CITY OF LANCASTER TREE MANUAL: REGULATIONS AND STANDARDS FOR ARBORICULTURE WORK

Section 1.00. Sources of Regulations and Standards.

These regulations and standards have been compiled from professional sources including the International Society of Arboriculture Tree Pruning Best Management Practices, International Society of Arboriculture tree condition and risk evaluation protocols, American National Standards Institute A300 Standard Practices for Tree, Shrubs and Other Woody Plant Maintenance, and Penn State University Cooperative Extension publications on tree pruning and planting and tree protection during development.

Section 2.00. General Requirements.

A. Purpose. The regulations of this Tree Manual are intended to reduce tree canopy loss and implement urban forest management improvements through requirements for the planting and transplanting of trees, the care and maintenance of existing trees, tree protection, and the preservation of trees within the City of Lancaster.

   This Tree Manual is supplemental to Chapter 273, Trees, of the Code of the City of Lancaster and establishes minimum standards for the design of landscapes so as to improve the community aesthetically, economically and environmentally.

B. No person shall perform, or have performed, any of the following acts without first obtaining a permit from the City of Lancaster Department of Public Works in accordance with the provisions in Chapter 273 of the Code of the City of Lancaster.

   The standards and requirements set forth in this Tree Manual shall apply to all work performed to trees on public property including City-owned parks, playgrounds and open space; within the public right-of-way of all City streets; and within easements granted to the City. In addition, this Tree Manual should be considered best management practice (BMP) for tree work by owners of private property, as well as contractors and others in the performance of tree work on private property.

   1. Plant, transplant, cut, prune, treat or remove any tree, in the right-of-way and other public areas.
   2. Prune or remove any tree on private property, if such tree or portions thereof may reasonably be expected to fall on City-owned property or public right-of-way.
   3. Fasten, or causing to be fastened, any sign, wire, rope or other materials, to, around or through any shade tree.
   4. Deposit, place, store or maintain any stone, brick, sand, concrete or other material which may impede the free passage of water, air or fertilizer to the roots of any shade tree.
   5. Move any building or other object on or over any public street or public right-of-way in such a manner as to damage or injure any shade tree.
   6. Hang lights and other seasonal or holiday displays. When permitted, all such displays shall be removed within thirty (30) days following the holiday or end of season.

7. Damage or cut tree roots larger than two (2) inches in diameter on any tree by tunneling, trenching or excavating for the purpose of sidewalk, curb, pipe, conduit or electric wire installation and repair; and grading or construction.
8. Perform any excavation or fill within a tree's protection zone (See Tree Planting Details).
9. Treatment of the soil within the tree protection zone with a soil sterilant.
10. Apply pesticides, fertilizers, or other chemicals to trees or soils within the tree protection zone (TPZ).
11. No person shall break, injure, mutilate, kill or in any other way harm any shade tree.

C. Exception. Nothing in this section shall be construed to exempt abutting property owners, municipal authorities or public utility companies or their agents from any of the requirements of these regulations and standards. Only the Public Works Director, her/his designee or a contractor hired by the Department of Public Works may perform work on protected trees without obtaining a permit.

D. Planting Guidelines. All trees shall be planted in accordance with the policies and guidelines set forth herein and all applicable standards, specifications and regulations in other City codes and ordinances, including, but not limited to, the Subdivision and Land Development Ordinance (SALDO), Specifications and Guidelines Manual, and Zoning Ordinance, and all amendments thereto.

E. Violation of the provisions of this Tree Manual shall constitute a violation of Chapter 273, Trees, of the City of Lancaster Code of Ordinances, and are therefore subject to the penalties set forth therein.

Section 3.00. Special Requirements for Pesticide Application and Tree Felling.

A. Pesticide application license required. All treatment of trees for insect, disease or other pests or pathogens shall be completed by a person(s) with a current pesticide application license and proof of license shall accompany any permit application. See additional requirements for the application of pesticides in Section 7.00 of this Manual.

B. Felling of trees upon City-owned property. If tree work entails the felling of any tree, or part thereof, which, as a result of such felling, reasonably may be expected to fall upon City-owned property or public right-of-way, then the owner or contractor performing the work shall agree to indemnify and to hold the City harmless for all damages resulting from work conducted pursuant to the permit and shall deposit with the City of Lancaster a Comprehensive General Liability Insurance Policy or Certificate of Insurance with limits established by the City and listing the City of Lancaster as an additional insured.

Section 4.00. Protecting Trees during Land Development and Construction Activity.

A. Identification of trees on development and landscape plans. All land development or landscape plans shall accurately show all existing trees including the trunk location and the dimensions of the tree protection zone. Every possible effort shall be made to preserve and protect worthy trees. Trees proposed to be saved and removed shall be indicated. All trees

adjacent to said projects that may be damaged by construction activities shall also be shown on the plans along with their required tree protection zone.

B. Protecting trees during construction.

1. The standards and specifications in A *Guide to Preserving Trees in Development Projects*, published by the Penn State College of Agricultural Sciences and Cooperative Extension, should be regarded as best management practices for tree protection during construction activities. Contractors and architects shall demonstrate their understanding of and adherence to these criteria, including, but not limited to, the protection zones required for different species of trees undergoing permitted soil compaction, root severance and other construction impacts.
2. Trees not permitted to be removed, pruned or encroached upon within the protected zone, but impacted by land development, shall be marked with a sign or other prominent identification. The property owner shall install, or cause to be installed, a chain link fence, other fencing or barrier, four (4) feet in height, as approved by the City Arborist, around all portions of the tree protection zone located on both public and private property, excluding any portions occupied by sidewalks, street cartway, curbs or driveways. A sign shall be placed on the tree protection fence explaining the purpose of the tree protection zone. Any unpermitted trespass of this protective zone by personnel, equipment or materials shall be considered a violation of the City Tree Ordinance and any land development or construction permit.
3. Equipment access routes shall be established by approval of the City Arborist. Equipment shall not be allowed to travel within a tree protection zone, nor shall materials or equipment be stored within a protection zone, unless geotextile landscape fabric and wood chips or gravel maintained at least eight (8) inches deep are used to avoid compaction of the soil and damage to a tree's roots as approved by the City Arborist.
4. Cut and fill, grade change, or soil compaction, within a protection zone shall be avoided. If grade changes are necessary, as permitted by the Department, protective devices and engineering techniques (e.g., retaining wall) shall be used as approved by the Public Works Director.
5. The routing of underground utilities shall be around and away from all tree protection zones. No excavation shall take place within a protection zone unless permitted by the Department. Tunneling, boring or other method of project modification under or around the tree shall be used when needed to protect the condition and survivability of the tree.
6. In any activity, no tree roots over two (2) inches in diameter shall be pruned without a signed permit. When, in the process of excavating within a protection zone, roots larger than two (2) inches are encountered, the City Arborist shall be immediately contacted. As permitted, all roots shall be cleanly cut with a sharp pruning tool. Exposed roots shall be protected from desiccation by the use of geotextile, straw or other technique, and backfilling shall be done as soon as possible. Immediately after backfilling, the tree shall be adequately irrigated.
7. If trees are in full leaf during the construction phase, it may be necessary to supply supplemental irrigation. The City Arborist shall notify the permittee when, and the

amount of, irrigation required to maintain the condition of a tree impacted by construction.

8. The permittee shall take all necessary measures to not damage trees during permitted excavation and associated construction activities. Any damage sustained by a tree(s), such as broken limbs, severed roots or scarred bark shall be reported immediately to the City Arborist and treated according by his/her recommendation. All measures taken to further protect or treat such trees shall be done under the supervision of the Arborist.

Section 5.00. Pruning Specifications for Trees.

A. General requirements.

1. All pruning shall protect and reinforce a tree form typical of the species of tree being pruned.
2. The pruning regulations and standards of the City of Lancaster shall demonstrate a philosophy of correct and judicious pruning completed over regular pruning cycles on newly planted trees, young trees, mature trees, and over mature trees.
3. Proper pruning shall be performed as needed through the entire life cycle of a tree.

B. Specific requirements pertaining to the pruning of trees.

1. All tree pruning shall be completed in accordance with the latest version of the American National Standards Institute Pruning Standards (ANSI A300) and/or the International Society of Arboriculture Tree Pruning Best Management Practices.
2. No tree shall be pruned in such a manner that its present or future condition is impaired. An exception to this shall occur if tree removal or pruning is necessary to provide emergency relief of an immediate hazard to person or property. Any such emergency procedures must be promptly reported to the Public Works Director.
3. Authority to prune trees does not include the cutting back of sound, healthy tree branches outside the stated purpose of the tree permit issued.
4. No person or firm shall be permitted to use heading or stub cuts to top any living tree. Only thinning (removal of a branch at its origin on stem) and reduction (pruning back to a lateral at least 1/3 the diameter of the limb being pruned) pruning cuts shall be used. Topping is the severe reduction of upper and side branches of a tree without consideration for their normal growth habit or natural form. All pruning shall be done to enhance and protect a tree form typical of the species of tree being pruned.
5. All dangerous, broken or dead limbs, or other defective tree parts, which constitute a risk to the condition of the tree, to public safety or to property shall be removed.
6. All tools used on a tree known to contain an infectious disease shall be properly disinfected immediately after completing work in such a tree and prior to being used on any other tree.
7. All cutting tools and saws used in tree pruning shall be kept adequately sharpened to assure clean cuts without jagged edges.

8. When removing branches too large to hold securely in one hand during the pruning operation, such branches shall be cut using the Three-step Pruning Method. Final cuts shall be made in such a manner to prevent unnecessary tearing of bark and wood (See Figure 1).

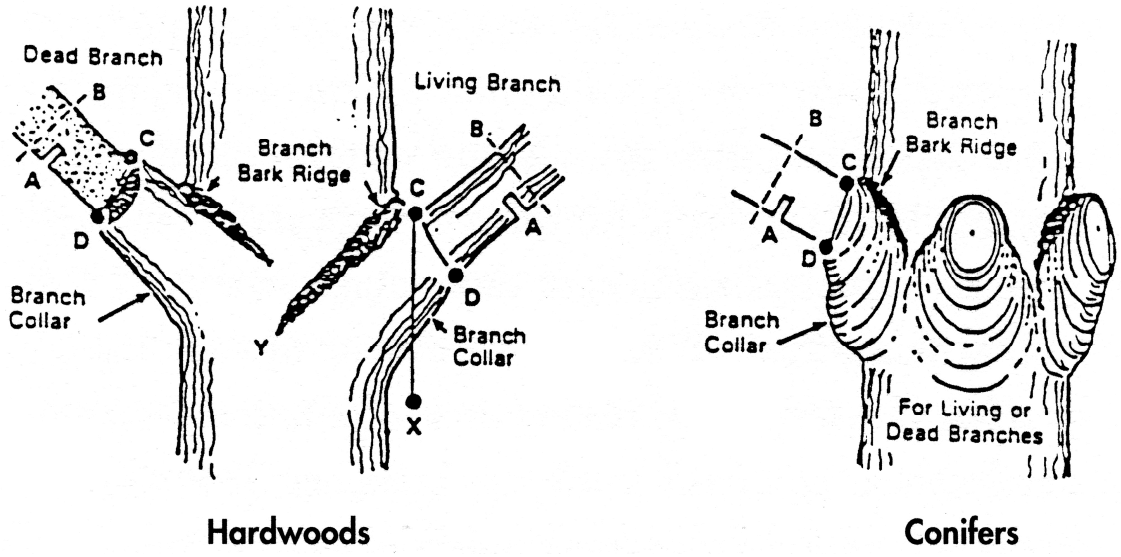


Fig. 1. Three-step and Natural Target Pruning. The first cut is a notch at A. The second cut removes the branch at B. The third cut is made at C and is done so to protect the branch collar.

9. To protect the branch bark collar and facilitate the growth of wound wood, all final branch removal pruning cuts shall use Natural Target Pruning. Final pruning cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch bark ridge or branch collar, or leaving a protruding stub. Clean cuts shall be made with the proper pruning tools in all cases (See Figure 1).
10. When pruning mature trees, no more than twenty-five (25) percent of the live canopy of any tree shall be removed in any year unless approved by the City Arborist. Limbs over eight (8) inches shall not be removed unless they constitute a risk or are unhealthy as approved by the City Arborist.
11. Pruning shall not “over-lift” a tree canopy by pruning only lower branches. No “Lions Tailing”, or removal of all interior branches, is permitted. Pruning will be distributed evenly throughout a tree canopy.
12. Pruning of any deciduous tree should be avoided from time of bud break until leaves have grown to full size. Pruning of conifers shall be avoided during summer months or unseasonably hot weather. Pruning of elms, oaks and other trees susceptible to summer born insects and associated pathogens shall be avoided during summer months.
13. Flowering trees (e.g., red bud) shall be pruned immediately after flowering to allow a tree to develop flower buds for the following spring.

B. Special Considerations for Trees: Pruning Young Trees and Establishing Tree Structure

1. Competing branches on newly planted trees shall be pruned to reduce codominant stems and establish a dominant leader. Other pruning of all newly planted street trees shall include: a) removal of malformed branches, b) removal of crossing or rubbing branches,

c) removal of branches growing at sharp or unusual angles, d) removal of any badly broken branches, and e) removal of suckers and water sprouts. No more than twenty-five (25) percent of a young tree canopy shall be removed in any year without approval of the City Arborist.

2. To reduce sunscald, formation of interior trunk and limb decay columns and tree risk, the establishment of proper tree structure including the use of pruning for the elimination of codominant stems, proper spacing of lateral branches, proper development of aspect ratio (ratio of the diameter of a lateral branch to its stem) and lifting canopy for views and traffic should be established over the first twenty-five (25) years of a tree's life.
3. With the approval of the City Arborist, structural pruning of mature trees using reduction cuts on larger diameter branches should be done to: a) reduce codominant stems, b) reduce horizontal branch weight, c) subordinate competing leaders and d) reduce canopy height and spread.

C. Authorized types of pruning.

1. Tree pruning shall follow the latest version of the American National Standards Institute Pruning Standards (ANSI A300) and/or the International Society of Arboriculture Tree Pruning Best Management Practices and are summarized below.
    a. Crown cleaning. Crown Cleaning shall consist of the removal of dead, dying, diseased, crowded, weakly attached and low-vigor branches from the crown of a tree.
    b. Crown thinning. Crown thinning shall consist of the selective removal of branches to increase light penetration and air movement through the crown. Thinning opens the foliage of a tree and reduces weight on heavy limbs. Thinning enhances and protects a tree form typical of the species of tree being pruned.
    c. Crown raising. Crown raising properly removes the lower branches from a tree to provide clearance for buildings, vehicles, pedestrians and vistas.
    d. Crown reduction. Crown reduction reduces the size of a tree for the reduction of tree risk and clearance for utility lines. Reducing the height or spread of a tree is accomplished by using reduction and thinning cuts, as well as directional pruning.
    e. Crown restoration. Crown restoration attempts to repair damage to a tree canopy caused by storm injury or improper pruning such as topping. It requires multiple entries and treatments to a tree canopy over multiple years.

D. Standards of workmanship for pruning and removal of trees.

1. The use of climbing spurs or spikes shall be permitted only in the process of removing a dead tree.
2. Trees or poles in the public right-of-way shall not be used as an anchor for any mechanical device for tree removal.
3. Under no circumstances, when in the process of removing a tree, or any part of a tree, shall the work site be left unattended unless the tree and its branches are in a safe condition.

4. Unless the tree work area is totally barricaded, or otherwise kept safe while pruning or removing trees, at least one responsible worker shall serve to coordinate safe operations on the ground at all times when work operations are in progress.
5. Under no condition shall it be considered proper to leave any severed or partially cut branches in the upper portion of any tree being worked on after the tree workers leave the scene of the operation.
6. Whenever large tree sections are being cut which may endanger person or property, such materials shall be secured by ropes and lowered safely in a controlled manner. Tree branches shall be removed and controlled in such a manner as not to cause damage to other parts of the tree or to other plants, people or property.
7. Cleanup of branches, logs, or any other debris resulting from any tree pruning or removal shall be promptly and properly accomplished. The work area shall be kept safe at all times during the cleanup operation. Under no condition shall the accumulation of brush, branches, logs, or other debris be allowed upon a public property in such a manner as to result in a public hazard.
8. All removal of trees shall be done in a manner so that the remaining stumps will be left as close to ground level as possible. If stump removal is required, they shall be ground at least eight (8) inches below ground level or removed intact.
9. Excavations resulting from tree removal must be properly filled in to conform to the surrounding ground level with a top soil fill lightly compacted and free of debris. Surface material shall be restored to match adjacent material including seeding and restoration of lawn areas where applicable.
10. All wood, leaves and other debris from diseased and/or infected trees shall be properly disposed of to avoid contamination of healthy trees.

Section6.00. Assessment of Tree Risk.

All assessments of tree risk shall be completed using the latest version of the American National Standards Institute Standards for Tree Risk Assessment (ANSI A300) and/or the International Society of Arboriculture Tree Risk Best Management Practices.

Section 7.00. Chemical Application Specifications.

A. General specifications. The following specifications pertain to the spray application, soil application or injection of fertilizers, pesticides or growth inhibitors to the above ground portions of trees or roots, or within the Tree Protection Zone (TPZ).
   1. Applicators applying chemical pesticides to public trees shall adhere to all federal and state laws and regulations pertaining to pesticides and their application.
   2. The pesticide applicator shall know and understand the capacities and safety precautions of those materials used by either himself or his employees and be aware of those recommendations stipulated by the manufacturer.
   3. Ineffectual control (damage, injury or death to plants) or adverse effects on animals or persons resulting from the use of materials beyond the limitation of the manufacturer's

guarantee shall be considered the responsibility of the licensed operator and his employer.

