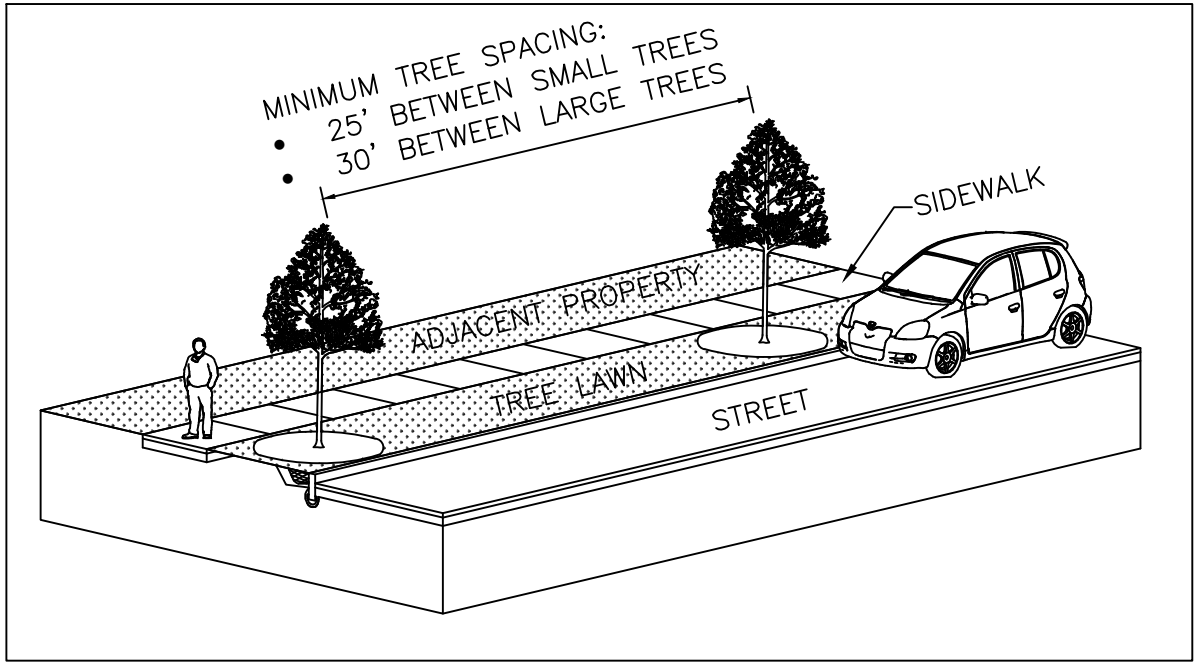
NOTE:
1. DETAIL APPLIES TO ALL TREES AND SHRUBS PLANTED CONTIGUOUSLY IN BEDS

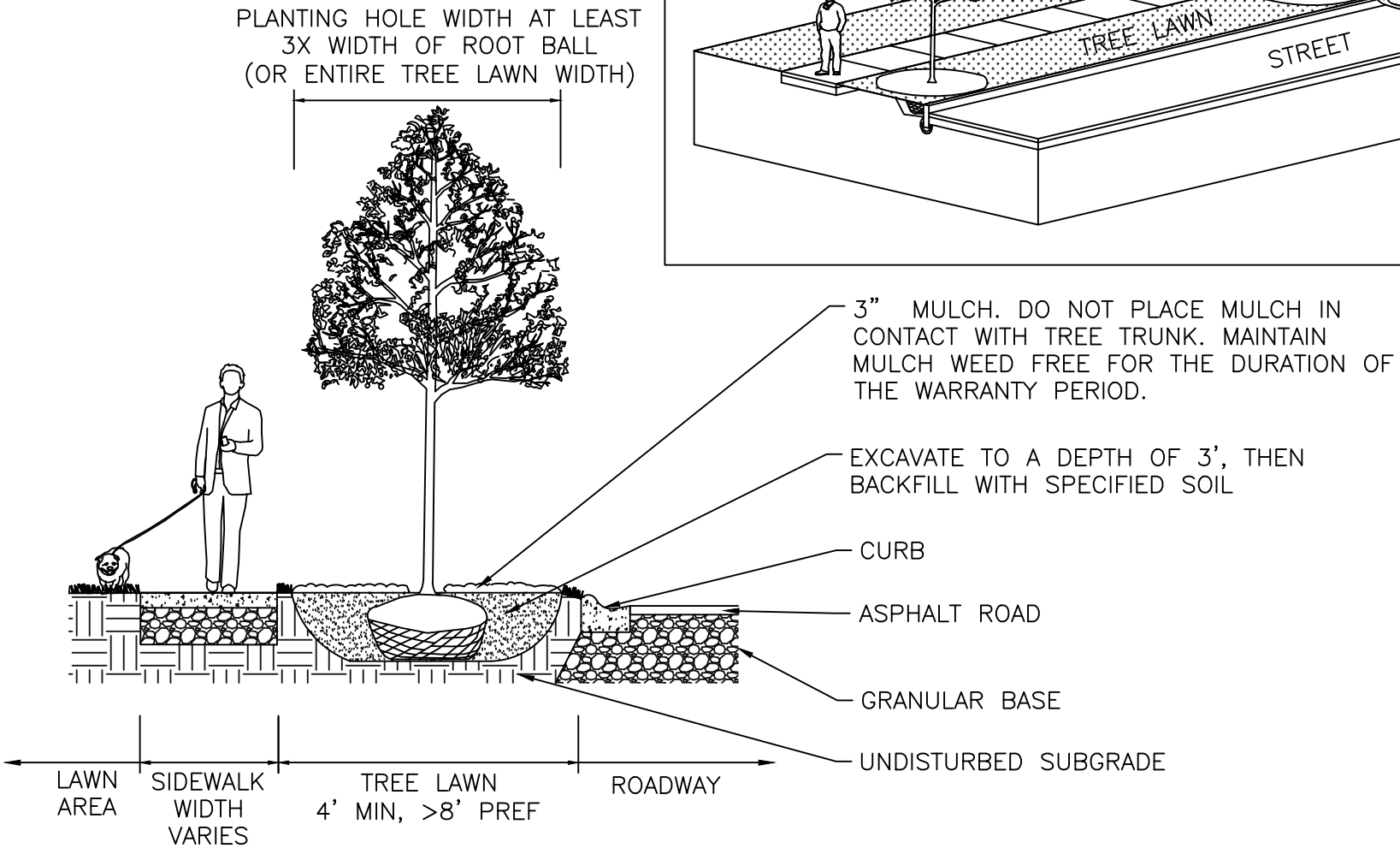


