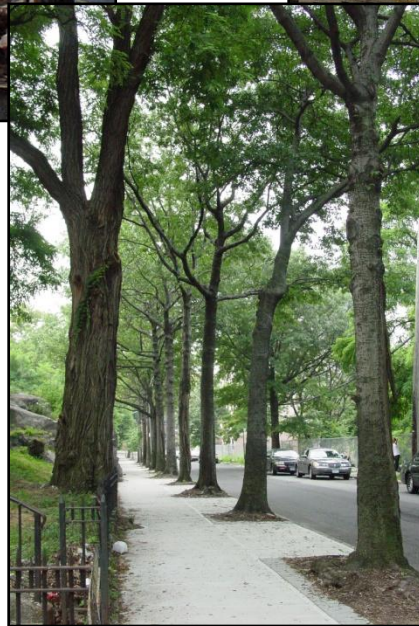




Tree Planting Standards



City of New York Parks & Recreation

Michael R. Bloomberg, Mayor
Adrian Benepe, Commissioner

April 2008

TABLE OF CONTENTS

1. Design	2
A. Spacing Requirements	2
B. Tree Pit Configuration.....	3
C. Group Plantings.....	3
D. Species Selection.....	3
E. CU Structural Soil.....	4
2. Plant Pest Control Requirements	8
A. Asian Longhorned Beetle	8
3. Materials	8
A. Plants	9
B. Backfill.....	9
C. Mulch	10
D. Water.....	10
E. Mycorrhizal Inoculant.....	11
F. Water Retention Additive	11
4. Planting Specifications	11
A. Planting Seasons	12
B. Tree Pit Size.....	12
C. Installation	13
D. Tree Wrap	13
E. Staking	13
F. Pruning.....	14
G. Watering.....	14
H. Mulching.....	15
5. Seasonal Maintenance	15
A. Watering.....	15
B. Other Maintenance Activities	15
6. Guarantee Period	16
A. Tree Replacement.....	16
B. Vandalism	16
7. Finishing	16
A. Paving Blocks.....	17
B. Tree Pit Guards	18
8. Attachments	19
A. Tree Planting and Paving Detail.....	19
B. Planting Pit Configurations.....	20
C. Approved Street Tree Species List.....	21

TREE PLANTING GUIDELINES

Street trees are important to our quality of life in the city. They are living elements of our street infrastructure. Located in the public right-of-way, they provide cooling shade, cleaner air, and more beautiful urban streetscapes. ‘Trees confer important esthetic and ecological benefits to City residents as well. Yet plants in the urban landscape face a variety of environmental and physical stresses, including pedestrian and vehicular traffic, soil compaction, air pollution, and drought. Some of the key factors to maximize long-term plant survival are proper handling, careful planting, and immediate and continued aftercare.

All approved tree planting permit applicants must follow these guidelines. Any tree work improperly performed or otherwise not in accordance with these specifications will be subject to restitution and penalty at the direction of Parks & Recreation and at the expense of the property owner.

1. Design

A. SPACING REQUIREMENTS

The following guidelines shall be observed when citing tree pits along sidewalks. These guidelines generally follow regulations of other agencies with street jurisdictions such as Fire, DOT, and MTA. These requirements are design and species dependent. The Americans with Disabilities Act (ADA) guidelines must be followed.

- a. Do not plant in front of building entrances in order to permit easy access by the Fire Department.
- b. Minimum distance between trees (center to center) ranges from 20' to 30', depending upon the tree species and other local conditions.
- c. Minimum distance from a streetlight is 25' (varies with tree species).
- d. Minimum distance from a stop sign is 30'.
- e. Minimum distance from other traffic signs is 6'.
- f. Suggested distance from a parking meter is no more than 5' behind the meter, to allow for the swing of car doors.
- g. Minimum distance from a gas or water valve is 2' from the edge of the pit.
- h. Minimum distance from an oil fill pipe is 4' from the edge of the pit.
- i. Minimum distance from a coal chute is 6'.
- j. Minimum distance from a fire hydrant is 5' from the edge of the pit.
- k. Minimum distance from a curb cut or driveway is 7'.
- l. Minimum distance from the middle of a street intersection is 40'.