4. Spray equipment shall be kept clean and in good working order. The Department of Public Works may inspect the equipment at any time and take samples of spray materials being applied.
5. It shall not be permitted to perform chemical application with dirty or contaminated tanks or equipment.
6. Operators shall properly dispose of excess chemicals, including rinse water, in accordance with federal and state laws and regulations. Unsanitary or unsafe methods of washing out or draining tanks and equipment into public sewers and gutters is prohibited.
7. No spray application shall be carried out when there is sufficient wind to make pesticide control ineffectual or create an overspray hazard to persons, plants or property.
8. No spraying of pesticides shall be done when air temperature is less than 40° Fahrenheit.
9. All spray machines other than hand pump sprayers must have agitators capable of maintaining a uniform spray solution at all times when spray application is in progress.
10. Adequate precautions shall be taken in all phases of chemical preparation and application in order to minimize the chances of toxicity or phytotoxicity to non-target species.
11. Pesticide applicator shall post a sign visible from the right-of-way no less than 24 hours before the pesticide application. The sign shall be dark lettering on a yellow background, at least one foot square in area and indicate the pesticide(s) applied.

B. Specific requirements pertaining to chemical injections of trees.

1. Authorization by the Director must be given prior to any injection of chemicals into any tree.
2. Injection hole size, spacing and timing of application will be according to product label and tree species.
3. Injection holes should not be placed near wounds in the tree trunk, such as knots, frost cracks, cankers and decay.
4. Holes shall be drilled as low on the trunk of a tree as feasible.
5. Vertical alignment of holes from previous treatments should be avoided.
6. Remove external fixtures as soon after treatment as the manufacturer and legal requirements allow.
7. If growth regulators are used, each stem of a multi-stemmed tree should be treated as a separate tree and any tree showing visible signs of decline or decay should not be injected unless permitted by the Department.
8. A record of trees injected shall be kept and turned in to the City Arborist upon the completion of work. The record shall include the date, time of day and location that the tree or trees were injected, the operator, chemicals used, size and species of tree, amount of chemical used and any other pertinent information.

Section 8.00. Planting Specifications for Trees on City-owned Property

The following specifications shall apply to the planting of trees on any property owned or otherwise controlled by the City of Lancaster, including but not limited to public street rights-of-way, parks and open spaces, and other municipal facilities. In addition, property owners and developers are encouraged to utilize this tree manual and adhere to the guidelines and specifications contained herein when appropriate for planting trees on private property.

A. Guidelines for Tree Selection

1. This section presents general principles for tree selection for the benefit of property owners and landscape architects. In presenting plans to city agencies and commissions, owners and their representatives should be prepared to justify the selection of trees based on the principles described here and best practices as embodied in recognized standards.

   Much of the information in this section is derived from "Recommended Urban Trees: Site Assessment and Tree Selection for Stress Tolerance", published by Cornell University's Urban Horticulture Institute.

   Older urban communities such as Lancaster present particular challenges for trees. Narrow streets, historically significant facades, a profusion of overhead and underground utilities, impoverished soils, steeply sloping streets and yards, and the need to assure accessibility and mobility are all factors that influence tree selection and maintenance. Therefore, it is important to look ahead for how a tree planted today might impact and be impacted by its environment decades from now, including, but not limited to, conflicts with buildings, utilities and sidewalks.

   Selecting a tree for a particular site requires consideration of many factors. There is no perfect tree. The range of possibilities is continually changing, as new species and varieties are introduced, as some trees are found to be invasive or to have structural defects, and as new diseases and pests threaten long-favored trees. Although a Tree Planting List is provided in this Tree Manual, it must be emphasized that over time such lists become outdated.

2. Tree Lists. The City of Lancaster operates a residential *Tree Planting Program* for planting street trees. The recommended list found online is not a list of all trees acceptable for planting; it is a much shorter list of those trees that are currently available for purchase through the *Tree Planting Program*. Additional lists of trees currently acceptable for planting in the City of Lancaster can be found in Appendix D.

3. Site Conditions. The most successful approach to select trees for a particular location is to match site conditions and limitations based on a thorough site assessment. What applies to a site along a street may be quite different from what applies to a parking lot or a backyard. Consideration should be given to soils, microclimates, and other site conditions and constraints. Both above ground and below ground conditions can change dramatically in the space of ten feet. A comprehensive site assessment should occur which considers plant requirements such as

   - climate and microclimate (hardiness zone, light conditions, heat, wind),
   - soil factors (pH, texture, compaction levels, drainage characteristics, yearly salt application),

- above-ground limitations (wires, proximity to structures), and
- below-ground limitations (rooting space, utility issues).

4. Diversity is one key to a successful tree planting program. Over-planting of one species in an area can result in monocultures that encourage the build-up of insect populations and diseases that can destroy an entire population.

   a. To achieve the desired diversity, the following concepts are recommended:

      - Trees should be planted in alternating groups (3–6 trees) of different tree species on a city street or along a frontage.
      - No single tree species should represent more than 20–25% of a block segment.
      - Using many species of trees that offer visual similarity to balance the desires for the uniform look of monocultures are encouraged.
      - Monoculture plantings along a street should be avoided.

   Diversity Based on Number of Trees Required

Number Trees Required	Number Tree Varieties/Species
1-5	1-2
5-15	2-3
15-25	3-5
25-50	5-7
50-100	7-10
100+	10 +

   b. Tree Planting Diversity Goals

      - No single species should make up more than 10% of a planting/population.
      - No single genus should make up more than 20% of a planting/population.
      - Maple (Acer) may not comprise more than 5% of any given planting project.
      - Asian Longhorn Beetle (ALB) host species may not exceed 25% for any given planting project.
      - Any non-street tree planting project is recommended to have at least 20% of the species be non-deciduous.
      - Any street tree planting project should consider appropriate non-deciduous species.

5. If there is no one perfect tree, it is because there is no one homogeneous urban environment or site.

6. There is a general preference among urban and community foresters for native species. However, the options for natives have, unfortunately, been constrained by the arrival of successive waves of insect pests and diseases: Dutch elm disease, chestnut blight, emerald ash borer, and Asian longhorn beetle, to name a few. These agents have devastated native species and turned previously beautiful urban areas into barren streetscapes. It is probably inevitable that such invasions will continue. Breeders seek to develop resistant varieties, but the inevitable evolutionary struggle between pests and hosts will likely preclude a permanent success.

7. Lancaster is committed to enhancing the urban forest for the many benefits that trees provide. Tree canopy is a key component of the City's Green Infrastructure Plan that seeks to minimize the damaging effects of storm water runoff to the City, the Conestoga River and other streams, and ultimately, the Chesapeake Bay. Trees reduce air temperature, reduce heating and cooling costs and thus greenhouse gas emissions, improve property values, enhance physical and psychological health, and reduce air pollutants. Trees help people reconnect with nature.
8. Additional sources of Information on Trees for Lancaster:
    a. "Recommended Urban Trees: Site Assessment and Tree Selection for Stress Tolerance", Cornell University, Urban Horticulture Institute http://www.hort.cornell.edu/uhi/outreach/recurbtree/

        This list is very extensive, and contains detailed information about species and varieties. It is designed for USDA Hardiness Zone 6 or colder. Since Lancaster is in Zone 7, some appropriate species are not included. Other resources listed below will provide information on warmer-climate species. Of course microclimate considerations must also be included in the selection process.

    b. "Recommended Urban Trees – Wilmington DE area" http://www.wilmingtonde.gov/residents/recommendedtrees (download full document at this URL)

        This list applies to the same Hardiness Zone as Lancaster.

    c. "State College Borough Municipal Tree Plan", State College Borough Tree Commission http://www.statecollegepa.us/index.aspx?NID=331 (Select the link to "The Municipal Tree Plan. Appendix 9 contains recommended trees)

    d. "Landscape Tree Factsheets", Henry Gerhold *et al*., Pennsylvania State University College of Agricultural Sciences

    e. "Manual of Woody Landscape Plants", Michael Dirr, Stipes Publishing Co.

        This is a widely-recognized, authoritative reference source.

B. Plant material.

1. All trees planted on City-owned property shall be of a species and variety chosen from the City of Lancaster approved tree planting lists in Appendix D, unless otherwise authorized by the City Arborist. To enhance stormwater management through evapotranspiration the largest canopied tree for an existing planting site shall be planted.
    a. No invasive plants shall be permitted on any property owned or controlled by the City of Lancaster.

    b. Tree species and variety shall be appropriate to the site constraints such as overhead and underground utilities, proximity to buildings and other structures, prolonged inundation by flooding, winter maintenance risks, etc.

    c. Tree size.

        (1) Large Trees are designated as those attaining a height of forty-five (45) feet or more with a mature spread of thirty (30) feet or more. Large trees should be

spaced at least twenty-five (25) to thirty (30) feet apart and should be planted two and one half (2 ½) feet away from any concrete curb, sidewalk, or patio. Soils must be a minimum of three (3) to four (4) feet in depth. These trees require adequate space for canopy growth and should not be planted underneath power lines or within ten (10) feet of streetlights or utility curb boxes.

(2) Medium trees are designated as those attaining a height of thirty (30) feet to forty-five (45) feet with a mature spread of twenty (20) feet or more. Depending on the species, medium trees can be planted less than twenty-five (25) feet apart and may be planted under utilities with greater than forty-five (45) feet of overhead clearance.

(3) Small Trees are designated as those attaining a height of less than thirty (30) feet with a mature spread of ten (10) feet or more. Small trees are appropriate for planting under overhead wires and utilities and can be planted less than twenty-five (25) feet apart.

2. Tree material shall conform to the latest version of the American Standard for Nursery Stock (ANSI Z60.1). Plant material shall be of standard quality or better, true to name and type of species or variety.
3. The minimum sizes of trees, straightness of trunk, clearance of lower branches and geographic location of the nursery tree origin and propagation method shall be specified by the City Arborist.
    a. All trees to be planted within a public right-of-way (street tree) or within a municipal park or open space (park tree) shall have a minimum two and one half (2½) inch caliper at the time of planting unless otherwise approved by the City Arborist.
4. The City Arborist shall be notified and have the right to inspect, and accept or reject, any trees before they are selected, purchased or planted.
5. Trees shall have normal, well developed branches and root systems. They shall be healthy and vigorous, free from limb, root and other defects, decay, sunscald injuries, abrasions of the bark, insect and pests and all forms of infestations or objectionable disfigurements and structural conditions caused by nursery practices including roots buried too deep in a root ball.
6. Balled and burlapped trees shall have solid balls of standard size, the balls securely wrapped with burlap or canvas and tightly bound with natural rope or twine. Plastic twine or wrapping material is not permitted.
7. Bare root trees.
    a. All bare root trees shall have adequate root systems as defined by the latest version of the American Standard for Nursery Stock (ANSI Z60.1).
    b. Bare roots shall be protected from desiccation during transit and planting. Bare root plants shall have their roots covered either with a moist bag and/or mulch while transported to and being held at the planting site.
    c. Bare root trees shall be transplanted before or after bud break and within the spring or autumn planting seasons.

d. All bare root trees shall be correctly staked and irrigated adequately during hot, dry weather as specified by the City Arborist. See Details in Appendix C for proper staking technique.

8. In transporting plants to a planting site, trees shall be handled, secured and covered to prevent any damage from wind or vibration. Plants shall never be thrown, dropped or bounced off a truck or loader to the ground. Plant material shall be handled in a manner to cause the least amount of damage during the planting process. The trunk shall be protected against mechanical damage during handling and transport.

9. Trees shall not be dug, balled and burlapped or moved with a tree spade during their active growth period unless the root ball is large enough to insure survival and the foliage is protected from desiccation.

10. Plant material shall be planted the day it is taken to the planting site; or it shall be mulched, watered and placed in a shady area to prevent dehydration.

C. Planting methods and techniques for trees on City-owned property.

1. No tree planting pit shall be dug or approved until all underground electric or telephone lines, gas lines, water lines or any other improvement locations are checked in accordance with the Pennsylvania One-Call System.

2. Planting location.

a. Trees may not be planted within any clear sight triangle as defined in Chapter 300, Zoning, of the City of Lancaster Code of Ordinances.

b. No tree shall be planted within five (5) feet of any private driveway for a single family dwelling, or within ten (10) feet of the access drive for any non-residential building or off-street parking lot.

c. No tree shall be planted closer than twenty-five (25) feet from the point of intersection of any two public right-of-way lines, and a distance of thirty (30) feet must be maintained from a stop sign.

d. No tree may be planted within twenty (20) feet of a fire hydrant or ten (10) feet of any pole supporting a street light.

e. The minimum distance between trees shall be determined by the tree species, as approved by the Arborist.

f. Actual tree planting locations shall be approved by the City Arborist or Shade Tree Commission, as applicable.

3. Trees shall be planted in accordance with the International Society of Arboriculture Tree Planting Best Management Practices. For planting in tree lawns, parks and other unconfined areas, every planting pit should be at least three (3) times wider and at the depth of the root ball, or the full extent of the root system of bare root trees (See Appendix C for tree planting details). In the process of digging a tree planting pit, "glazing" the sides of the hole shall be avoided and/or corrected by scarifying the sides and bottom of the hole. Augers shall not be used for digging a tree planting pit.

4. All trees shall be planted at a proper depth that identifies and protects the root collar. No root of a newly planted tree shall be less than two inches below the top of finished grade.
5. The backfill for all balled and burlapped, bare root and container plantings shall be of desirable structure, texture and pH to support vigorous growth. The City Arborist shall approve the use of existing soil, new top soil or other rooting medium at each planting site. Backfill shall be added and tamped firmly, but not excessively, around the ball or root system at twelve (12) inch increments, or lifts, until the planting site is at desirable grade.
6. Organic amendments to backfill should be avoided. To reduce problems with soil settling and poor drainage and root growth, organic amendments to backfill shall only be used as approved by the City Arborist.
7. Each plant should be centered and vertically aligned in a tree planting pit.
8. For all balled and burlapped stock, once a tree has been properly positioned in the pit, burlap and twine surrounding the root ball shall be removed or tucked down in the planting hole. Plastic burlap or other synthetic materials shall be completely removed from the pit. Tree baskets may remain on the root ball, but the top 1/3 rings of all wire baskets shall be removed.

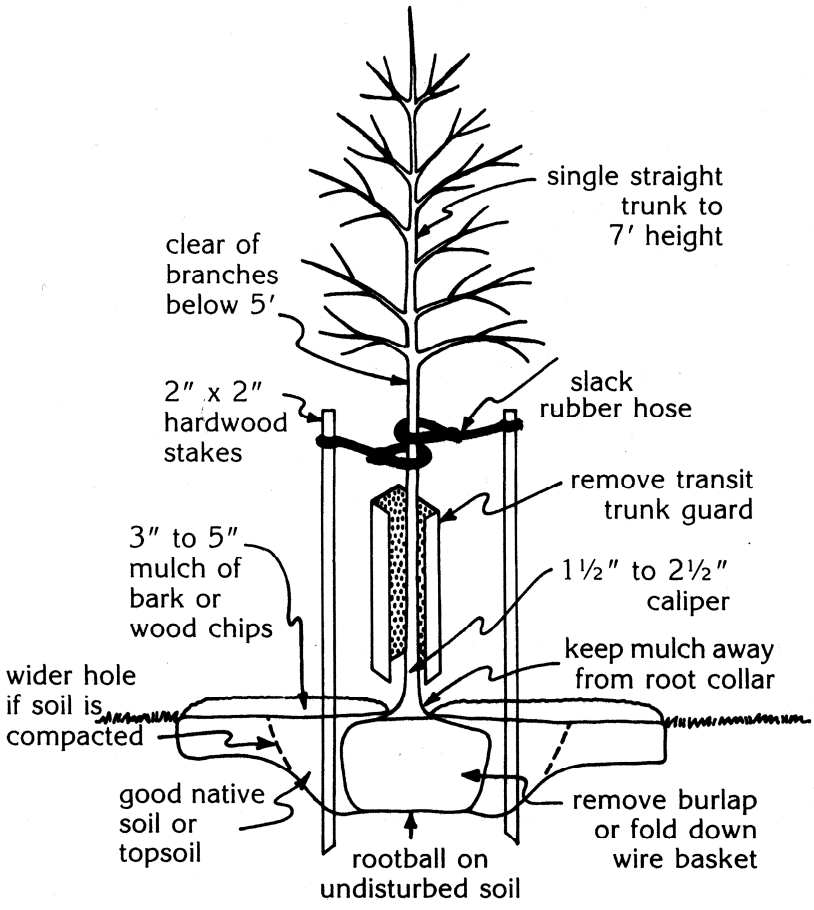


Fig. 3. Standard unconfined tree planting detail. See Appendix C for more tree planting details.