TYPICAL TREE LAWN PLANTING DETAIL

SCALE: N.T.S

DRAWN BY: BRD

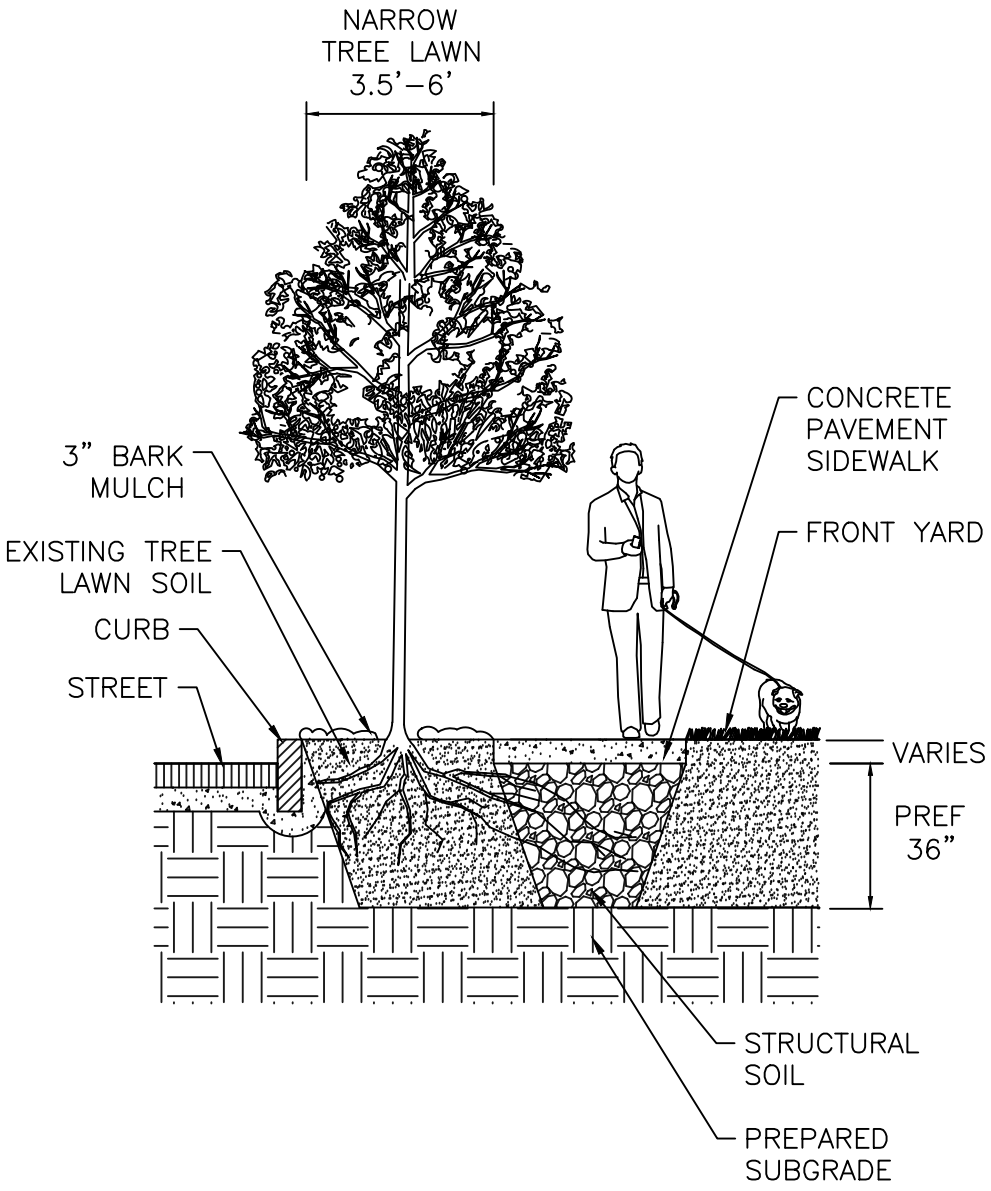