- m.* Minimum distance from the edge of the pit to any opposite obstruction (building wall, stoop, railing, etc) is from 4' to 6', depending upon local conditions and the amount of sidewalk traffic.
- n.* All tree pits must be contiguous to the street curb (except as noted below, or with the permission of the Agency representative).
- o.* Trees may be planted on either side of sidewalks (if any exist) in lawn areas where there is sufficient room between the property line and the street curb.
- p.* Do not plant within bus stops.

The locations of all trees shown on plans may be relocated as required by site and as directed by the Agency representative.

B. TREE PIT CONFIGURATION

Tree pits should be as large as possible to allow for ample growing space for tree roots and crown. Optimal tree pit size would be 4 feet by 10 feet or 5 feet by 10 feet. The overall width of a sidewalk can limit the size of a tree pit. Please refer to the Sample Tree Pit Configuration Sheet on page 23 for a range of possible tree pit sizes.

Parks encourages continuous tree pits whenever possible, and designs that call for continuous pits may be given more flexible spacing requirements by the Agency representative. Tree pits shall be continuous wherever group plantings are involved (see below)

C. GROUPED PLANTINGS

Grouped plantings are encouraged due to the benefits of trees in close proximity. These benefits include increased shading, less evapotranspiration, less soil compaction, greater shared soil volume, and less reflective heat absorbed by a single tree. A grouped planting can be achieved in several types of sites: (1) a greenstreet, such as a median or traffic triangle, with opportunity for a large planting bed; (2) a continuous tree pit, where two or more trees are planted in a single trench in the sidewalk (at least 30 feet long); or (3) a raised planting bed as within a plaza or alongside a pedestrian passageway.

Species selection is very important in grouped plantings. Tolerant species are strongly recommended and monoculture plantings are discouraged. Low maintenance cost and low replacement costs are two advantages of planting tolerant species in grouped configurations.

D. SPECIES SELECTION

Growing conditions and microclimates can vary from location to location within a borough and across the City. Final tree variety selection is determined by site conditions

and design goals, and a New York City Parks and Recreation Representative. In choosing a tree, the mature height and spread shall be considered to ensure that it will not interfere with existing or proposed structures and overhead utilities. Parks will not allow large and medium trees to be planted under overhead wires. The species characteristics shall be considered to ensure that they will not cause interference with walls, walks, drives, and other paved surfaces, or affect water and sewer lines or underground drainage systems.

See the attached list of approved street trees for New York City for information on each species shape, growth rate, visual interest, environmental tolerances and sensitivities (including Asian Longhorned beetle hosts), and special needs.

E. CU STRUCTURAL SOIL

Trees are not to be planted directly in CU Structural Soil. CU Structural Soil is to only be used as a base material under impermeable surfaces. Exposed or permeable surfaces should be excavated and replaced with fresh topsoil meeting tree planting specifications.

a. Materials.

Structural Soil Foundation Material. Shall conform with “CU Soil”, as patented by Cornell University, patent #5,849,069. The product shall be obtained from a licensed producer and proof of such licensing shall be submitted to the Engineer prior to delivery. Tri-State licensed providers as of this date are East Coast Mines, Quogue, NY, Tully Environmental Co. d/b/a Evergreen Recycling of Corona, NY or Ascape Landscape, New City, NY. For further information on licensed providers or licensing requirements and application, contact Fernando Erazo at Amereq, Inc., New City, NY (patentholder rights granted to Amereq, Inc. by Cornell Research Foundation.) Structural Soil components shall be mixed by the licensed producer to the following proportions:

Component	Unit	of	Weight	(Dry)
Crushed Stone	83%			
Clay Loam	17%			
Hydrogel	1 ounce	per	200 pounds	of stone

Crushed Stone: Shall be crushed granite or traprock or washed limestone, no sandstone shall be accepted. No recycled material shall be accepted. Stone shall meet the AASHTO/ ASTM C33 requirements for #4 crushed angular stone graded within the following limits:

Passing Sieve (dry analysis)	Percent by Weight
2 inch	100%
1 1/2 inch	90-100%
1 inch	20-55%

3/4 inch	0-15%
3/8 inch	0-5%

Stone shall be clean and certified to meet NYCDOT aggregate soundness requirements for use in road construction. A single sized crushed stone near one-inch (1") will be preferable to a wider size distribution or smaller single size stone fitting the general description.