9. All twine, rope or plant labels secured around the trunk and branches shall be removed before planting is completed.
10. A watering berm shall be constructed around every new tree when possible. The soil in the planting hole shall be thoroughly irrigated to the depth of the root ball or roots immediately after planting.
11. Immediately following planting, all newly planted trees shall be deeply irrigated by applying at least twenty-five (25) gallons of water, and shall be continued weekly during hot and/or dry periods of the first planting season using TreeGators or other deep irrigation methods.
12. All tree plantings shall be mulched with two to three inches of composted wood chips, coarse fibrous bark or other surface treatment as specified by the City Arborist. Mulching shall be placed in a circle a minimum of two to three feet in diameter, but not touching a tree trunk.
13. All bare root and containerized trees will be properly staked as specified by the City Arborist and in accordance with the tree planting details in Appendix C. The staking of balled and burlapped trees shall be at the discretion of the City Arborist. Every evergreen tree in excess of six (6) feet in height shall be guyed securely. All stakes and ties shall be removed from a tree after one (1) year.
14. For any tree transplanted with a tree spade, all space between the ball and surrounding soil shall be filled. Trees shall be staked or guyed and irrigated and mulched immediately after transplanting. Further irrigation shall be at the discretion of the City Arborist.
15. Excavated tree planting pits that will be left open when work is not in progress or pose hazards to pedestrians or vehicles shall be adequately barricaded with qualified warning devices.
16. Cleanup of soil, branches or other debris resulting from any tree planting shall be promptly accomplished. The tree planting work area shall be kept safe at all times until the planting and cleanup operations are completed. Under no condition shall the accumulation of soil, branches or other debris be allowed upon City-owned property in such a manner as to result in a public hazard or be unsightly.
17. Covering of tree planting areas and tree wells shall be in accordance with the City of Lancaster Streetscape Design Guidelines, as amended.

Section 9.00. Special Considerations: Planting specifications for trees in sidewalks, patios, squares or other confined planting areas.

A. Tree species to be planted in sidewalks and other confined planting areas shall be approved by the City Arborist.

B. When planting any tree surrounded by sidewalk, or other impervious surfaces, a tree shall be planted in a concrete or other planting cutout no smaller than five (5) feet long by five (5) feet wide with a depth of three (3) feet. Larger tree planting cutouts shall be provided if possible (e.g. 6 feet long x 6 feet wide) or uneven sized tree planting cutouts (e.g. 8 feet long x 4 feet wide). Lesser planting cutouts may be used as approved by the City Arborist.

C. Stormwater Management. To increase tree rooting area, support tree condition and improve stormwater collection and infiltration, the engineered systems summarized below shall be considered in capital improvement or other projects that remove and replace roads, sidewalks or other hardscapes. The design and construction of any of the below systems shall be approved by the Director of Public Works and the City Arborist.

1. Engineered structural soil. Structural soils should be placed three (3) feet in depth under the entire tree planting area, not only within or around a tree planting pit. Soil depth may be modified according to the size of the root ball being planted. Structural soils should be mixed eighty percent (80%) angular stone one to one and one-half (1 – 1 ½) inches in size and twenty percent (20%) high clay soil by volume. Hydrogel should be used as a bonding agent. Limestone gravel shall be avoided. Structural soils should be installed and compacted in six (6) inch lifts and can be compacted to ninety-eight percent (98%) Proctor Density to support sidewalk panels and porous pavers.
2. Continuous Planters. In wide sidewalks, or rows of trees in other paved or surfaced open spaces, a continuous tree rooting space should be constructed by retaining or cutting a minimum four (4) foot wide planting strip parallel to the curb, or within the paved area. The planting area should be three (3) feet in depth with an open bottom. Depending on use (e.g., pedestrian traffic), the planting area should be filled with top soil or structural soil. Brick, pavers or other porous material, not set in concrete or other non-porous material, may cover the top of the planting area.
3. Retention basins below tree planting areas. The construction of gravel stormwater retention basins should be considered below the rooting area of trees planted in confined areas. Techniques including suspended pavements and structural cells may be utilized with the approval of the City Engineer.
4. Raingardens and bioretention basins. The use of raingardens, bioretention areas and other systems should be considered in conjunction with street and park tree planting projects.
5. Grading and curb modification. Grading of sidewalks areas and other hardscape and the use of rolled curbs, curb cut-outs and deletion of curbs should be considered to facilitate drainage into tree planting pits and areas.

Section 10.00. Special Considerations: Construction, Repair and modification of sidewalks and curbs.

A. All City of Lancaster sidewalks shall be a minimum of four (4) feet wide with a cross grade of no more than two percent (2%), and built to City of Lancaster specifications. Consideration shall be given to ADA requirements and other applicable standards when determining the technical feasibility, lines and grades for sidewalk, curbs and other hardscape.

B. Tree roots over two (2) inches in diameter shall not be cut without a permit. During sidewalk repair or modification, roots less than two (2) inches in diameter may be cleanly pruned on the tree side without obtaining a permit If possible, sidewalks, curbs and other hardscape installation shall be vertically and horizontally redesigned within tolerances acceptable to the City Engineer and the City Arborist to avoid cutting of any tree root.

C. When repairing, modifying, or installing sidewalks the use of asphalt and rubber panels, increased expansion joints, panel removal or cutting, panel bridging, and realignment of sidewalk into street or on private property easement shall be options to protect valuable trees as approved by the City Arborist and City Engineer.

D. ADA accessible curb cuts shall not be closer than five (5) feet from the trunk of a tree without approval of the City Arborist and City Engineer. No asphalt paving or concrete shall be installed closer than two and one-half (2 ½) feet from a tree trunk.

E. During curb repair or installation, damage to roots over two (2) inches in diameter may be permitted by the City Arborist. Encroachment upon any tree lawn while excavating shall not exceed twelve (12) inches unless done under the supervision of the City Arborist.

F. Replacement of concrete curbing with metal curbing to clear trees or large roots, the use of rolled curbing without footers, curb cut-outs and deletion of curbs shall be options to protect valuable trees as approved by the City Engineer.

Section 11.00. Glossary of Terms.

For additional definitions, refer to a standard reference dictionary or the City of Lancaster Trees Ordinance, Chapter 273; otherwise, words and terms used in this Manual shall be interpreted as follows:

Arborist, City Arborist -The Arborist/Horticulturist of the City of Lancaster, as supervised by the Director of Public Works or designee, or any urban tree professional employed or contracted by the City within the Bureau of Operations and designated with the responsibilities set forth in this Ordinance including but not limited to administering the Shade Tree Program of the City of Lancaster.

Bureau – The Bureau of Operations of the City of Lancaster.

Caliper – The measure of the diameter of the trunk of balled or burlapped nursery trees at a point six (6) inches above the ground, or twelve (12) inches above the ground for trees over four (4) inches in caliper. See also DBH, Diameter at Breast Height. It should be noted that Caliper and Diameter at Breast Height are both used in this Manual and carry different meanings, and should not be used interchangeably.

Cartway - The paved surface of a street or alley available for use by vehicular traffic.

City - The City of Lancaster, PA.

Commission - The Shade Tree Commission of the City.

Council - The Council of the City of Lancaster.

DBH, Diameter at Breast Height – The measure of the diameter in inches of a tree trunk at a point four and one half (4.5) feet above ground. See also CALIPER.

Department - The Department of Public Works of the City.

Director - The Director of the Department of Public Works or her/his designee.

Park - Includes all public parks under the jurisdiction of the Department of Public Works.

Permit - Any permit in writing as issued by the Bureau of Parks and Public Property of the Department of Public Works.

Property Owner - The owner of record of a parcel of land.

Protected Tree - All trees, whether on City-owned or private property, currently proposed as protected by the City of Lancaster Tree Ordinance, and including but not limited to trees within the public right-of-way, as part of a land development, and within parking lots.

Public Areas – For the purposes of this Chapter public areas shall include any public right-of-way including street, alley, avenue, boulevard, road, highway, freeway, lane, viaduct and any other dedicated and accepted public right-of-way, and any public park, trail, greenway, recreational facility, or open space under the jurisdiction of the City, as well as any City agency, commission, and board.

Public Street - A street or alley which has been dedicated to and accepted by the City of Lancaster and has been placed on the Official City (Street) Plan. This definition includes any street, avenue, boulevard, road, highway, freeway, parkway, lane, alley, viaduct and any other ways used or intended to be used by vehicular traffic or pedestrians.

Right-of-Way or Right-of-Way Line - A line or lines delineating the extent or dimensions (usually expressed in feet) of the width of a public or private street or alley and which abuts two or more lots or property lines. The total width of any land used, reserved or dedicated as a street, alley, driveway, sidewalk or utility easement.

Scarify – To loosen or break up the surface of soil or pavement.

Shade Tree - Any tree, shrub or other woody plant in or upon any public street, highway or avenue, or public park, trail, greenway or open space in the City, or that part of any tree, shrub or other woody plant which extends within the lines of any public street, highway or avenue, or public park, trail, greenway or open space in the City. For the purposes of this Manual, a shade tree shall also include any tree, shrub or other woody plant located within any properly executed and recorded easement on private property.

Shrub - A multi-stemmed woody plant differing from a tree by its low stature and habit in branching from the base.

Street Tree - Any shade tree planted in the right of way, including but not limited to between a street curb or cartway and a sidewalk. For the purpose of this Manual, a street tree shall also include any shade tree located within any properly executed and recorded easement on private property on the side of a sidewalk opposite the street.

Tree - As used herein, tree shall mean shade tree. The following tree size designations are based upon trees available through the City's Tree Planting Program:

1. Large Trees are designated as those attaining a height of forty-five (45) feet or more with a mature spread of thirty (30) feet or more.
2. Medium trees are designated as those attaining a height of thirty (30) feet to forty-five (45) feet with a mature spread of twenty (20) feet or more.
3. Small Trees are designated as those attaining a height of less than thirty (30) feet with a mature spread of ten (10) feet or more.

Tree Condition- A measure of both a tree's health and structural stability.

Tree Dripline - A line derived by the horizontal line extending along a radius from the trunk of a tree to the outermost tips of branches.

Tree Protection Zone (TPZ) – The TPZ extends from the tree trunk a distance equal to twelve (12) times the trunk diameter at breast height, or to the tree's drip-line plus five (5) feet, whichever distance is greater.

Tree Risk Rating - A method that ranks the relative degree of risk and consequence of tree failure by considering tree condition and defects, the size of the tree part prone to failure, and the vulnerability and value of any target that may be struck. Tree risk ratings are:

Improbable- Tree is not likely to fail even in severe weather.

Possible- Failure could occur, but is unlikely during normal weather conditions.

Potential- Tree failure is expected under normal weather conditions.

Imminent- Tree failure has started or will occur in near future.

Tree Work – For the purpose of this Manual, tree work shall mean any and all work performed to a tree requiring a permit as set forth herein.

Appendix A

City of Lancaster Street Tree Planting Program

The City of Lancaster offers a Tree Planting Program to **Street Tree Planting**
Those residents living within Lancaster City limits may take advantage of the City's Street Tree Planting Program. **The program is free of charge except for the cost of the tree.** The hassle-free four-step process is listed below for interested residents.

Call the City Arborist at (717) 291-4846

Review tree list online at http://www.cityoflancasterpa.com/tree-planting and complete a Tree Planting Release form
The city will prepare a proper site for your new tree. If an old stump or concrete sidewalk must be removed, they handle it. There is no additional charge.

A City crew will deliver and plant your new tree. including soil preparation, mulching, staking, and anything else required to make sure your tree will thrive. at no additional charge.

The Tree List provided on the City of Lancaster website is based on the best information available for trees well suited for life on the streets of Lancaster. They are hardy, resistant to disease and require only a normal amount of care and maintenance.

For more information and photographs of the trees suitable for planting in Lancaster, visit the following web sites:

University of Florida http://orb.at.ufl.edu/TREES/index.html

University of Connecticut http://www.hort.uconn.edu/Plants

Urban Tree and Shrub Selection http://www.na.fs.fed.us/spfo/pubs/uf/uts/index.htm

PA Trees.org Resource Guide http://www.patrees.org/selecting-the-right-tree

Appendix B

Tree Planting Easement

TREE PLANTING, MAINTENANCE AND REPLACEMENT AGREEMENT
AND DECLARATION OF EASEMENT

THIS AGREEMENT AND DECLARATION OF EASEMENT made as of this _____ day of _____, 20__ by and between the **CITY OF LANCASTER**, Lancaster County, Pennsylvania, a city of the third class duly organized under the laws of the Commonwealth of Pennsylvania, with its municipal offices located at 120 North Duke Street, Lancaster, Pennsylvania (hereinafter referred to as the "City"), and _____ (hereinafter referred to as the "Owner").

NOW THEREFORE, and in consideration of the mutual covenants contained herein and intending to be legally bound hereby, Owner hereby grants to City a permanent easement as hereinafter described for the purposes hereinafter set forth.

1. The easement shall be ____ feet in width, bounded on the _____ side by the _____ side of street, and extending _____ feet in length in a generally _____ direction as more fully depicted on Exhibit "A" (the Easement) attached hereto and made a part hereof. The area shall be deemed a public area insofar as the trees situated thereon are concerned.

2. The species, caliper and placement of the trees planted within the easement shall be approved by the City through its Department of Public Works, Bureau of Parks and Public Property or successor agency ("Department"), provided that all trees shall have a minimum trunk diameter of 2 ½ inches, as measured 12 inches from the ground, at the time of planting. The trees shall be planted within one year of the recording of the Easement.

3. Owner shall have the right to use and occupy the above area in any manner not inconsistent with the grant herein, except that Owner shall have no right to plant trees or shrubs, or to erect any structures within said area, without the approval of City. Owner shall be required to maintain the lawn or other ground cover within the aforesaid area. The Owner shall not

remove, or replace, any tree planted in the Easement without the written approval of the Director of Public Works or the Director's designee.

4. The Owner shall replace any deceased tree or any tree removed from the Easement, with the approval of the Department Director or the Director's designee, within a period of one year from the date of removal.

5. All trees within the Easement shall be planted, maintained and cared for by the Owner, its successors and assigns, in conformance with Chapter 273, Trees, of the Code of the City of Lancaster. These responsibilities shall include, but not be limited to, the following:

a. Trimming and pruning (in a manner to so as not to interfere with pedestrian and vehicular movements upon the Premises and adjacent street);

b. Pest and disease control; and

c. Protection from damage caused by landscape machinery and vehicles visiting the Premises.

The Owner, its successors and assigns, shall be responsible for performing the foregoing maintenance.

6. The Owner, for itself, its successors and assigns, agrees that the failure to maintain and replace the trees within the Easement in conformance with this Agreement shall constitute a nuisance and shall be abatable by the City as such.

7. The Owner, for itself, its successors and assigns, authorizes the City, at any time and from time to time, by its authorized representatives, to enter upon the Premises to inspect the trees planted in the Easement. The City representatives assigned by the Director shall inform the Owner at least one day prior to the date upon which the City representatives intend to enter the Premises to examine the trees.

8. The City may require that the Owner, its successors or assigns, or any future owner or occupier of the Premises, or any part thereof, take such corrective measures as the City may deem reasonably necessary to bring the Premises into compliance with this Agreement.

9. Upon the failure of the Owner, its successors or assigns, or any future owner or occupier of the Premises to comply with the terms of this Agreement or to take corrective measures following thirty (30) days' written notice from the City, the Owner hereby grants the City and its authorized representatives permission to enter the Premises and take such corrective measures as it deems reasonably necessary to bring the Premises into compliance with this

Agreement, including, but not limited to, to remove or trim, as appropriate, damaged or diseased trees in accordance with Chapter 273, Trees, of the Code of the City of Lancaster. The City may charge the costs thereof to the Owner, its successors or assigns, or any owner of the Premises and, in default of such payment, may cause a municipal lien to be imposed upon the Premises or any part thereof.

10. Notices to the parties hereunder must be in writing and shall be made by hand delivery, registered or certified mail, or telefacsimile addressed as follows:

To the City of Lancaster:

_____, Director of Public Works
City of Lancaster, Department of Public Works
120 North Duke Street
PO 1599
Lancaster, PA 17608-1599
Fax Number: 717-291-4713

11. The Owner shall include a specific reference to this Agreement in any deed of conveyance for the Premises or any part thereof including a portion of the Easement.

12. The City may, in addition to the remedies prescribed herein, proceed with any action at law or in equity to bring about compliance with this Agreement.

13. The Owner's responsibilities under this Agreement shall cease at such time as the Owner has transferred the entire Premises to a third party. Notwithstanding the foregoing, the Owner's responsibilities shall continue for any violations of this Agreement which occurred during the time that Owner owned the Premises or any lot created from the Premises.

14. It is the intent of the parties to this Agreement that responsibilities and maintenance obligations shall pass to subsequent title owners upon change in ownership of the Premises, and such subsequent owners shall assume all responsibilities and maintenance obligations for the time period during which they hold title. Liability shall remain for any violations of this Agreement which occurred during the period in which an owner held title.

15. This Agreement shall be binding upon the Owner, the successors and assigns of Owner, and all present and future owners of the Premises, or any part thereof including the Easement, and is intended to be recorded in order to give notice to future owners of the Premises, or any part thereof, of their duties and responsibilities with respect to the trees planted within the Easement.

16. This Agreement may be amended only by written instrument signed on behalf of all owners of the Premises (which contain the Easement) and the City. City shall have the right, at any time, in writing, to relinquish this easement, but in the absence thereof, this easement shall be permanent and shall be binding on any subsequent owner of the premises more fully described in Lancaster County Recording Book Volume _____, at Page _____.

17. When the sense so requires, words of any gender used in this Agreement shall be held to include any other gender, and words in the singular number shall be held to include the plural, and vice versa.

IN WITNESS WHEREOF, the undersigned have caused this Agreement and Declaration to be executed on the day and year first above written.