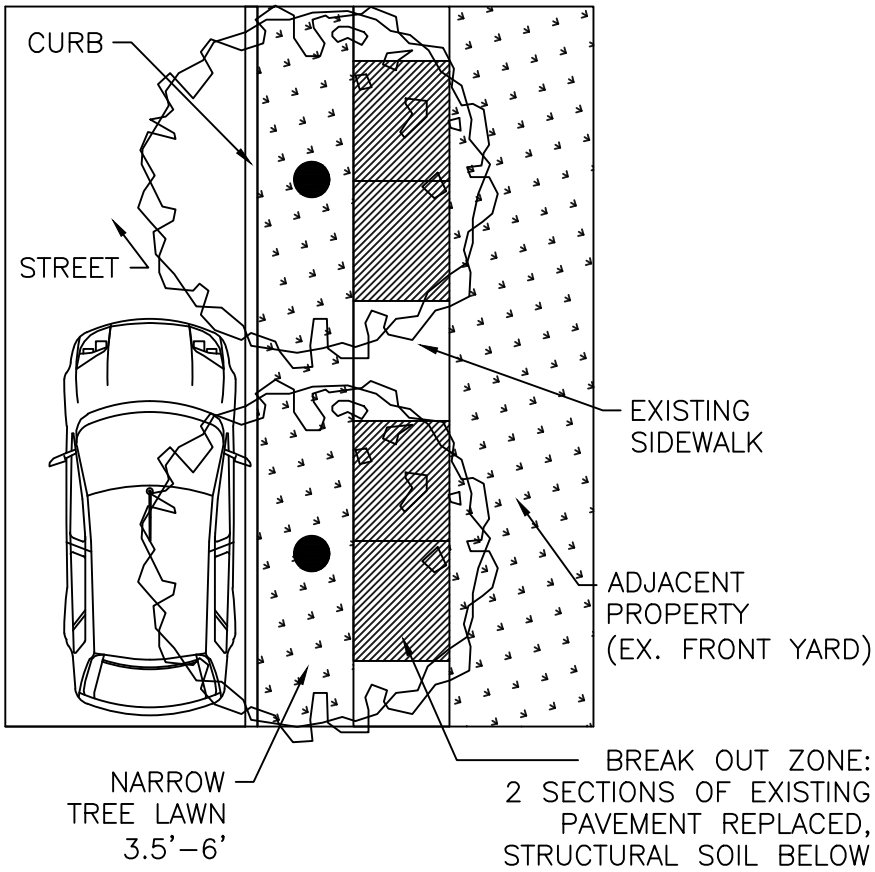


STRUCTURAL SOIL BREAK–OUT ZONE FROM NARROW TREE LAWN TO ADJACENT PROPERTY

SCALE: N.T.S

DRAWN BY: BRD





NOTES:

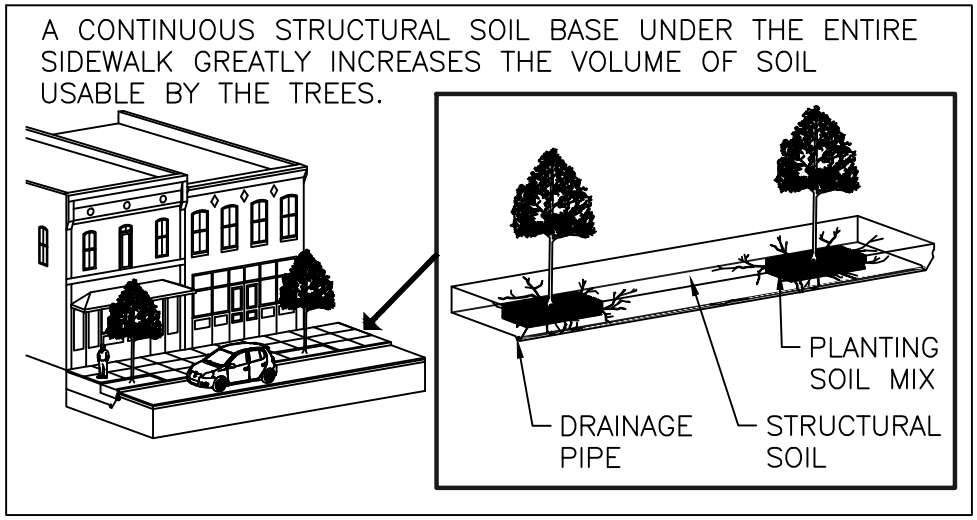
BREAK–OUT ZONES SHOULD BE CONSIDERED WHEN TREE LAWN IS LESS THAN 6' WIDE.

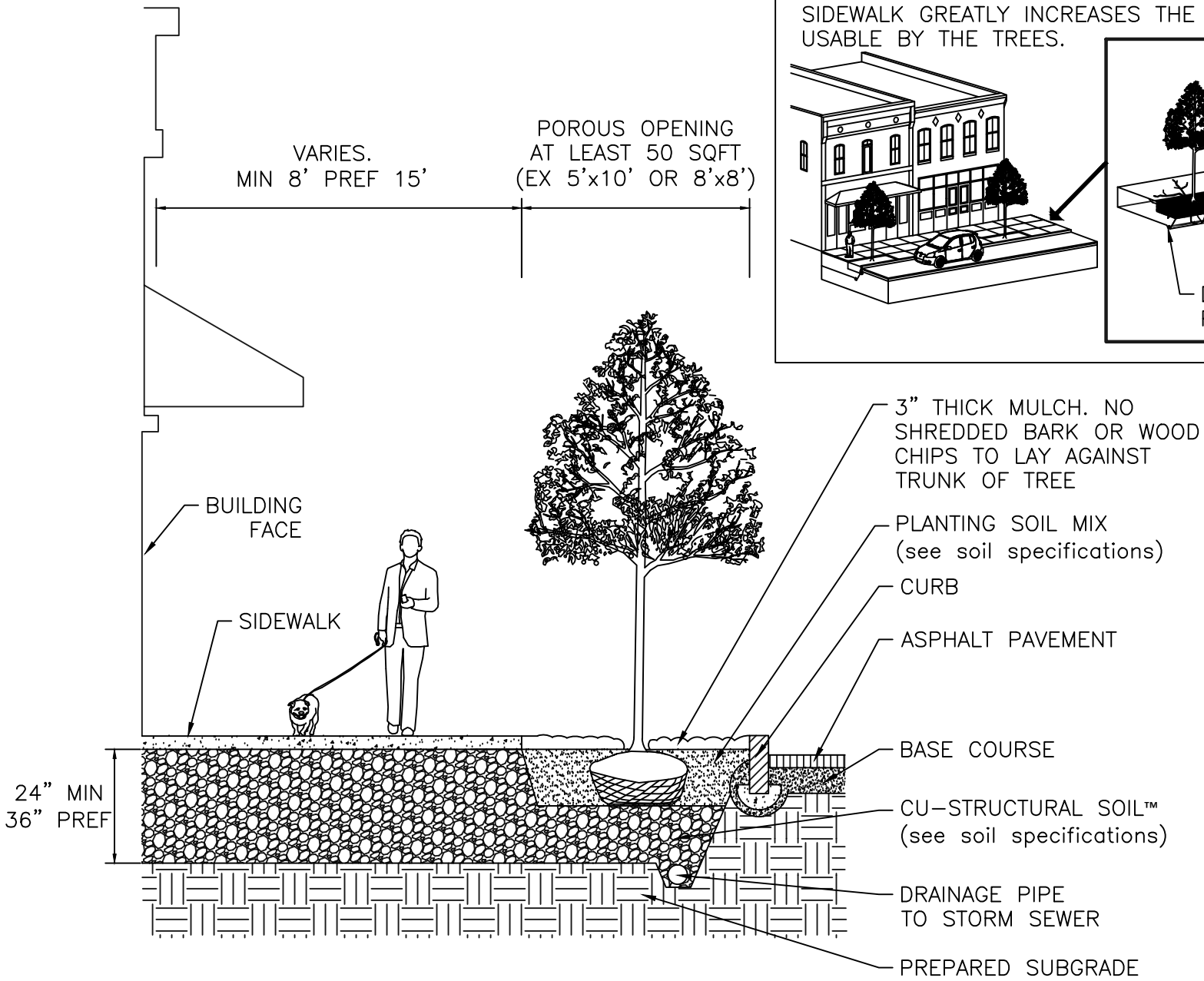
FOR EACH TREE, TWO 5'x5' SIDEWALK SLABS ARE TO BE REMOVED AND RECONSTRUCTED WITH A BASE OF 24" MIN (36" PREF) STRUCTURAL SOIL, TO ALLOW TREE ROOTS TO SAFELY GROW UNDER SIDEWALK AND INTO ADJACENT PROPERTY WITHOUT HEAVING SIDEWALK.