CITY OF LANCASTER

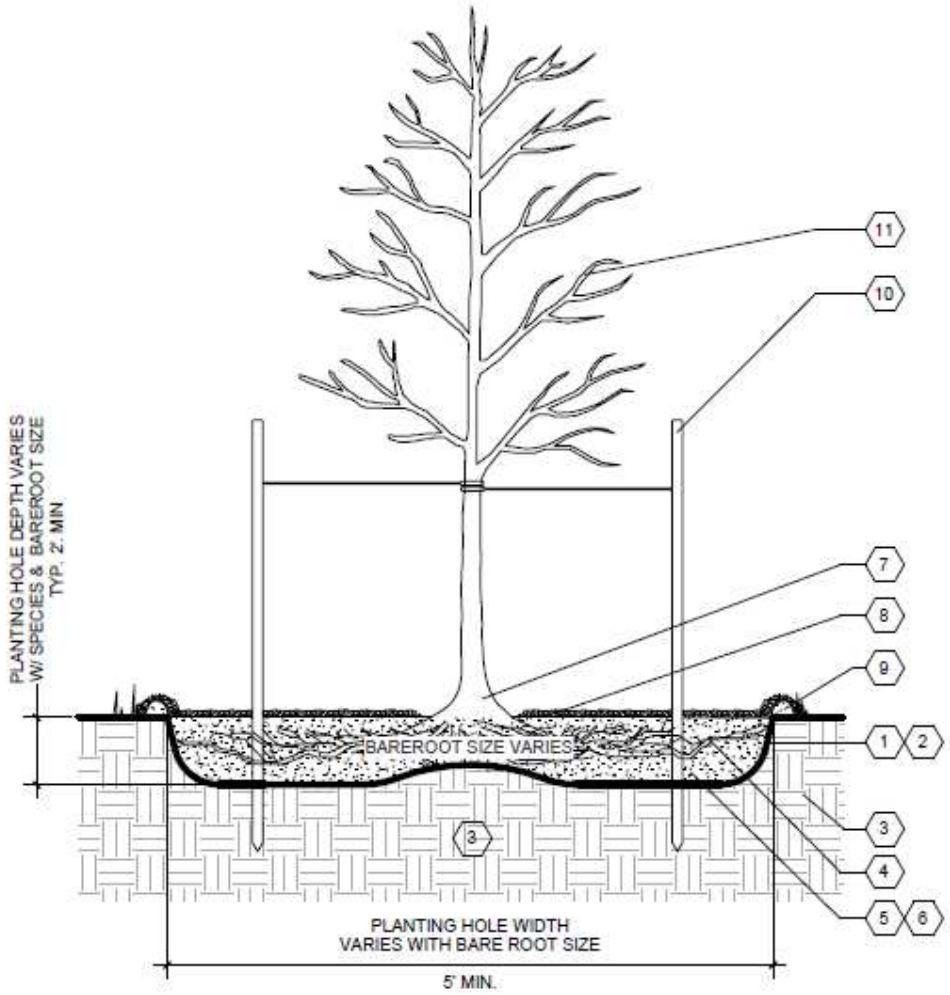
Attest: _____ **By: _____**
City Clerk Mayor

By: _____
Controller

[SEAL]

Appendix C
Planting Details

Figure C.1. Tree Planting – Open Field Bare Root



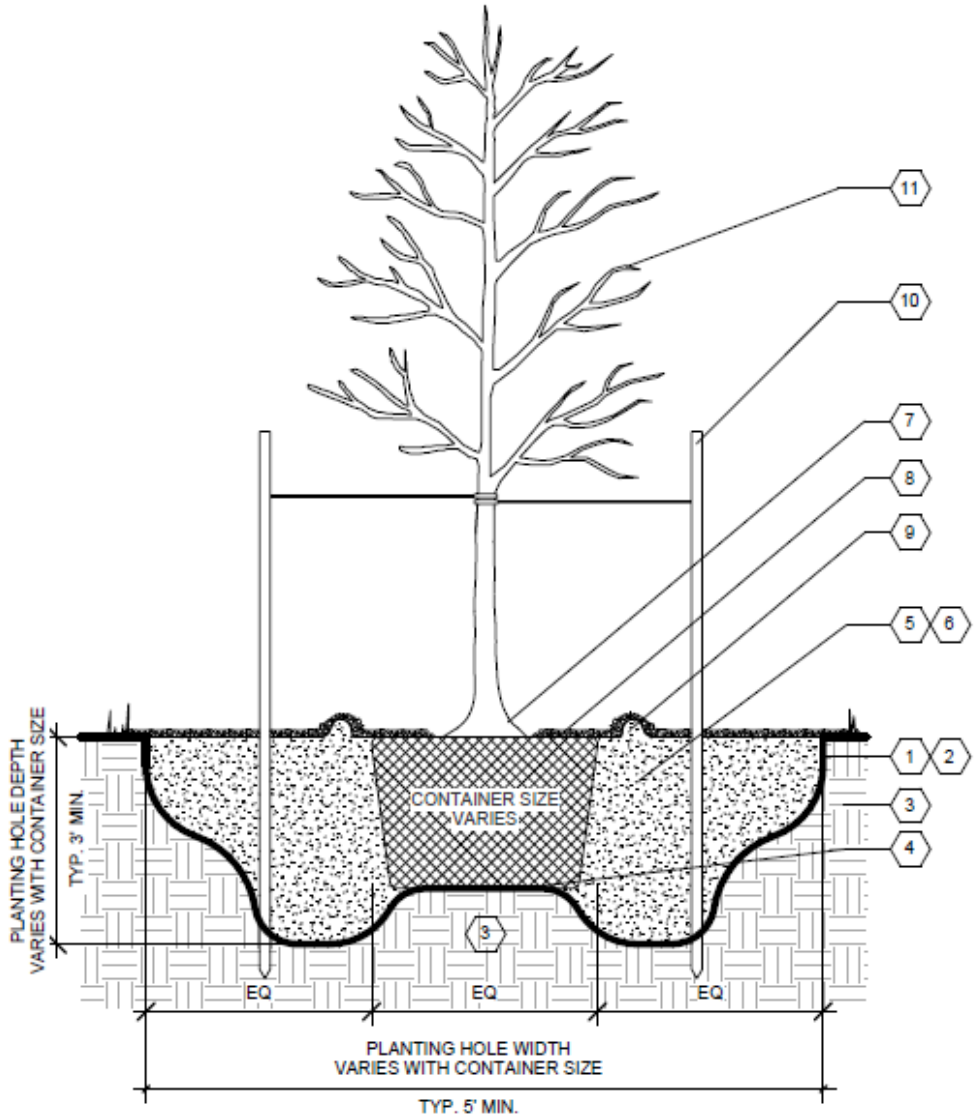
GENERAL NOTES

A. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
B. TREES MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
C. TREES MUST BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).

⬡ SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. PLACE ROOTS EVENLY AT BOTTOM OF PLANTING HOLE. DO NOT KINK ROOTS.
5. USE ORIGINAL OR QUALITY TOP SOIL AS PLANTING SOIL PER ARBORIST SPECIFICATION. IMPORTED TOP SOIL SHOULD HAVE SIMILAR TEXTURE AND 5 - 8% ORGANIC MATERIAL. DO NOT AMEND TOP SOIL WITH ORGANIC MATERIAL.
6. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
7. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
8. MULCH 2" -3" WITH COURSE GROUND COMPOSTED MULCH. MAINTAIN A 4" CLEAR ZONE FROM BASE OF TRUNK. IN AREAS OF HEAVY FOOT TRAFFIC MULCH MUST BE REMOVED OR REPLACED YEARLY.
9. BUILD 6" HIGH EARTH BERM BEYOND EDGE OF ROOT SPREAD FOR WATERING. COVER BERM WITH MULCH.
10. BARE ROOT TREE MUST BE STAKED. DRIVE HARDWOOD STAKES 18" TO 24" INTO GROUND OUTSIDE OF ROOT AREA. USE POLYETHYLENE TIES. TREE MUST BE ABLE TO SWAY. REMOVE STAKES AFTER ONE YEAR.
11. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.

Figure C.2. Tree Planting – Open Field Container



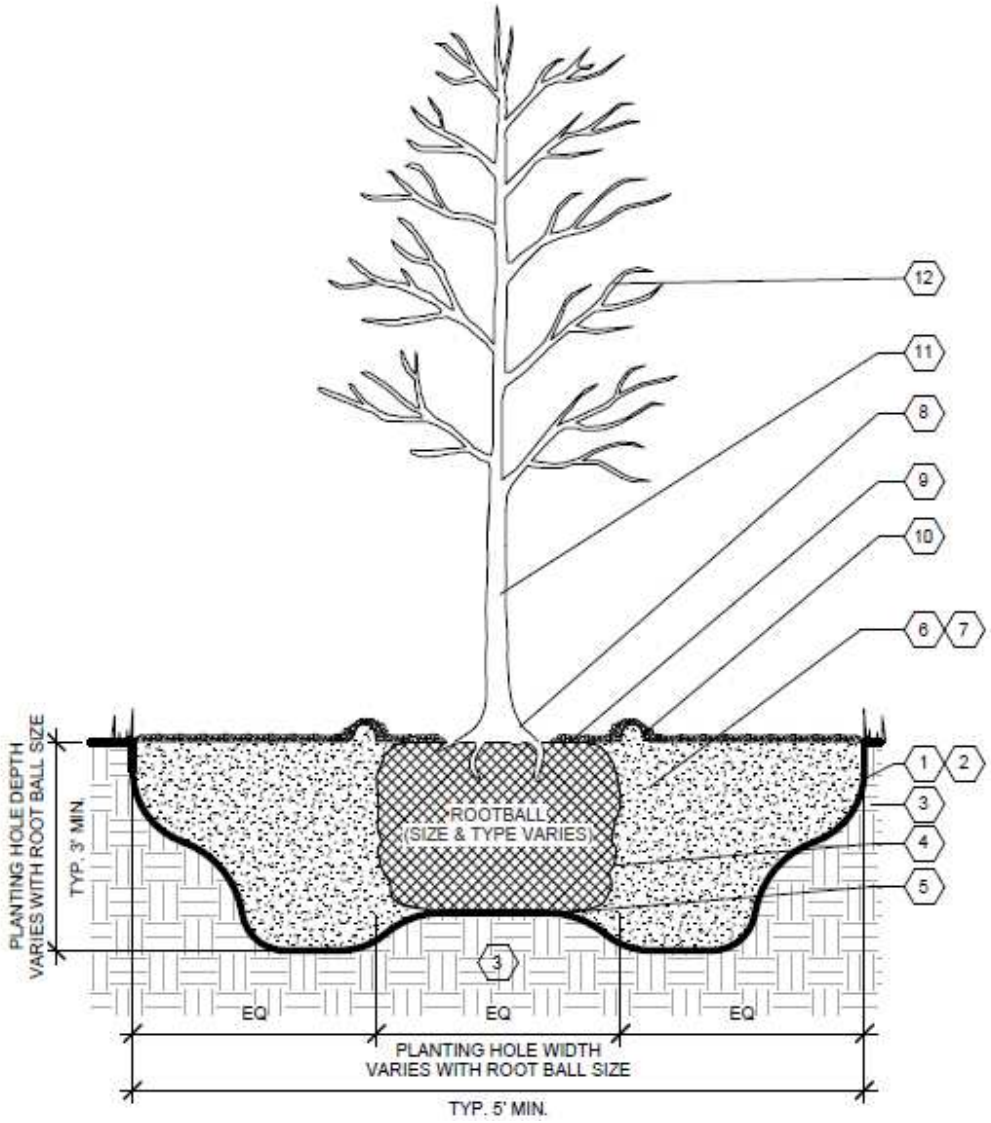
GENERAL NOTES

A. TREES WITH GIRDLING OR CIRCLING ROOT SHOULD BE REJECTED.
B. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREES MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D. TREES MUST BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).

SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. SET CONTAINER ON TOP OF SCARIFIED SUBGRADE. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE AND NOT COVERED WITH SOIL OR MULCH.
5. USE ORIGINAL OR QUALITY TOP SOIL AS PLANTING SOIL PER ARBORIST SPECIFICATION. IMPORTED TOP SOIL SHOULD HAVE SIMILAR TEXTURE AND 5 - 8% ORGANIC MATERIAL. DO NOT AMEND TOP SOIL WITH ORGANIC MATERIAL.
6. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
7. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
8. MULCH 2" -3" WITH COURSE GROUND COMPOSTED MULCH. MAINTAIN A 4" CLEAR ZONE FROM BASE OF TRUNK. IN AREAS OF HEAVY FOOT TRAFFIC MULCH MUST BE REMOVED OR REPLACED YEARLY.
9. 6" HIGH EARTH BERM BEYOND EDGE OF ROOT SPREAD FOR WATERING. COVER BERM WITH MULCH.
10. CONTAINER TREE MUST BE STAKED. DRIVE HARDWOOD STAKES 18" TO 24" INTO GROUND OUTSIDE OF ROOT AREA. USE POLYETHYLENE TIES. TREE MUST BE ABLE TO SWAY. REMOVE STAKES AFTER 1 YEAR.
11. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.

Figure C.3. Tree Planting – Open Field Ball and Burlap



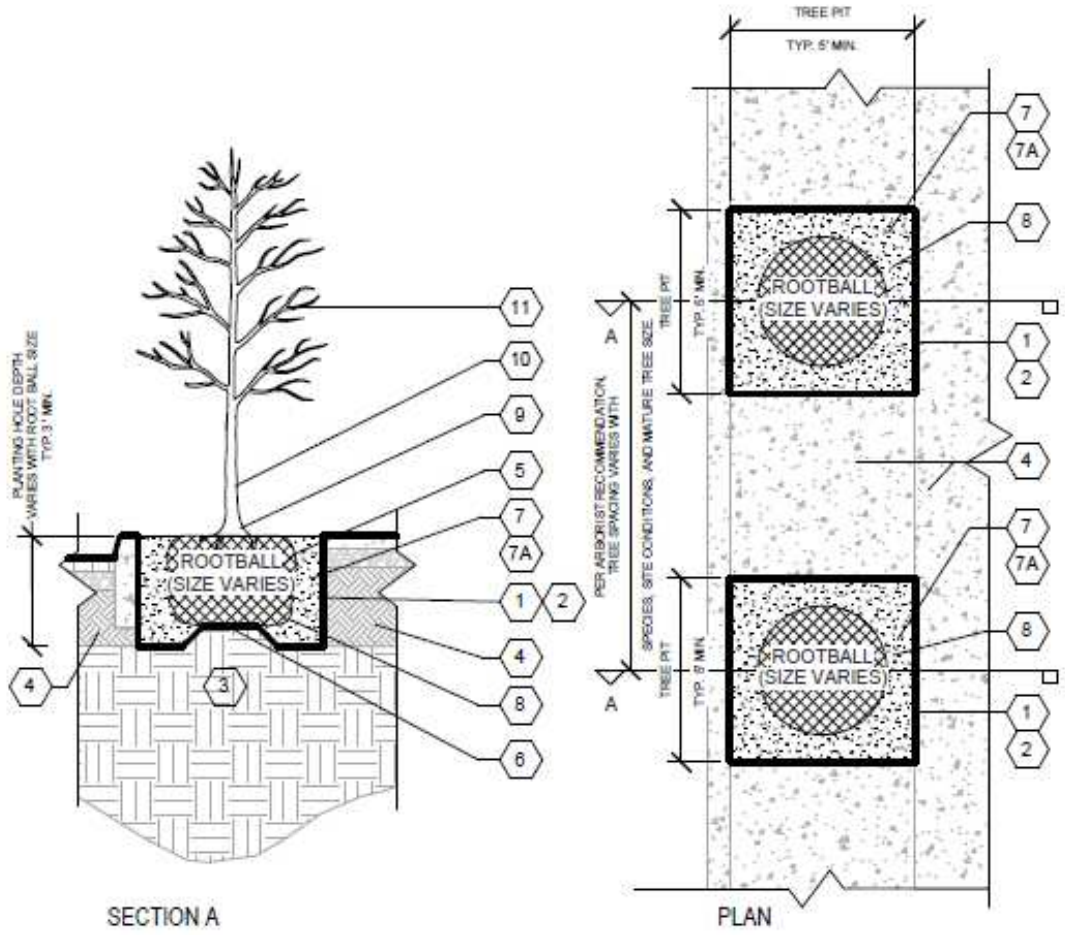
GENERAL NOTES

A. NURSERY STOCK SHOULD BE REJECTED IF ROOT FLARE IS BURIED AND CANNOT BE LOCATED.
B. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREE MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D.TREE SHOULD BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).
E. STAKE TREE ONLY UPON THE RECOMMENDATION OF ARBORIST. SEE L-101 FOR STAKING DETAILS.

⬡ SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. CUT AWAY WIRE BASKET FROM TOP 2/3RDS OF ROOT BALL. REMOVE BASKET AND PUSH BURLAP INTO BOTTOM OF HOLE.
5. SET ROOT BALL ON TOP OF SCARIFIED SUBGRADE. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE AND NOT COVERED WITH SOIL OR MULCH.
6. USE ORIGINAL OR QUALITY TOP SOIL AS PLANTING SOIL PER ARBORIST SPECIFICATION. IMPORTED TOP SOIL SHOULD HAVE SIMILAR TEXTURE AND 5 - 8% ORGANIC MATERIAL. DO NOT AMEND TOP SOIL WITH ORGANIC MATERIAL.
7. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
8. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
9. MULCH 2" -3" WITH COURSE GROUND COMPOSTED MULCH. MAINTAIN A 4" CLEAR ZONE FROM BASE OF TRUNK. IN AREAS OF HEAVY FOOT TRAFFIC MULCH MUST BE REMOVED OR REPLACED YEARLY.
10. 6" HIGH EARTH BERM BEYOND EDGE OF ROOT SPREAD FOR WATERING. COVER BERM WITH MULCH.
11. REMOVE ALL TIES AND TRUNK WRAP.
12. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.