TYPICAL TREE PLANTING PIT WITH STRUCTURAL SOIL ALONG SIDEWALK

SCALE: N.T.S

DRAWN BY: BRD

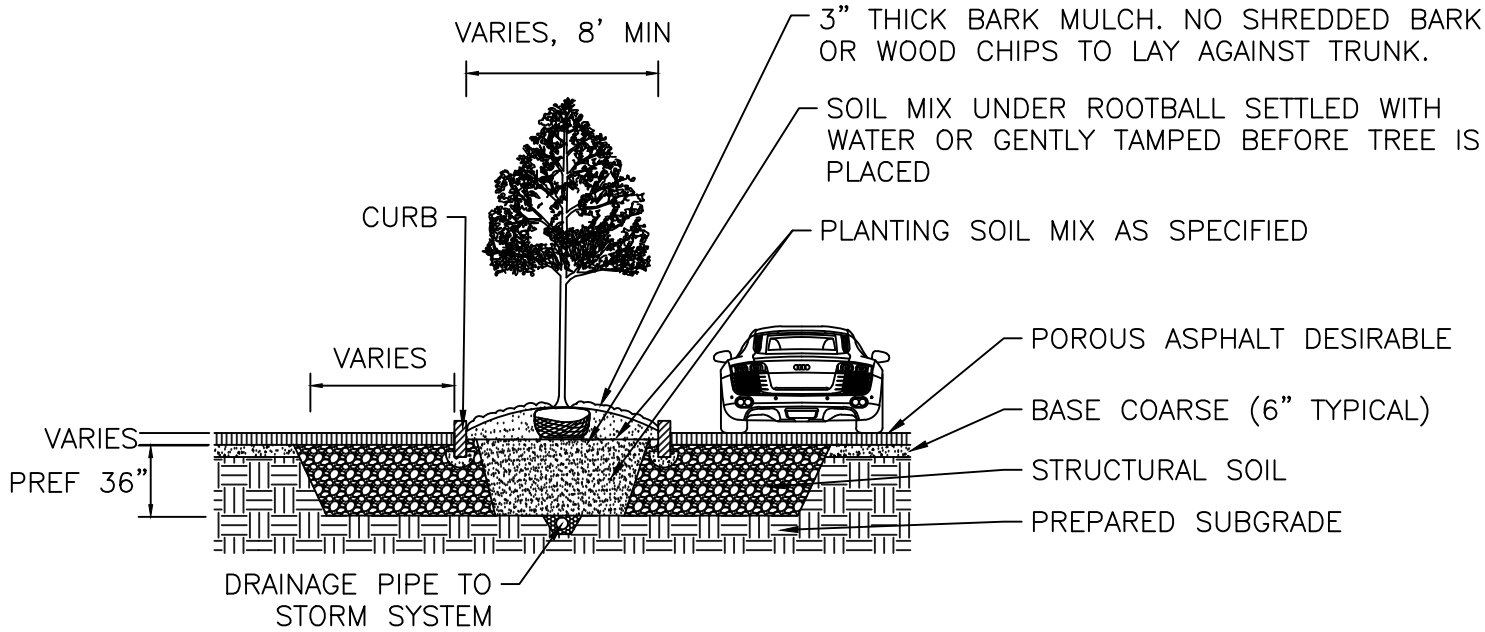




TYPICAL TREE PLANTING ISLAND IN A PARKING LOT WITH STRUCTURAL SOIL

SCALE: N.T.S

DRAWN BY: BRD



A TYPICAL 36' x 8' PARKING ISLAND WITH 3' DEPTH OF SANDY LOAM SOIL CAN SUPPORT:

<u>WITH NO STRUCTURAL SOIL</u>

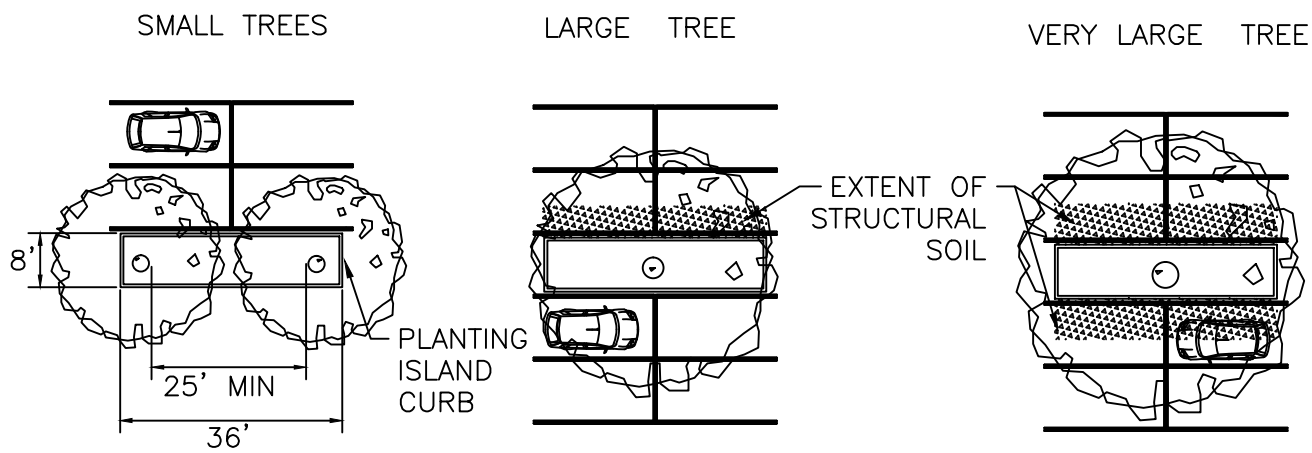
- 2 SMALL TREES (<30' TALL AT MATURITY)

<u>WITH 150 CU FT STRUCTURAL SOIL (EX. 36' x 4.25' x 3')</u>

- 1 LARGE TREE (30'–50' TALL AT MATURITY)

<u>WITH 1215 CU FT STRUCTURAL SOIL (EX. 36' x 12' x 3')</u>

- 1 VERY LARGE TREE (>50' TALL AT MATURITY)