Figure C.4. Street Tree Planting Pit for Sidewalks and Other Confined Spaces



GENERAL NOTES

A. NURSERY STOCK SHOULD BE REJECTED IF ROOT FLARE IS BURIED AND CANNOT BE LOCATED.
B. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors*. HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREE MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D.TREE SHOULD BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).
E. STAKE TREE ONLY UPON THE RECOMMENDATION OF ARBORIST. SEE L-101 FOR STAKING DETAILS.
F. CUT AND REMOVE EXISTING SIDEWALK TO MEET ADA REQUIREMENTS, BUT PROVIDE LARGEST TREE PLANTING PIT POSSIBLE WITH MINIMUM OF 5' X5'.
G. B&B TREES ARE RECOMMENDED, BUT BARE ROOT AND CONTAINER TREES CAN BE USED WITH ARBORIST RECOMMENDATION.
H. TREE SPECIES SHOULD BE SELECTED FROM ARBORIST APPROVED TREE PLANTING LIST FOR CONFINED SPACES.

⬡SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. EXISTING COMPACTED SUBGRADE W/ SIDEWALK OR OTHER SURFACE ABOVE.
5. CUT AWAY WIRE BASKET FROM TOP 2/3RDS OF ROOT BALL. REMOVE BASKET AND PUSH BURLAP INTO BOTTOM OF HOLE.
6. SET ROOT BALL ON TOP OF SCARIFIED SUBGRADE. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE AND NOT COVERED WITH SOIL OR MULCH.
7. USE ORIGINAL OR QUALITY TOP SOIL AS PLANTING SOIL PER ARBORIST SPECIFICATION. IMPORTED TOP SOIL SHOULD HAVE SIMILAR TEXTURE AND 5 - 8% ORGANIC MATERIAL. DO NOT AMEND TOP SOIL WITH ORGANIC MATERIAL.
7A. PER ARBORIST SPECIFICATIONS, USE SAND BASED SOIL COVERED WITH 12" OF TOP SOIL. CAN BE USED AS PLANTING MEDIUM.
8. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
9. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
10. REMOVE ALL TIES AND TRUNK WRAP.
11. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.

Figure C.5. Street Tree Planting in Existing Tree Lawn

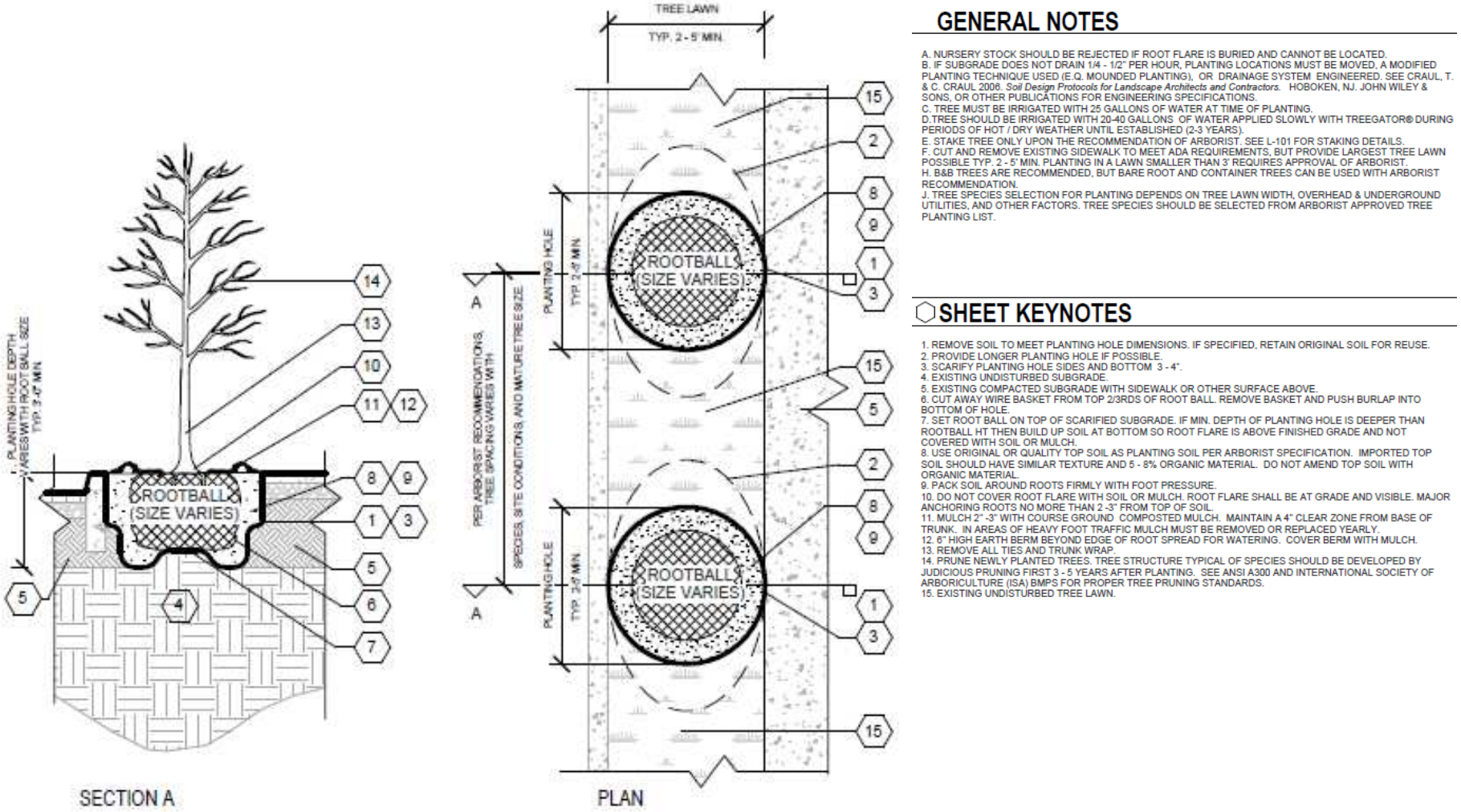
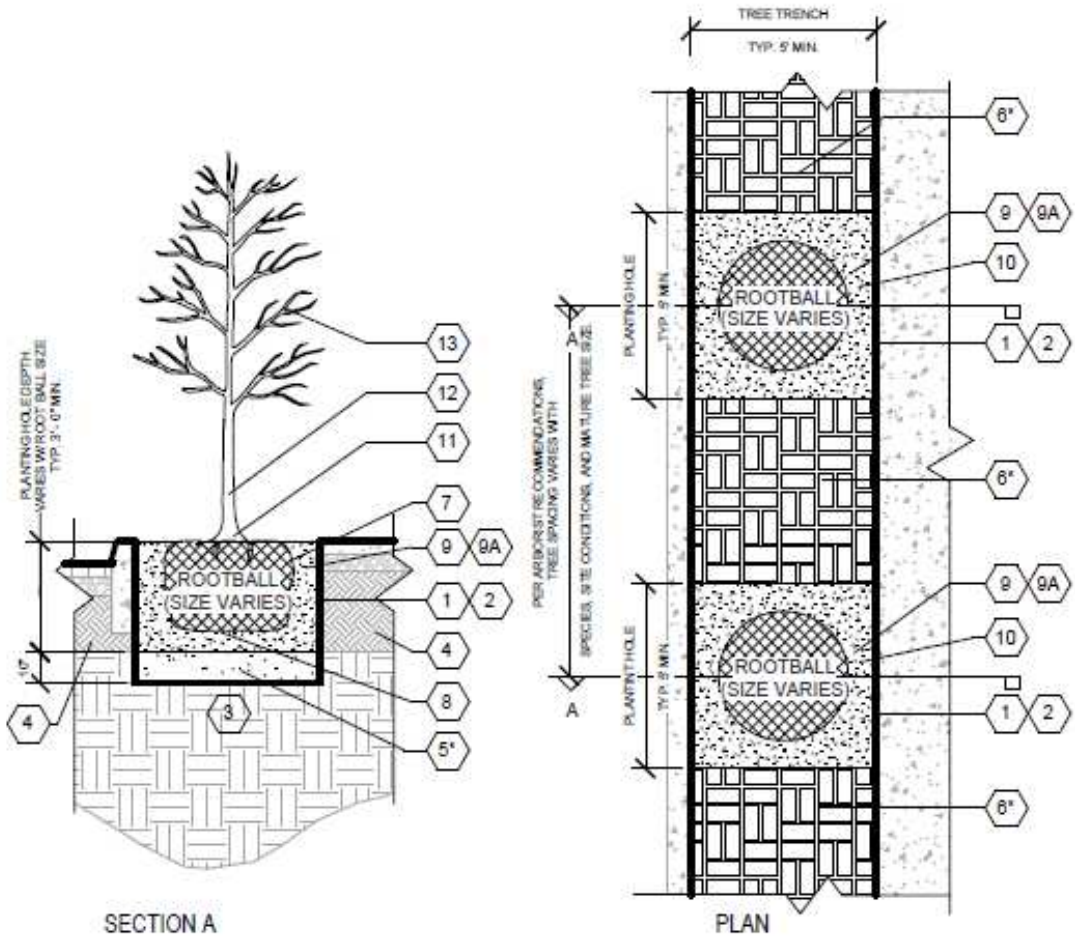


Figure C.6. Street Tree Trench with Structural Soils



GENERAL NOTES

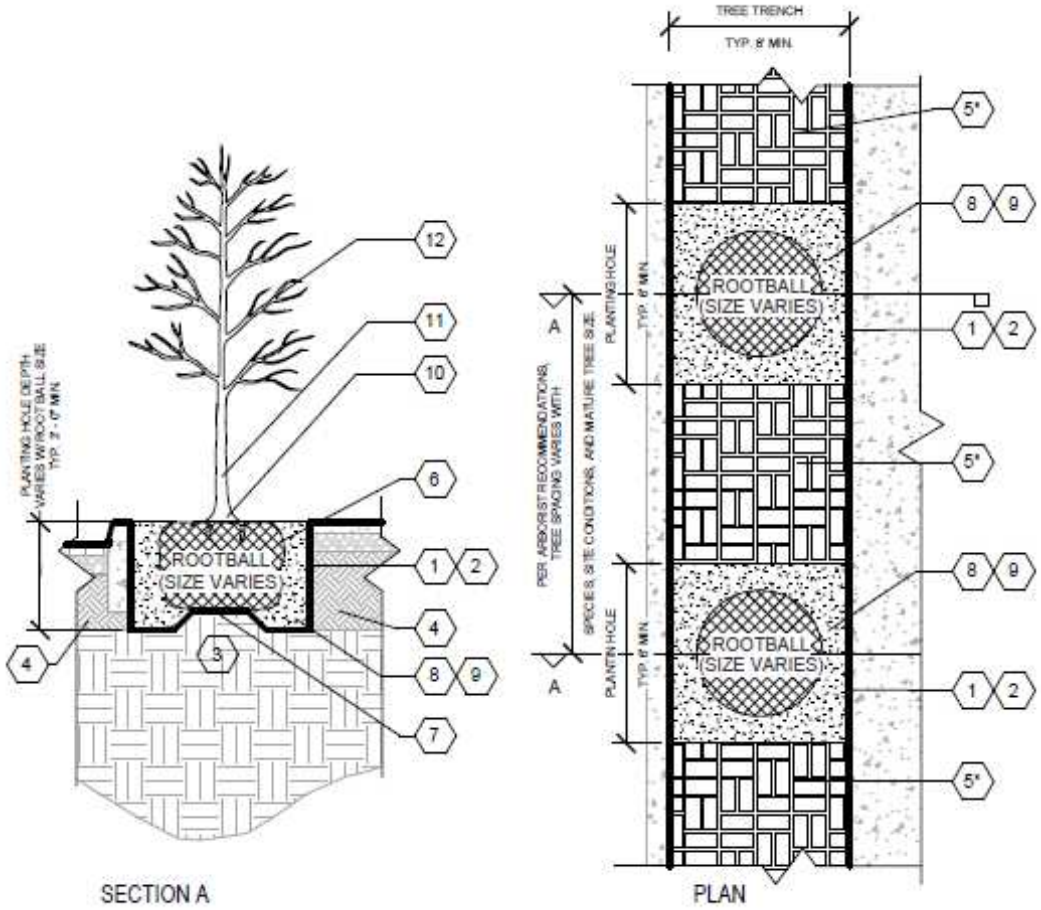
A. NURSERY STOCK SHOULD BE REJECTED IF ROOT FLARE IS BURIED AND CANNOT BE LOCATED.
B. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREE MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D.TREE SHOULD BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).
E. STAKE TREE ONLY UPON THE RECOMMENDATION OF ARBORIST. SEE L-101 FOR STAKING DETAILS.
F. CUT AND REMOVE EXISTING SIDEWALK TO MEET ADA REQUIREMENTS, BUT PROVIDE LARGEST TREE TRENCH WIDTH POSSIBLE TYP. 5' MIN. PLANTING IN A TREE TRENCH SMALLER THAN 3' REQUIRES APPROVAL OF MUNICIPAL ARBORIST.
H. B&B TREES ARE RECOMMENDED, BUT BARE ROOT AND CONTAINER TREES CAN BE USED WITH ARBORIST RECOMMENDATION.
I. TREE SPECIES SHOULD BE SELECTED FROM ARBORIST APPROVED TREE PLANTING LIST FOR CONFINED SPACES.
K. FOR STRUCTURAL SOILS, TREE SPECIES SELECTED MUST BE DROUGHT TOLERANT AND IRRIGATED UNTIL ESTABLISHED.

⬡SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. EXISTING COMPACTED SUBGRADE. SIDEWALK OR OTHER SURFACE ABOVE.
5". **SEE HIGHLIGHTED SHEET KEYNOTES**
6". **SEE HIGHLIGHTED SHEET KEYNOTES**
7. CUT AWAY WIRE BASKET FROM TOP 2/3RDS OF ROOT BALL. REMOVE BASKET AND PUSH BURLAP INTO BOTTOM OF HOLE.
8. SET ROOT BALL ON TOP OF COURSE SAND. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE, AND NOT COVERED WITH SOIL OR MULCH.
9. USE QUALITY TOP SOIL AS PLANTING SOIL PER ARBORIST SPECIFICATION. IMPORTED TOP SOIL SHOULD HAVE SIMILAR TEXTURE AND 5 - 8% ORGANIC MATERIAL. DO NOT AMEND TOP SOIL WITH ORGANIC MATERIAL.
9A. PER ARBORIST SPECIFICATIONS, USE SAND BASED SOIL COVERED WITH 12" OF TOP SOIL. CAN BE USED AS PLANTING MEDIUM.
10. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
11. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
12. REMOVE ALL TIES AND TRUNK WRAP.
13. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.

HIGHLIGHTED SHEET KEYNOTES:
5". TO FACILITATE LATERAL MOVEMENT AND INFILTRATION OF WATER, SPREAD 6" -10" OF COURSE SAND TOP OF SUBGRADE THROUGHOUT BOTTOM OF TRENCH.
6". STRUCTURAL SOILS 36" MIN. DEPTH COVERED WITH POROUS CONCRETE OR OTHER APPROVED PERVIOUS PAVING TO OPTIMIZE INFILTRATION. VERIFY POSITIVE DRAINAGE AWAY FROM BUILDINGS AND MINIMUM SETBACKS FROM BUILDINGS & STREET. A RATIO OF 80% CRUSHED STONE, 20% HIGH CLAY SOIL AND SMALL AMOUNT OF HYDROGEL RECOMMENDED. AVOID LIMESTONE GRAVEL.

Figure C.7. Street Tree Trench with Engineered Soils



HIGHLIGHTED SHEET KENOTE:

5*. ENGINEERED SAND SOILS HAVE 3' DEPTH HORIZONTAL COURSE SAND. COVERED WITH POROUS CONCRETE OR OTHER APPROVED PERVIOUS PAVING SURFACE TO OPTIMIZE INFILTRATION. VERIFY POSITIVE DRAINAGE AWAY FROM BUILDINGS AND MINIMUM SETBACKS FROM BUILDINGS & STREET. ENGINEERING SOIL PARAMETER DESIGN ARE SITE SPECIFIC. TREE PLANTING PITS ARE MINIMUM OF 10' X 10' FOR LARGE GROWING (OVER 45' AT MATURITY) TREES AND 6' x 6' FOR MEDIUM (OVER 35' AT MATURITY) TREES. PLANT LOW GROWING DROUGHT TOLERANT VEGETATION THROUGHOUT PLANTING AREA.