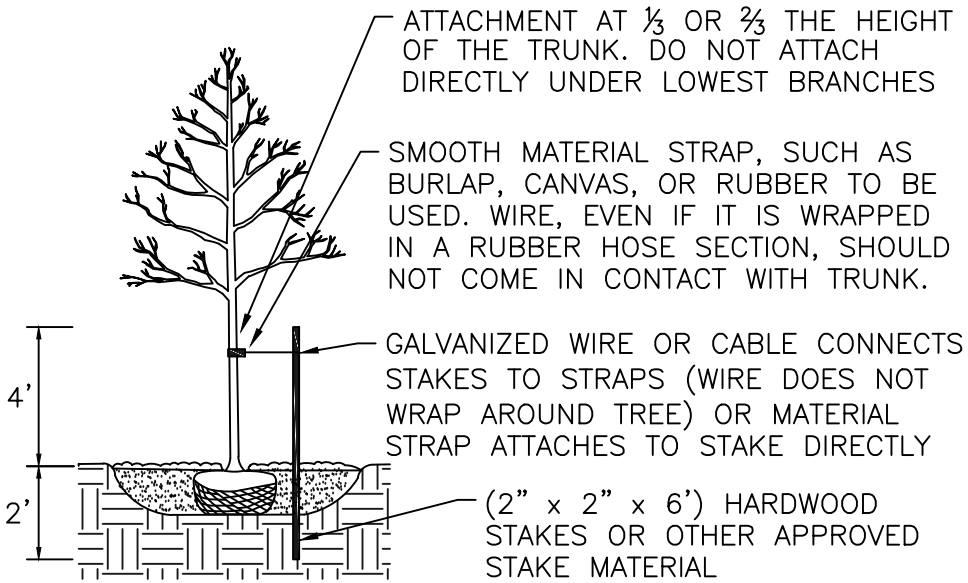


TREE STAKING AND GUYING DETAILS– TREES 3" CALIPER OR LESS

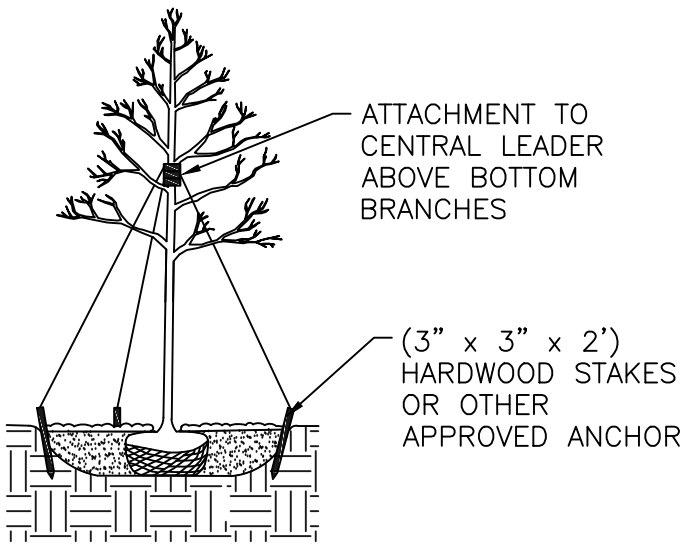
SCALE: N.T.S

DRAWN BY: BRD

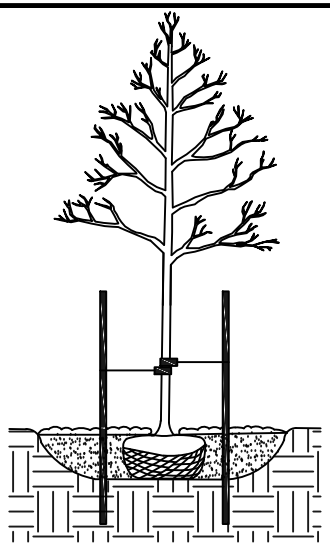
1 STAKE METHOD (STAKE PLACED UPWIND)



GUYING METHOD (1 ANCHOR IS PLACED UPWIND)



2 STAKE METHOD (STAKES PARALLEL TO WIND)



NOTES:

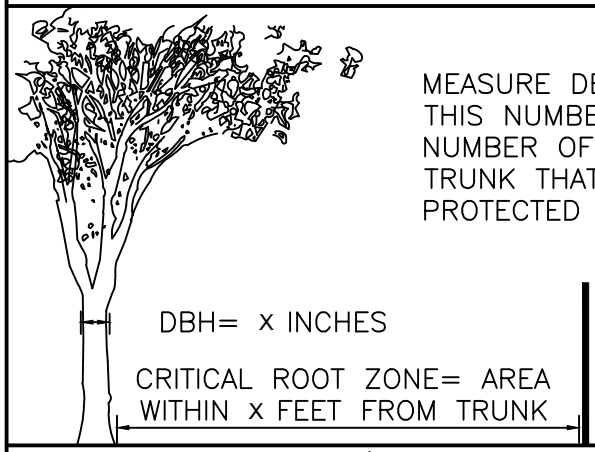
1. STAKE OR GUY TREES ONLY UPON APPROVAL OF THE CITY FORESTER.
2. TIGHTEN WIRE OR CABLE ONLY ENOUGH TO KEEP FROM SLIPPING.
3. ALLOW FOR SOME TRUNK MOVEMENT, MATERIAL STRAPS MUST BE LONG ENOUGH TO ACCOMMODATE AT LEAST 1.5" OF GROWTH
4. TUCK ANY LOOSE ENDS OF THE WIRE OR CABLE SO THAT NO SHARP WIRE ENDS ARE EXPOSED.
5. ALL STAKES SHALL BE DRIVEN OUTSIDE THE EDGE OF THE ROOT BALL.
6. ASSURE THAT THE BEARING SURFACE OF THE MATERIAL STRAPS AGAINST THE TREE TRUNK IS A BROAD SMOOTH SURFACE. WIRE OR CABLES SHALL NOT COME INTO CONTACT WITH TREE TRUNK OR BRANCHES.
7. REMOVE ALL STAKING AS SOON AS THE TREE HAS GROWN SUFFICIENT ROOTS TO OVERCOME THE PROBLEM THAT REQUIRED THE TREE TO BE STAKED, USUALLY AFTER ONE GROWING SEASON.

TREE PROTECTION FENCING DETAIL

SCALE: N.T.S

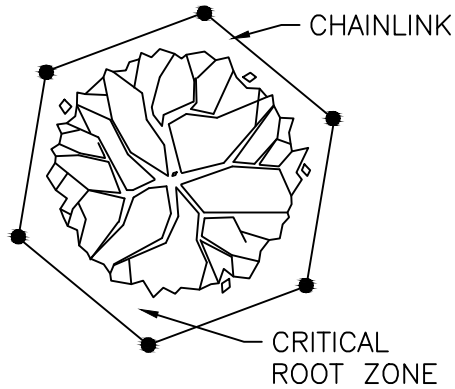
DRAWN BY: BRD

DETERMINING CRITICAL ROOT ZONE:

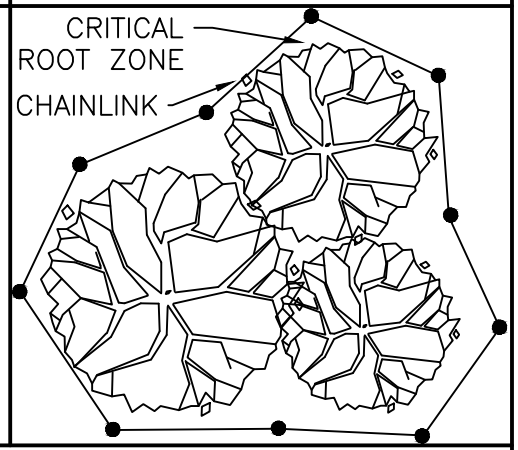


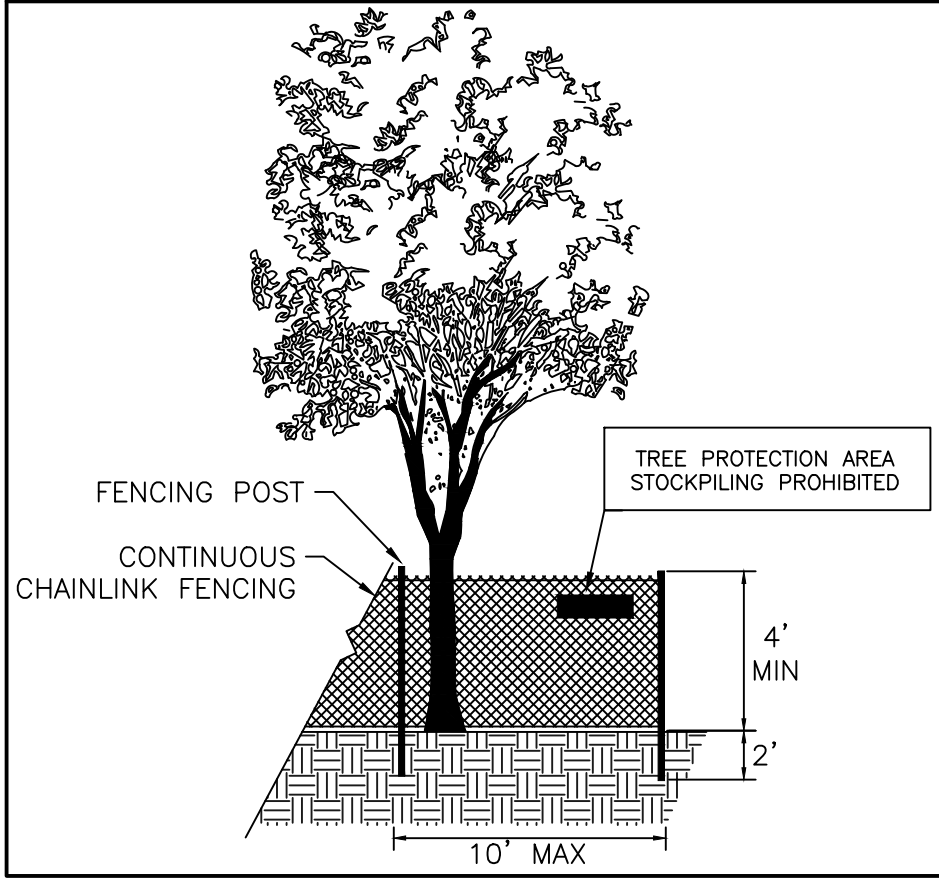
MEASURE DBH OF TREE IN INCHES. THIS NUMBER IS THE MINIMUM NUMBER OF FEET FROM THE TRUNK THAT SHOULD BE PROTECTED BY FENCING

SINGLE TREE



MULTIPLE TREES





NOTES:

1. TREE PROTECTION FENCING SHALL BE ERECTED AT THE EDGE OF THE CRITICAL ROOT ZONE OR BEYOND PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.
2. THE PROTECTED CRITICAL ROOT ZONE OF EACH TREE SHALL EXTEND FROM THE TRUNK A MINIMUM DISTANCE OF 1 FOOT FOR EACH INCH OF TRUNK DIAMETER, OR 6', WHICHEVER IS GREATER.
3. FENCE SHALL BE MINIMUM 4' HIGH ON ALL SIDES, AND BE CONSTRUCTED OF CHAINLINK.
4. FENCE SHALL BE SUPPORTED BY VERTICAL POSTS DRIVEN 2' (MIN) INTO THE GROUND. POSTS MUST AVOID MAJOR ROOTS, AND MUST BE SPACED NOT MORE THAN 10' APART.
5. NO STOCKPILING OF MATERIALS, VEHICULAR TRAFFIC, OR STORAGE OF EQUIPMENT SHALL BE ALLOWED WITHIN THE THE FENCING. FENCING SHALL NOT BE MOVED OR REMOVED UNLESS APPROVED BY CITY FORESTER.
6. FENCING SIGNAGE AS DETAILED MUST BE POSTED IN A VISUALLY PROMINENT LOCATION.