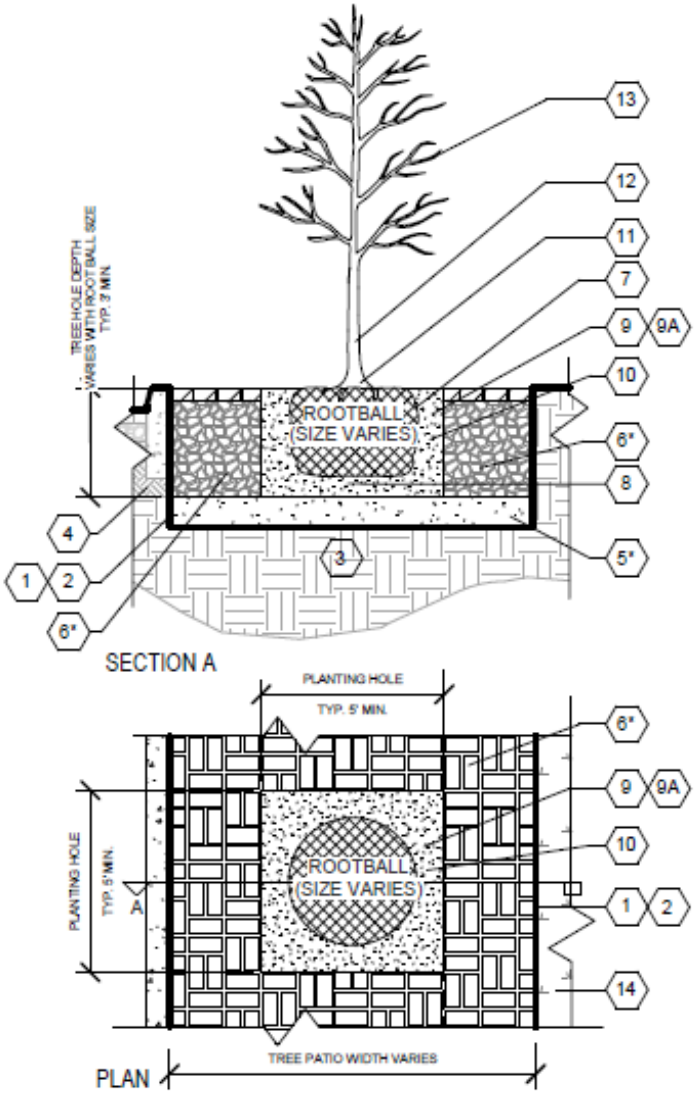
GENERAL NOTES

A. NURSERY STOCK SHOULD BE REJECTED IF ROOT FLARE IS BURIED AND CANNOT BE LOCATED.
B. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREE MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D.TREE SHOULD BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).
E. STAKE TREE ONLY UPON THE RECOMMENDATION OF ARBORIST. SEE L-101 FOR STAKING DETAILS.
F. CUT AND REMOVE EXISTING SIDEWALK TO MEET ADA REQUIREMENTS, BUT PROVIDE LARGEST TREE TRENCH WIDTH POSSIBLE TYP. 5' MIN. PLANTING IN A TREE TRENCH SMALLER THAN 3' REQUIRES APPROVAL OF MUNICIPAL ARBORIST.
H. B&B TREES ARE RECOMMENDED, BUT BARE ROOT AND CONTAINER TREES CAN BE USED WITH ARBORIST RECOMMENDATION.
I. TREE SPECIES SHOULD BE SELECTED FROM ARBORIST APPROVED TREE PLANTING LIST.
J. FOR ENGINEERED SAND SOILS, TREE SPECIES SELECTED MUST BE DROUGHT TOLERANT AND IRRIGATED UNTIL ESTABLISHED.

SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. EXISTING COMPACTED SUBGRADE. SIDEWALK OR OTHER SURFACE ABOVE.
5*. **SEE HIGHLIGHTED SHEET KEYNOTE**
6. CUT AWAY WIRE BASKET FROM TOP 2/3RDS OF ROOT BALL. REMOVE BASKET AND PUSH BURLAP INTO BOTTOM OF HOLE.
7. SET ROOT BALL ON TOP OF SCARIFIED SUBGRADE. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE AND NOT COVERED WITH SOIL OR MULCH.
8. TREES ARE PLANTED IN SAND BASED PLANTING SOILS AMENDED WITH ORGANIC MATERIALS MIXED INTO TOP 12".
9. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
10. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
11. REMOVE ALL TIES AND TRUNK WRAP.
12. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.

Figure C.8. Patio Tree Trench with Structured Soils



HIGHLIGHED SHEET KEYNOTES:

5*. TO FACILITATE LATERAL MOVEMENT AND INFILTRATION OF WATER, SPREAD 6" -10" OF COURSE SAND ON TOP OF SUBGRADE THROUGHOUT BOTTOM OF PATIO.

6*. STRUCTURAL SOILS 36" MIN. DEPTH COVERED WITH POROUS CONCRETE OR OTHER APPROVED PERVIOUS PAVING TO OPTIMIZE INFILTRATION. VERIFY POSITIVE DRAINAGE AWAY FROM BUILDINGS AND MINIMUM SETBACKS FROM BUILDINGS & STREET. A RATIO OF 80% CRUSHED STONE, 20% HIGH CLAY SOIL AND SMALL AMOUNT OF HYDROGEL RECOMMENDED. AVOID LIMESTONE GRAVEL.

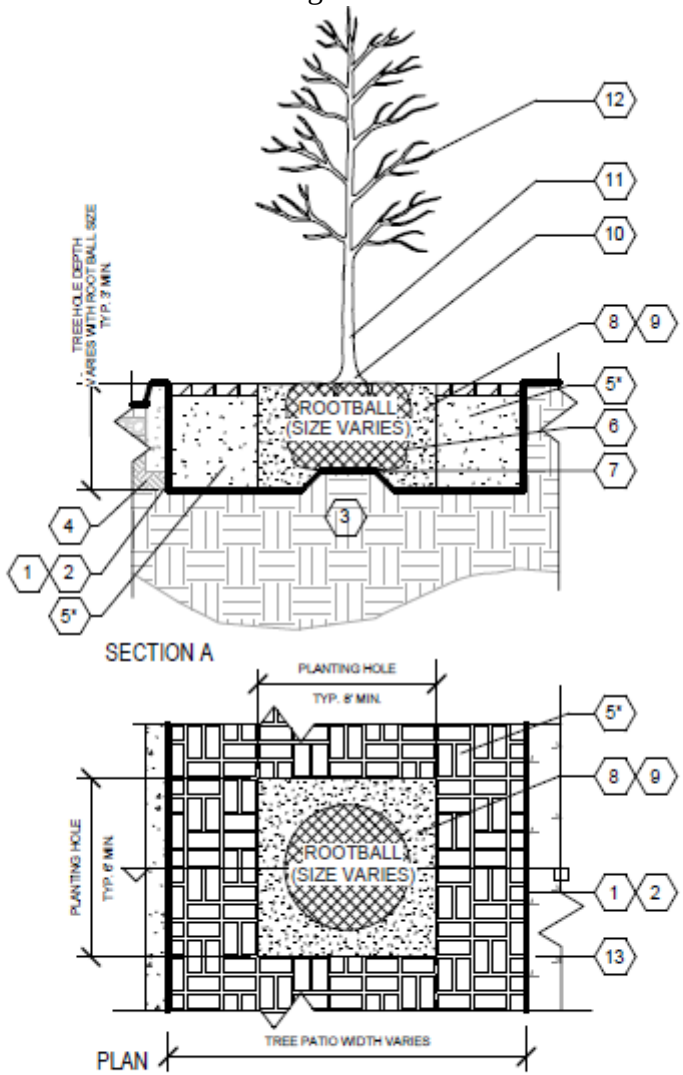
GENERAL NOTES

A. NURSERY STOCK SHOULD BE REJECTED IF ROOT FLARE IS BURIED AND CANNOT BE LOCATED.
B.IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREE MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D.TREE SHOULD BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).
E. STAKE TREE ONLY UPON THE RECOMMENDATION OF ARBORIST. SEE L-101 FOR STAKING DETAILS.
F. B&B TREES ARE RECOMMENDED, BUT BARE ROOT AND CONTAINER TREES CAN BE USED WITH ARBORIST RECOMMENDATION.
H. TREE SPECIES SHOULD BE SELECTED FROM ARBORIST APPROVED TREE PLANTING LIST.
I. NOTE FOR STRUCTURAL SOILS, TREE SPECIES SELECTED MUST BE DROUGHT TOLERANT AND MUST BE IRRIGATED UNTIL ESTABLISHED.

⬡ SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. EXISTING COMPACTED SUBGRADE. SIDEWALK OR OTHER SURFACE ABOVE.
5*. **SEE HIGHLIGHTED SHEET KEYNOTES.**
6*. **SEE HIGHLIGHTED SHEET KEYNOTES.**
7. CUT AWAY WIRE BASKET FROM TOP 2/3RDS OF ROOT BALL. REMOVE BASKET AND PUSH BURLAP INTO BOTTOM OF HOLE.
8. SET ROOT BALL ON TOP OF COURSE SAND. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE, AND NOT COVERED WITH SOIL OR MULCH.
9. USE QUALITY TOP SOIL AS PLANTING SOIL PER ARBORIST SPECIFICATION. IMPORTED TOP SOIL SHOULD HAVE SIMILAR TEXTURE AND 5 - 8% ORGANIC MATERIAL. DO NOT AMEND TOP SOIL WITH ORGANIC MATERIAL.
9A. PER ARBORIST SPECIFICATIONS, USE SAND BASED SOIL COVERED WITH 12" OF TOP SOIL. CAN BE USED AS PLANTING MEDIUM.
10. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
11. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
12. REMOVE ALL TIES AND TRUNK WRAP.
13. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.
14. EXISTING TO REMAIN.

Figure C.9. Patio Tree Trench with Engineered Soils



HIGHLIGHTED SHEET KEYNOTE:

5*. ENGINEERED SAND SOILS HAVE 3' DEPTH HORIZONTAL COURSE SAND. COVERED WITH POROUS CONCRETE OR OTHER APPROVED PERVIOUS PAVING SURFACE TO OPTIMIZE INFILTRATION. VERIFY POSITIVE DRAINAGE AWAY FROM BUILDINGS AND MINIMUM SETBACKS FROM BUILDINGS & STREET. ENGINEERING SOIL PARAMETER DESIGN ARE SITE SPECIFIC. TREE PLANTING PITS ARE MINIMUM OF 10' X 10' FOR LARGE GROWING (OVER 45' AT MATURITY) TREES AND 6' x 6' FOR MEDIUM (OVER 35' AT MATURITY) TREES. PLANT LOW GROWING DROUGHT TOLERANT VEGETATION THROUGHOUT PLANTING AREA.

GENERAL NOTES

A. NURSERY STOCK SHOULD BE REJECTED IF ROOT FLARE IS BURIED AND CANNOT BE LOCATED.
B. IF SUBGRADE DOES NOT DRAIN 1/4 - 1/2" PER HOUR, PLANTING LOCATIONS MUST BE MOVED, A MODIFIED PLANTING TECHNIQUE USED (E.Q. MOUNDED PLANTING), OR DRAINAGE SYSTEM ENGINEERED. SEE CRAUL, T. & C. CRAUL 2006. *Soil Design Protocols for Landscape Architects and Contractors.* HOBOKEN, NJ. JOHN WILEY & SONS, OR OTHER PUBLICATIONS FOR ENGINEERING SPECIFICATIONS.
C. TREE MUST BE IRRIGATED WITH 25 GALLONS OF WATER AT TIME OF PLANTING.
D.TREE SHOULD BE IRRIGATED WITH 20-40 GALLONS OF WATER APPLIED SLOWLY WITH TREEGATOR® DURING PERIODS OF HOT / DRY WEATHER UNTIL ESTABLISHED (2-3 YEARS).
E. STAKE TREE ONLY UPON THE RECOMMENDATION OF ARBORIST. SEE L-101 FOR STAKING DETAILS.
F. B&B TREES ARE RECOMMENDED, BUT BARE ROOT AND CONTAINER TREES CAN BE USED WITH ARBORIST RECOMMENDATION.
G. TREE SPECIES SHOULD BE SELECTED FROM ARBORIST APPROVED TREE PLANTING LIST.
H. NOTE FOR ENGINEERED SAND SOILS, TREE SPECIES SELECTED MUST BE DROUGHT TOLERANT AND MUST BE IRRIGATED UNTIL ESTABLISHED.

⬡ SHEET KEYNOTES

1. REMOVE SOIL TO MEET PLANTING HOLE DIMENSIONS. IF SPECIFIED, RETAIN ORIGINAL SOIL FOR REUSE.
2. SCARIFY PLANTING HOLE SIDES AND BOTTOM 3 - 4".
3. EXISTING UNDISTURBED SUBGRADE.
4. EXISTING COMPACTED SUBGRADE. SIDEWALK OR OTHER SURFACE ABOVE.
5*. **SEE HIGHLIGHTED SHEET KEYNOTE**
6. CUT AWAY WIRE BASKET FROM TOP 2/3RDS OF ROOT BALL. REMOVE BASKET AND PUSH BURLAP INTO BOTTOM OF HOLE.
7. SET ROOT BALL ON TOP OF SCARIFIED SUBGRADE. IF MIN. DEPTH OF PLANTING HOLE IS DEEPER THAN ROOTBALL HT THEN BUILD UP SOIL AT BOTTOM SO ROOT FLARE IS ABOVE FINISHED GRADE AND NOT COVERED WITH SOIL OR MULCH.
8. TREES ARE PLANTED IN SAND BASED PLANTING SOILS AMENDED WITH ORGANIC MATERIALS MIXED INTO TOP 12".
9. PACK SOIL AROUND ROOTS FIRMLY WITH FOOT PRESSURE.
10. DO NOT COVER ROOT FLARE WITH SOIL OR MULCH. ROOT FLARE SHALL BE AT GRADE AND VISIBLE. MAJOR ANCHORING ROOTS NO MORE THAN 2 -3" FROM TOP OF SOIL.
11. REMOVE ALL TIES AND TRUNK WRAP.
12. PRUNE NEWLY PLANTED TREES. TREE STRUCTURE TYPICAL OF SPECIES SHOULD BE DEVELOPED BY JUDICIOUS PRUNING FIRST 3 - 5 YEARS AFTER PLANTING. SEE ANSI A300 AND INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA) BMPS FOR PROPER TREE PRUNING STANDARDS.
13. EXISTING TO REMAIN.

Appendix D

Approved Tree Planting Lists for Streets and Parks

Introduction

Many tree species, cultivars, and hybrids are provided in this planting list. Tree cultivars, or cultivated variety, provide the desired traits of a tree species, such as fall color or drought resistance, and are usually propagated vegetative through cuttings, grafting, and tissue culture. Hybrids are trees that are bred from two different species to form a new species. The trees in this planting list are proven to be good performers in differing street and park landscapes; therefore, the trees listed here would perform similarly in a variety of residential and commercial settings.

Two excellent references for tree selection are:

> Dirr, M. A. 1990. *Manual of Woody Landscape Plants: Their identification, Ornamental Characteristics, Culture, Propagation, and Uses.* Champaign, Illinois: Stipes Publishing Company.
>
> Gerhold, H. D., W. N. Wandell., and N. L. Lacasse. *Landscape Tree Factsheets: Including Evergreens for Screens*. University Park, Pennsylvania: The Pennsylvania State University College of Agricultural Science.

Restrictions on the planting of certain trees have been provided as *Notes* at the end of the tree's description. Separate lists that summarize trees that require the permission of the Public Works Director for planting, trees to be planted in full or partial shade, trees recommended for sidewalk and parking lot cutouts, trees to be planted under utility lines, and trees that should not be planted are provided at the end of the document.

Newly planted trees require irrigation. All newly planted trees will be deeply irrigated with 25 gallons of water immediately after planting using a TreeGators or other deep irrigation method. All newly planted trees will be provided with 25 gallons of water per week during hot dry weather for the first 1 – 3 growing seasons.

All trees shall be planted in accordance with the City of Lancaster Tree Manual: Regulations and Standards for Arborculture Work.

Trees for Large Landscape Areas (Trees Over 45' in Height)

Large landscape trees require planting areas a minimum of 5' wide. Trees should be spaced at least 25 to 30 feet apart and should be planted 2.5' away from any concrete curb, sidewalk, or patio. Soils must be a minimum of 3 to 4' in depth. These trees require adequate space for canopy growth and should not be planted underneath power lines or within 10 feet of streetlights or utility curb boxes.

Acer rubrum- Red Maple

This fast growing tree reaches 50 to 75' in height with a somewhat smaller spread. It is a colorful tree year round with enjoyable bark and brilliant red and yellow fall color. The tree and other maples can have somewhat shallow root systems. *Notes: Performs poorly on*

limestone/alkaline soils and requires acid soil. Avoid fall planting. May be susceptible to verticillium wilt.

> ***Cultivars of Red Maple*****:** 'Autumn Flame'- (better limb structure than some cultivars); 'Bowhall' (upright growth habit, good for narrower spaces); 'October Glory'- (one of the best cultivars for fall color); 'Red Sunset' (good fall color, susceptible to salt spray)

Hybrid Maples

A genetic cross between red and silver maple, these trees grow quickly where space is ample reaching 50 to 70' in height with a somewhat smaller spread. Leaves are typically the color of red maple, and offer enjoyable red and yellow fall color. Although tolerant of a large variety of soil conditions, they prefer slightly acidic soils. They have somewhat shallow root system. Tough urban trees that transplant and grow well on poorer sites. *Notes: Susceptible to verticillium wilt.*

> ***Types of Hybrid Maples***: A. xfreemani 'Autumn Blaze'- (branching structure and color of red maple, rapid growth); A. xfreemani 'Celebration'- (branching structure and color of red maple, rapid growth, tolerant of limestone soils, fall planting hazard); A. xfreemani 'Scarlet Sentinel'- (upright form, avoid fall planting)

Betula nigra 'Heritage'- River Birch

This medium to fast growing tree reaches 40 to 70' in height with a slightly smaller spread. It offers interesting drooping branches and flakey bark. The tree is a very handsome specimen and is the most trouble free and toughest of all birches in terms of insect and disease problems. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil.*

Catalpa speciosa- Catalpa

This fast to medium growing tree reaches 40 to 60' in height with a smaller spread. Leaves are very large 6 to 12", medium green in summer changing to yellow or brown in fall. Fruit is a 10 to 20' long 'cigar' type capsule. Very tolerant of difficult soils including limestone/alkaline soils. In open landscapes can be subject to lightning strike.

Celtis occidentalis 'Prairie Pride'- Prairie Pride Hackberry

This medium to fast growing tree reaches 40 to 60' in height with an equal spread. Leafs are light green in summer and yellow to yellow-green in fall. Tolerant of acid or alkaline soils. The tree transplants and grows well on adverse urban sites. *Notes: Avoid fall planting. May be difficult to locate.*

Cercidiphyllum japonica- Katsura Tree

This medium to fast growing tree with a somewhat upright form reaches 40 to 60' in height with an equal spread. New leafs are reddish purple changing to bluish green in summer and a pretty yellow to apricot in fall. Adaptable to acid or alkaline spoils. *Notes: May require irrigation for young trees.*

Eucommia ulmoides- Hardy Rubber Tree

This medium growing tree reaches 40 to 60' in height with an equal or greater spread. Leaves are lustrous dark green in summer and fall color is non-existent as leaves fall green. The tree

withstands a variety of soils, drought, and partial shade. It is an excellent urban tree with few if any pest problems. *Notes: May be difficult to locate.*

Ginkgo bilboa- Ginkgo

This slow growing tree reaches 50 to 80' in height with a variable crown form dependent on cultivar (spreading to upright). It has an interesting leaf with excellent yellow fall color. Mature trees have excellent structure and branch strength. They will grow in many soils and urban situations and are pH adaptable and extremely pest free. An excellent urban tree. Notes: *Because of the unpleasant odor of female fruit, only "certified" male varieties should be planted.*

> ***Cultivars of Ginkgo*:** 'Autumn Gold'- (a good urban tree); 'Lakeview'- (upright growth form, good for narrow spaces); 'Princeton Sentry'- (upright growth form, good for narrow spaces).

Gleditsia triacanthos- Thornless Common Honeylocust

This fast growing tree reaches 40 to 60' in height with equal spread. They have small leaves that are bright green in summer and yellow in fall. One of the most adaptable trees ever used in landscapes, they withstand a wide variety of soil conditions, are adaptive to pH and urban conditions, and are the most salt tolerant of all landscape trees. *Notes: Insect problems, such as plant bug and locust leaf miner, are becoming a concern.*

> ***Cultivars of Thornless Common Honeylocust*:** 'ShadeMaster'- (somewhat upright form, reduced fruiting, plant in full sun); 'Skyline'- (less susceptible to plant bug, plant in full sun)

Gymnocladus dioicus- Kentucky Coffee Tree

This tree grows rapidly after establishment reaching 60 to 75' in height with a somewhat smaller spread. It is one of last trees to leaf out in spring. Leaves are medium green in summer changing to yellow or brown in fall. The tree has handsome bark and interesting limb characteristics in winter. Adaptable to a wide range of soil and site conditions with no serious insect or disease problems it is an excellent urban tree. *Notes: Large seed pods can be a problem. Plant "certified" male variety ('Espresso') only in full sun. Requires large planting area.*

Liriodendron tulipifera- Tulip Tree

This very large and magnificent tree is referred to as the "redwood of the east." It is the tallest growing eastern hardwood reaching 70 to 90' in height with a smaller spread. Fall color can be a spectacular yellow. It is adaptable to pH, but prefers slightly acidic soils. It can be slow in establishment in terms of root development. Slightly weak wooded, but perhaps stronger than most people give credit for. *Notes: Plant in full sun.*

Magnolia acuminata- Cucumber Tree

This tree has a somewhat upright form and grows rapidly 50 to 80' in height with the same spread. It has very large 10" leaves which are dark green in summer and green to brown in fall. Tolerant of limestone/alkaline soils. *Notes: Susceptible to verticillium wilt.*

Magnolia grandiflora- Southern Magnolia

This slow to medium growing evergreen tree reaches 60 to 80' in height with a somewhat smaller spread. It has lustrous green leaves and offers fragrant, white flowers May to June. The

tree has a strong pyramidal form with low branching. Can tolerate partial shade and is essentially insect and disease free. *Notes: Should be protected from wither winds and full sun in northern areas. Only cold hardy cultivars should be planted.*

> ***Cultivars of southern Magnolia***: 'Edith Bogue'- (possibly the most cold hardy cultivar, found in the Morris Arboretum in Philadelphia)

Metasequoia glytostroboides – Dawn Redwood

This fast growing tree has an upright canopy form and reaches 70 to 100' with a smaller spread. Leaves resemble hemlock and are bright green in fall changing to brown or orange-brown in fall. It has limited insect and disease problems. A unique and lovely ornamental. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. May require irrigation when young on dry sites. Plant in full sun.*

Nyssa sylvatic – Blackgum

This slow to medium growing tree has an upright form reaching 30 to 50' in height with a somewhat smaller spread. Leaves are deep green in summer changing to scarlet-purple in fall. One of the best trees for fall color. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Difficult to transplant and may require irrigation when young on dry sites.*

Platanus X acerifolia- London Plane Tree 'Bloodgood'

This medium growing tree is large and broadly spreading reaching 70 to 100' in height with a somewhat smaller spread. The tree has no fall color, but it offers interesting and handsome bark and limb structure during winter. It has extremely strong branching habits and is resistant to many insect and disease problems such as anthracnose. Tolerant of high pH soils, poor soils, and pollutants it is a tough urban tree. *Notes: Fruit and bark may cause litter problem.*

Quercus bicolor- Swamp White Oak

The medium growing tree reaches 50 to 60' in height with an equal or greater spread. It can have purple fall color, but usually fall color is yellow. The tree has a strong and interesting branching habit. Transplants and grows better than white oak and can be used as a substitute in urban landscapes. Extremely drought tolerant. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Avoid fall planting.*

Quercus imbricaria- Shingle Oak

This slow growing tree reaches 50 to 60' in height with an equal or slightly larger spread. Leaves are deep green in summer changing to yellow-brown in fall. Easier to transplant than many oaks. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Avoid fall planting.*

Quercus macrocarpa- Bur Oak

This slow growing tree reaches 70 to 80' in height with an equal or slightly larger spread. Leaves are deep green in summer changing to yellow-brown in fall. Tolerant of limestone/alkaline soils. A very large and impressive landscape tree. *Notes: Difficult to transplant and may require irrigation when young on dry sites. Avoid fall planting.*

Quercus muehlenbergi- Chinkapin Oak

This medium growing tree reaches 40 to 50' in height with a smaller spread. Leaves are dark yellow green in summer changing to orange brown in fall. It has an open, rounded crown. No

particular insect or disease problems. Prefers acid soils and reaches largest size in rich, deep soils. An attractive ornamental tree.

Quercus phellos- Willow Oak

This medium growing tree reaches 40 to 60'in height with a similar or somewhat smaller spread. Leaves are bright green in spring changing to yellow and dull red in fall. Mature trees have an attractive oval canopy from. Prefers moist, slightly acidic soil, but can grow on very tough sites. Essentially pest and disease free. An attractive street and park tree. *Notes: Depending on climate, may be deciduous or semi-evergreen.*

Quercus shumardii- Shumard Oak

This fast growing tree reaches 60 to 70' in height with an equal spread. A russet-red fall color is often not outstanding. It has excellent limb structure and strength. Adaptable to urban pollutants and relatively free of insect and disease problems. Performs better on limestone/alkaline soils than red oak and can be used as a substitute.

Robinia pseudoacacia 'Purple Robe'- Purple Robe Black Locust

This fast growing tree reaches a height of 50' with a slightly greater spread. The tree offers exceedingly fragrant, pretty, dark rose-pink flowers in May with a yellow-green fall color. Extremely tolerant of varied soils, pollution, salt, and climates. *Notes: Locust borer and plant bug can be insect problems. Limb breakage in storms is a concern.*

Taxodium distichum- Baldcypress

This medium growing tree has an upright growth form and reaches 50 to 70' with a smaller spread. Similar in appearance to dawn redwood, leaves are bright green in spring changing to a soft brown in fall. It has limited insect and disease problems. It is a distinctive specimen tree. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. May require irrigation when young on dry sites. Plant in full sun.*

Tilia americana- American Linden or Basswood

This medium growing tree has a somewhat upright growth form and reaches 60 to 80' in height with a smaller spread. Leaves are dark green above and lighter green below changing to greenish-yellow in fall. Tolerant of a range of soil conditions. A handsome native tree. *Notes: Susceptible to verticillium wilt and Japanese beetles.*

***Cultivar of American Linden*:** 'Redmond' (fast growing tree with more upright form)

Tilia tomentosa 'Sterling'- Silver Linden

This medium growing tree reaches 50 to 70' high with a smaller spread. It is pyramidal when young, remaining pyramidal or oval at maturity. It has interesting, shimmering leaves that are green above and silver below. Leaves can have yellow fall color. It is tolerant of urban pollution, soil compaction, and limestone/alkaline soils. It is more tolerant of drought and heat than other lindens. A beautiful ornamental tree.

Zelkova serrata "Village Green' and 'Halka'- Zelkova

These fast growing cultivars are hardier than trees of Japanese origin reaching 50 to 80' in height with an equal spread. They have dark green leaves in summer turning rusty-red in fall. Adaptable to soil compaction, pH, and drought, they are tough urban trees planted as a substitute for

American elm. *Notes: The cultivar 'Halka' has a shape more similar to American elm and less branch breakage during storms.*

Trees for Medium Landscape Areas (Trees 30 to 45' in Height)

Medium growing landscape trees require planting areas a minimum of 4' wide. Trees should be spaced 20 feet apart, and the trees must be planted 2' feet away from any concrete curb, sidewalk, or patio. Soils must be a minimum of 3 to 4' feet in depth. These trees require adequate soil for root growth and space for canopy growth.

Acer campestre- Hedge Maple

This slow growing tree reaches 25 to 40' in height with a similar spread. Leaves are a handsome dark green in summer changing to yellow-green in fall. Although small, it has an enjoyable tree-like form. The tree transplants readily and is extremely adaptable to soils, pH, drought, compaction, and pollution. It is a very tough and excellent landscape tree that can withstand heavy pruning.

> ***Cultivar of Hedge Maple*:** 'Evelyn'- Queen Elizabeth Hedge Maple (more upright growth form than true species)

Acer truncatum x A. Platanoides 'Warrenrod'- Pacific Sunset Maple

This fast growing tree reaches 30 to 40' in height with a somewhat smaller spread. Leaves are dark green in the summer changing to orange-red to bright red fall in the fall. It tolerates a wide range of soils and pH, heat, drought, pollutants, and partial shade. A very lovely small maple.

Aesculus c carnea 'Briotii'- Ruby Red Horsechestnut

This medium growing tree reaches 30 to 40' with a slightly smaller spread. The tree offers beautiful red flowers in May. Leaf color is dark green in summer changing to a poor yellow or brown in fall. It is adaptable to pH. *Notes: Not tolerant of heat or drought. Leaves will brown in late summer if exposed to full western sun. Can be difficult to find.*

Carpinus betulus 'Fastigiate'- Upright European Hornbeam

This slow to medium growing tree reaches 35 to 40' in height with a much smaller spread and a very formal, upright growth habit. Smaller leaves are dark green in summer changing to yellow or yellow-green in fall. Tolerant of a wide range of soil conditions including acidic or alkaline pH. No serious disease or insect problems. Good for narrower planting spaces or screens.

Cladrastis kentukea- American Yellowwood

This medium growing tree reaches 30 to 50' in height with a similar spread. It offers beautiful bark and fragrant white flowers in May to early June. Leaves open yellow and change to bright green in summer and yellow to golden yellow in fall. The tree tolerates acidic and alkaline pH. An excellent tree for flowers and foliage, it is a choice selection for smaller areas. *Notes: Poor branching structure can split during storms. Prefers full sun.*

Gleditsia triacanthos 'Imperial'- Thornless Common Honeylocust

This fast growing tree reaches 30 to 35' in height with equal spread. It withstands a wide variety of soils, is adaptive to pH and urban conditions, and is one of the most salt tolerant of all

landscape trees. It is one of the most adaptable native trees ever used in landscapes. *Notes: Insect problems, such as plant bug and locust leaf miner, are becoming a concern*.

Koelreuteria paniculata- Goldenraintree

This medium to fast growing tree reaches 30 to 40' in height with an equal or greater spread. It has compound, bright green leaves that change to yellow and golden in fall. The tree offers perfect, yellow, and enjoyable flowers in July. The tree has no particularly serious insect or disease problems and it is adaptable to a wide range of soils, is pH adaptable, and withstands drought and urban pollutants. It is a choice and beautiful specimen tree where space is limited.

Ostrya virginiana- American hophornbeam or Ironwood

This slow growing tree reaches 25 to 40' in height with a similar spread. Leaves are dark green in summer changing to yellow in fall. A handsome urban tree. *Notes: Sensitive to salt, drought, and compacted soils.*

Quercus acutissima- Sawtooth Oak

This medium growing tree reaches 35 to 45' in height with great variation in spread. It has dark lustrous leaves in the summer that change to a good yellow or golden brown fall color. It has no serious insect or disease problems. A nice, wide spreading shade or lawn tree for small planting areas. *Notes: It can be grown over a wide variety of sites, but requires acidic soil.*

Prunus sargentii- Sargent Cherry

This medium growing tree reaches 30 to 40' in height with an equal spread. The tree offers showy pink flowers April to May. Leaves are an excellent shiny green in summer changing to bronze or red in fall. The tree is adaptable to different soils and planting sites, but short lived. *Notes: Avoid fall planting. Plant in full sun.*

> ***Cultivars of Sargent Cherry***- 'Columnar' (much more upright growth form); 'Snow Goose' (smaller height and spread)

<u>Trees for Small Landscape Areas (Trees Under 30' in Height)</u>

Small growing landscape trees require planting areas a minimum of 2' wide. Trees should be spaced 10' apart, and the trees must be planted 1' feet away from any concrete curb, sidewalk, or patio. Soils must be a minimum of 3 to 4' feet in depth. These trees require smaller amounts of soil for root growth and space for canopy growth. These trees can be planted near, but not adjacent, to buildings. They also should be planted under utility lines.

Acer buergeranum- Trident Maple

This slow growing tree reaches 20 to 30' in height with an equal spread. Leaves are rich bronze in spring changing to dark green in summer and yellow, orange, and red in fall. It tolerates drought and other urban stresses, but refers well-drained acid soil. *Notes: Avoid fall planting. Plant in full sun.*

Acer griseum- Paperbark Maple

This slow growing tree reaches 20 to 30' feet in height with an equal or smaller spread. It offers a beautiful cinnamon or red-brown bark that becomes extremely attractive as the bark exfoliates. It has dark or bluish green leaves that change to bronze or russet-red in fall. It is tolerant of pH

and withstands a variety of soils, but prefers slightly moist soils. It has no serious insect or disease problems. It is an interesting and beautiful small landscape tree. *Notes: Prefers full sun.*

Acer tataricum – tatarian maple

This slow to medium growing tree reaches 15 to 20' in height with a similar spread. Leaves are dark green in summer changing to yellow and red in fall. Tolerant of limestone/alkaline soils and drought. *Notes: Susceptible to verticillium wilt.*

Carpinus caroliniana- American Hornbeam or Muscle Wood

This slow growing tree reaches 20 to 30' in height and spread, often with multiple trunks. Leaves are dark green in summer changing to a nice yellow or orange-red in fall. The tree offers an interesting fluted bark. One of the only landscape trees that can perform well in full shade. *Notes: Prefers slightly acidic, moister soils. Avoid fall planting. Plant in partial shade.*

Crataegus punctata 'Ohio Pioneer'- Ohio Pioneer Hawthorn

This slow to medium growing tree reaches 20 to 25' in height with a similar spread. It offers large clusters of white flowers in spring, but little fall color. A dark red fruit ripens and drops in fall. The tree is resistant to fire blight and has a reduced number of thorns. A tough urban tree it tolerates a variety of soils and drought. *Notes: Avoid fall planting. Plant in full sun.*

Crataegus viridis "Winter King'- Winter Green Hawthorn

This slow to medium growing tree reaches 25 to 30' in height with a similar spread. It offers clusters of white flowers in spring and yellow fall color. An abundant, red-orange fruit persists through winter. A tough urban tree, it tolerates a variety of soils and drought. *Notes: The tree can have problems with rust, and thorns can be a problem in some situations. Avoid fall planting. Plant in full sun.*

Other Hawthorn Cultivars: Thornless Cockspur Hawthorn; Washington Hawthorn

Magnolia 'Galaxy'- Galaxy Magnolia

This slow growing tree reaches 20 to 30' in height with a smaller spread. Provides pink flowers May to June. Leaves are dark green in summer changing to yellow to bronze in fall. *Notes: Prefers full sun and acidic soils. Little insect or disease problems. Susceptible to verticillium wilt. Avoid fall planting. Plant single trunk only.*

Magnolia virginiana- Sweetbay Magnolia

This semi-evergreen to deciduous tree reaches 10 to 20' in height with a similar spread. It offers attractive white, lemon scented flowers May to June and is often multi-stemmed with a spreading form. An attractive, graceful tree. *Notes: Intolerant of limestone/alkaline soils and requires acid soil.*

Cultivars of Sweetbat Magnolia: 'Henry Hick'- (may remain evergreen in northern climates); 'Moon Glow'- (may remain evergreen in northern climates)

Malus- Crabapple

There are many cultivars of this tree available that are fast growing 10 to 30' in height with somewhat smaller spread. Depending on cultivar, they provide white, pink, or red flowers and red, orange, or yellow fruit. Although adaptable to many soil types and conditions, they prefer acidic soils. A tough urban tree. *Notes: Root suckers may need to be removed. Some cultivars are*

highly susceptible to apple scab, fireblight, and cedar-apple rust. Fruit can cause litter problem. Plant in full sun.

> ***Cultivars of Crabapple*:** 'Prairiefire' (resistant to disease, pink flowers); 'Sugar Tyme' (disease resistant, white flowers, good street tree)

Prunus 'Okame'- Okame Cherry

This medium growing tree reaches 20 to 30' in height with a similar spread. It offers pink flowers in early May. Leaves are green in summer changing to reddish purple in fall. More upright growth form than other cherries**.** *Notes: Avoid fall planting.*

Prunus virginiana 'Shubert'- Common Chokecherry or Canada Red Cherry

This fast growing upright tree reaches 20 to 30' in height with a somewhat smaller spread. It provides white flowers April to May. Leaves are green in summer changing to reddish purple in fall. *Notes: Avoid fall planting.*

Syringa reticulate 'Ivory Snow'- Japanese Tree Lilac

The tree grows 20 to 30 feet in height and 20 to 25 feet in spread. It can be considered either a small tree. It offers white, lilac type flowers in early to mid-June which can look untidy after they have died. The tree is adaptable to soils and pH, but prefers slightly acidic, moist, and well drained soils. The most trouble free lilac. An excellent small tree and a good choice for extremely small planting areas. *Notes: Plant in full sun for best flowering.*

<u>Conifers for Parks and Other Very Large Planting Areas</u>

Conifers can provide larger stormwater management values than deciduous trees. They are appropriate for very large planters or park landscapes.

Picea abies- Norway Spruce

This medium to fast growing spruce reaches 40 to 60' in height with a smaller spread. It offers a pyramidal form with graceful hanging branches. Prefers moist, sandy, acidic, and well drained soils, but can be provided in other fertile soils if moisture is adequate. *Notes: Young trees may require irrigation. Does not perform well in heavy shade.*

Picea pungens- Colorado Blue and Green Spruce

This slow to medium growing tree reaches 30 to 60' in height with a smaller spread. The tree offers a narrow to broadly pyramidal form with stiff branches. It is often planted for its leaf color which is from gray-green to blue-green. Prefers rich, moist soils in full sun. *Notes: Overused and most likely will be infected by Cytospora canker. Plant in limited, dispersed numbers.*

Pinus bungeana- Lacebark Pine

This slow growing pine reaches 30 to 50' with a smaller spread. The tree offers a broad spreading form and very attractive bark. It prefers sun and well drained soils. Tolerant of limestone soils. One of the most beautiful of ornamental pines.

Pinus flexilis- Limber Pine

This slow growing pine reaches 30 to 50' feet in height with a smaller spread. It has a pyramidal form when young, changing to broad and flat-topped when mature. The tree has demonstrated

good adaptability to different sites, but prefers most, drained soils and full or partial sun. An attractive ornamental tree.

Pinus ridgida- Pitch Pine

This medium to slow growing pine reaches 40 to 60’ in height with a somewhat smaller spread. Young trees offer a pyramidal form growing into an irregular, gnarled crown when mature. Tolerant of poor soils and able to survive the driest, sandiest, and most unproductive sites. Tolerant of salt and salt spray.

Pinus taeda- Loblolly Pine

This fast growing pine reaches 40 to 50’ in height with a somewhat smaller spread. Young trees a pyramidal form growing into an oval-rounded crown when mature. Easy to transplant and very adaptable to a wide variety of soils, but prefers acidic soil.

Pinus virginiana- Virginia or Scrub Pine

This slow growing pine reaches 15 to 40’ in height with a somewhat smaller spread. Young trees offer an open pyramid form growing into a straggling and scrubby form. Performs will in poor dry soils where other pines will not grow.

TREES REQUIRING PERMISSION OF PUBLIC WORKS DIRECTOR

Because of severe problems with certain soil types, insects and diseases, and tree structures, the following trees can only be planted with the permission of the Public Works Director.

Large Landscape Areas (Trees Over 45’ In Height)

Acre saccharinum- Silver Maple

This fast growing tree has an upright growth form reaching 50 to 70’ in height with a somewhat smaller spread. Fall color is limited to a green-yellow combination. Tolerant of a wide range of soil conditions, it is one of the easiest trees to transplant. A large growing tree with massive spreading branches that some people consider very beautiful. Shallow root system. *Notes: Because of the large size and problems with decay and branching habit in older trees, only plant in riparian areas or other large open spaces. Susceptible to verticillium wilt.*

Acer saccharum- Sugar Maple

This slow growing tree has a somewhat upright growth form reaching 60 to 75' in height with a smaller spread. It offers beautiful brilliant yellow, burnt orange and red fall color. Somewhat adaptable to pH, but prefer slightly acidic soils. Beautiful large trees in fall color. *Notes: Poor street and parking lot trees, do not plant where heat, drought, soil compaction, or salt is common. Susceptible to verticillium wilt.*

> ***Cultivars of Sugar Maple***: ‘Bonfire’- (broader crown); ‘Green Mountain’- (more upright growth habit); ‘Legacy’- (faster growing)

Liquidambar styracflua- sweetgum

This medium to fast growing tree with an upright form reaches 60 to 75’ in height with a somewhat smaller spread. They have beautiful green leaves in summer changing to yellow-purple-red in fall. Excellent fall color. *Notes: Intolerant of limestone/alkaline soils and requires acid soil. Fruit may cause liter problem. Avoid fall planting. Plant in full sun.*

***Cultivars of Sweetgum*:** 'Rotundiloba'- (more upright growth form, fruitless, plant in full sun)

Quercus rubra- Northern Red Oak

This fast growing tree reaches 60 to 70' in height with an equal spread. A russet-red fall color is often not outstanding. It has excellent limb structure and strength. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Relatively free of insect and disease problems, but bacteria leaf scorch and oak wilt are concerns.*

Sophora japonica- Japanese Pagoda or Scholar Tree

This medium to fast growing tree reaches a height of 50 to 75' with the same spread. The tree offers beautiful white flowers July to August. Leaves are deep green in summer with little fall color. Tolerant of a wide variety of soils and relatively disease and insect free. *Notes: Flowers and fruit can be messy and slippery on steeper sidewalks and other slopes. Plant in full sun.*

Ulmus Americana- American Elm

This medium to fast growing tree reaches 60 to 80' in height with a somewhat smaller spread. Leaves are lustrous green in summer changing to yellow in fall. The tree is famous for a classic multiple trunk and vase shape growth form, interesting bark, and a massive and interesting winter form. It transplants easily in a variety of soils, is pH adaptive, and drought resistant. *Notes: Because of poor limb attachment, large limbs can be lost on mature trees during severe weather. Over the past 25 years, researchers have been involved in selecting and breeding American elms for tolerance to Dutch Elm Disease (DED), and more recently elm yellows. Two cultivars, 'Valley Forge' and 'New Harmony' have exhibited good tolerance to DED, but are most likely susceptible to elm yellows. A number of cultivars from the Morton Arboretum, 'Accolade', 'Triumph', 'Danada Charm', and 'Commendation' are resistant to DED and <u>may</u> be resistant to elm yellows; although no documentation of this has been made. These trees should be planted selectively in very small numbers with permission of the Public Works Director until resistance to elm yellows is proven.*

<u>Medium Landscape Areas (Trees 30 to 45' in Height)</u>

Acer saccharum 'Goldspire'- Goldspire Sugar Maple

This slow growing tree has an upright growth form reaching 40 to 50' in height with a smaller spread. It offers beautiful brilliant yellow, burnt-orange, and red fall color. Somewhat adaptable to pH, but prefer slightly acidic soils. A beautiful tree in fall color. *Notes: A poor street and parking lot tree, it absolutely cannot be planted where heat, drought, soil compaction, or salt is common. Susceptible to verticillium wilt.*

Acer saccharum 'Reba'- Belle Tower Sugar Maple

This slow growing tree has an upright growth form reaching 40 to 45' in height with a much smaller spread (18'). It has one of the most upright forms of all sugar maples. It offers beautiful brilliant yellow, burnt-orange, and red fall color. Somewhat adaptable to pH, but prefer slightly acidic soils. A beautiful tree in fall color. *Notes: A poor street and parking lot tree, it absolutely cannot be planted where heat, drought, soil compaction, or salt is common. Susceptible to verticillium wilt.*

Prunus serrulata- 'Kwanzan'- Japanese Flowering Cherry

This medium growing tree reaches 30 to 40’ in height with a somewhat smaller spread. It offers showy white to pink flowers April to May famous in Washington, D.C. It is one of the hardiest cherries, but still sensitive to pollution and several insects. Although relatively short lived, it provides great character and beauty. *Notes: Avoid fall planting. Plant in full sun.*

Sassafras albidum- Common Sassafras

This medium to fast growing tree reaches 30 to 60’ in height with a smaller spread. The tree offers attractive pink flowers April to May. Leaves are dark green in summer changing to deep orange to scarlet and purple in fall. One of the best native trees for fall color. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Can be difficult to locate.*

Small Landscape Areas (Trees Under 30’ in Height)

Cercis canadensis- Eastern redbud

This medium growing tree reaches 20 to 30’ in height and spread, often with multiple trunks. It offers perfect reddish-pink flowers which open in March to April. Fall color is usually a poor yellow-green, but can be an excellent yellow. It does well in many soils and light shade, but prefers moister soils. It is a beautiful, tough, and favorite native plant. *Notes: Relatively short lived. Performs best in partial shade.*

> ***Cultivars of Eastern Redwood***: ‘Alba’- white flowering redbud (white flowers); ‘Forest Pansy’- (leaves are reddish purple)

Cornus kousa- Kousa Dogwood

The medium growing tree reaches 20 to 30’ in height with the same spread. It flowers with creamy-white pointed bracts in early summer and has reddish purple to scarlet fall color. Not a good tree for tough planting sites, it prefers rich, acidic, and well drained soils. The tree offers beautiful flowers and foliage. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Avoid planting in fall. Performs best in partial shade.*

> ***Cultivars of Kousa Dogwood*****:** ‘Rutcan’ (flowers before Kousa)

Cornus mas- Cornelian Cherry Dogwood

Similar to kousa dogwood, the medium growing tree reaches 20 to 30’ in height with the same spread. One of first trees to bloom in spring with small yellow flowers and a reddish purple to scarlet fall color. Not a good tree for tough planting sites, it prefers rich, acidic, and well drained soils. The tree offers beautiful flowers and foliage. *Notes: Performs poorly on limestone/alkaline soils and requires acid soil. Avoid planting in fall. Performs best in partial shade.*

Mognolia stellata- Star Magnolia

This slow growing tree reaches 15 to 20’ in height with a somewhat smaller spread. Provides white flowers May to June. Leaves are dark green in summer changing to yellow to bronze in fall. Little insect or disease problems. *Notes: May not do well in full sun or exposed sites, plant in partial sun. Susceptible to verticillium wilt. Avoid fall planting.*

TREE RECOMMENDATIONS BASED ON SPECIFIC CHARACTERISTICS

Trees for Full or Partial Shade

Most, if not all, large growing ornamental hardwoods prefer full sun. This limits tree selection to a few medium and small trees and conifers such as hemlock.

- Acer truncatum x A. Platanoides 'Warrenrod'- pacific sunset maple (partial shade)
- Carpinus caroliniana- American hornbeam (full shade)
- Cornus kousa- kousa dogwood (partial shade)
- Cercis canadensis- Eastern redbud (partial shade)
- Eucommia ulmoides- hardy rubber tree (partial shade)

Trees for Sidewalk and Patio Plantings

Planter cutouts must be a 5 by 5' minimum. Larger trees can be considered if structural or other engineered soils are being used.

- xfreemania (hybrid maples)- A. xfreemani 'Autumn Blaze', A. xfreemani 'Celebration', and A. xfreeman 'Scarlet Sentinel'
- Eucommia ulmoides (hardy rubber tree)
- Gingko bilboa (gingko)- 'Autumn Gold', 'Princeton Sentry' and 'Lakeview'
- Gleditsia triacanthos (thornless common Honeylocust)- 'Imperial' and 'Skyline'
- Platanus X acerfolia (London plane tree)- 'Bloodgood'

Trees to Plant under Utility Lines

To avoid severe pruning only small trees should be planted under utility lines.

- Acer buergeranum- trident maple
- Acer griseum- paperbark maple
- Acer tataricum – tatarium maple
- Carpinus caroliniana- American hornbeam or muscle wood
- Cercis canadensis- Eastern redbud
- Crataegus punctata 'Ohio Pioneer'- Ohio pioneer hawthorn
- Crataegus viridis "Winter King'- winter green hawthorn
- Magnolia "Galaxy'- galaxy magnolia
- Mognolia stellata- star magnolia
- Malus- crabapple
- Prunus 'Okame'- okame cherry
- Prunus virginiana 'Shubert'- common chokecherry or Canada red cherry

- Syringa reticulate ‘Ivory Silk’- Japanese tree lilac

PROHIBITED TREES, SHRUBS AND OTHER PLANTS

Trees Not to Be Planted (See below for more Invasive Trees and Shrubs that should not be planted)

Because of severe problems with certain soil types, insects and diseases, and invasiveness, the following trees shall not be planted.

- Acer ginnala - amur maple (extremely invasive)
- Acer platanoides- Norway maple (extremely invasive)
- Corylus colurna- Turkish filbert (unresolved disease problems)
- Fraxinus- ash (emerald ash borer)
- Pinus strobus- white pine (storm damage, intolerant of salt)
- Pyrus calleryana- ornamental pear (extremely invasive, poor branch structure)
- Quercus palutris- pin oak (intolerant limestone soils, bacteria leaf scorch and oak wilt)
- Tilia cordata- littleleaf linden (aphids, sooty mold, bees)
- Tsuga canadensis- hemlock (wolly adelgid)

Invasive Trees and Shrubs from PA Department of Conservation and Natural Resources

DCNR defines invasive plants as those species that are not native to the state, grow aggressively, spread and displace native vegetation. Invasive plants are generally undesirable because they are difficult and costly to control and can dominate whole habitats, making them environmentally destructive.

Not all non-native plants become invasive. In fact, it is a very small fraction that do. The plants listed here have been found to act aggressively in parts of Pennsylvania or throughout the whole state, negatively impacting ecosystems.

New species cross state borders and some plants that have been here for decades may suddenly become invasive due to changing land uses, changes in weather or climate, or genetic reasons, so this list may change over time and will be updated periodically. This list is not regulatory; it is merely a suggestion that these plants can become invasive under the right environmental conditions and it will be used to guide the management efforts of DCNR staff. However, the plants on the following lists are prohibited in the City of Lancaster.

To learn more about invasive plants in Pennsylvania and how they can be controlled, visit www.dcnr.state.pa.us/forestry/plants/invasiveplants/index.htm.

TREES		
COMMON NAME	SCIENTIFIC NAME	OTHER COMMON NAMES
Amur corktree*	Phellodendron amurense	
Amur maple*	Acer ginnala	

Bee-bee tree*	Tetradium daniellii	Korean Evodia
Callery pear	Pyrus calleryana	Bradford pear
Empress tree	Paulownia tomentosa	Princess tree, royal paulownia
European black alder	Alnus glutinosa	Common alder
Japanese angelica tree	Aralia elata	
Japanese corktree*	Phellodendron japonicum	
Lavella corktree*	Phellodendron lavallei	Lavelle's cork tree
Mimosa	Albizia julibrissin	Persian silk tree, silktree, silky acacia
Norway maple	Acer platanoides	
Paper mulberry*	Broussonetia papyfera	
Siberian elm	Ulmus pumila	
Sycamore maple	Acer pseudoplatanus	Mock plane
Tree-of-heaven	Ailanthus altissima	Chinese or stinking sumac, tree of hell
White mulberry*	Morus alba	Common or Chinese or Russian white mulberry
SHRUBS		
COMMON NAME	SCIENTIFIC NAME	OTHER COMMON NAMES
Amur honeysuckle	Lonicera mackii	
Autumn olive	Elaeagnus umbellata	
Bell's honeysuckle	Lonicera morrowii x bella	Bella or showy bush or pretty honeysuckle
Border privet	Ligustrum obtusifolium	Blunt-leaved or obtuse-leaved or regal privet
Butterfly bush*	Buddleja davidii	Orange-eye butterfly bush
Chinese bushclover	Lespedeza cuneata	Chinese Lespedeza, sericea lespedeza
Chinese privet	Ligustrum sinense	
Common buckthorn	Rhamnus cathartica	Purging buckthorn
Common privet	Ligustrum vulgare	European privet, wild privet
Doublefile viburnum*	Viburnum plicatum	Japanese snowball bush
European barberry	Berberis vulgaris	Common barberry
Glossy buckthorn	Frangula alnus	
Guelder rose	Viburnum opulus	Cranberrybush viburnum, red elder, cramp bark
Japanese barberry	Berberis thunbergii	Red barberry, Thunberg's barberry
Japanese privet	Ligustrum japonicum	Waxleaf ligustrum, wax privet
Japanese spiraea	Spiraea japonica	Japanese meadowsweet, nippon spiraea
Jetbead	Rhodotypos scandens	Black jetbead
Linden viburnum*	Viburnum dilatatum	Linden arrowwood

Morrow's honeysuckle	Lonicera morrowii	
Multiflora rose	Rosa multiflora	Rambler or Japanese or baby or seven-sisters rose
Russian olive	Elaeagnus angustifolia	Oleaster, wild olive
Shrubby bushclover	Lespedeza bicolor	Shrubby lespedeza
Siebold viburnum*	Viburnum sieboldii	Siebold's arrowwood
Standish honeysuckle	Lonicera standishii	
Tartarian honeysuckle	Lonicera tatarica	
Wineberry	Rubus phoenicolasius	Wine raspberry, Japanese wineberry
Winged Euonymus	Eunoymus alata	Burning bush, winged burning bush, winged wahoo

* These species are on DCNR's "Watch List".