Clay Loam: Shall be as determined by the USDA Classification System and mechanical analysis, as per ASTM D-422. Clay loam shall be of uniform composition, without admixture of subsoil, and free of stones greater than one-half inch (1/2") diameter, leaves, roots, debris, toxic materials, or lumps or clods over one inch (1") diameter. It shall have been obtained from naturally well drained areas which have never been previously stripped for topsoil and shall have a history of supporting satisfactory vegetative growth. It shall contain not less than two percent (2%) nor more than five percent (5%) organic matter, as determined by loss on ignition of oven-dried samples, dried to a constant weight at a temperature of 230° F, plus or minus 9° F. Mechanical analysis for clay loam shall be as follows:

Textural Class	Percent of Total Weight (Dry)		
Gravel	Less	than	5%
Sand	25	-	30%
Silt	20	-	40%
Clay	25 - 40%		

Clay loam shall meet or be amended to meet the following chemical analysis criteria: (1) pH between 5.5 and 6.5; (2) organic matter 2 - 5 percent by dry weight; (3) nutrient levels as required by the testing laboratory recommendations for the types of plants to be grown in the structural soil; (4) toxic elements and compounds below the US EPA Standards for Exceptional Quality Sludge, or local standards, whichever are more stringent; (5) soluble salts less than 1.0 ml per cm; (6) cation exchange capacity (CEC) greater than 10; (7) Carbon/ Nitrogen ratio less than 33:1.

Clay loam shall be the product of a commercial processing facility specializing in production of stripped natural topsoil. No clay loam shall come from USDA classified prime farmland.

Slow Release Fertilizer: Commercial fertilizer shall comply with U.S. and N.Y State fertilizer laws. Fertilizer shall be delivered in original unopened containers. The fertilizer shall be 15-2-15 liquid slow release (50%), or approved equal, formulated for mixing into the soil and certified by the manufacturer to provide controlled release of nitrogen continuously for a period of no more than twelve

(12) months. Fertilizer shall be delivered in original unopened containers, which shall bear the manufacturer's certificate of compliance covering analysis, and shall be furnished to the Engineer.

pH Adjustment: To lower the clay loam pH to acceptable levels, commercial granular ferrous sulfate, ninety six percent (96%) pure sulfur may be added to lower soil pH above 6.5. To raise pH levels, the manufacturer may add agricultural limestone containing a minimum of eighty five percent (85%) carbonates. Minimum gradation: 100% passing 10 mesh sieve, 98% passing 20 mesh sieve, 55% passing 60 mesh sieve, and 40% passing 100 mesh sieve.

Hydrogel: Shall be Gelscape®, a potassium propenoate-propenamide copolymer hydrogel, as manufactured by Amereq, Inc., New City, N.Y., or approved tested equal. No substitution is recommended, since small changes in the hydrogel structure greatly change the quality of the structural soil.

d. Soil mixing and quality control testing.

All Structural Soil shall be mixed using appropriate soil measuring, mixing, and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. Structural soil must be mixed in the presence of the licensee, and no soil shall be placed until inspected by the licensee. No mixing of Structural Soil at the project site shall be permitted unless a large paved area is available for mixing and the site has been pre-approved for use by the Engineer. No Structural Soil shall be mixed or placed in air temperatures below 40° F or delivered or placed in frozen, wet, or muddy conditions. Material shall be delivered at or near optimal compaction moisture content, as determined by AASHTO T 99 (ASTM D 698). No material shall be delivered or placed in an excessively moist condition, beyond two percent (2%) above optimal compaction moisture content, as determined by AASHTO T 99 (ASTM D 698). Warning: Do not mix or transport structural soil when rain is expected. Place pavement immediately after placing and compacting structural soil to prevent excessive hydration.

Structural Soil components and the finished mixture shall be protected from excess water absorption and erosion at all times. Do not store materials unprotected from rainfall, nor allow excess water to enter the site prior to compaction. If water is introduced into the material after grading, allow material to drain to near optimal compaction moisture content.

The mixing procedure, performed by a front end loader shall proceed as follows: On a flat asphalt or concrete paved surface, spread an eight inch to twelve inch (8-12") layer of the specified crushed stone. Spread evenly over the crushed stone a proportional amount of dry Hydrogel. Spread over the dry Hydrogel and crushed

stone a proportional amount of clay loam. Blend the entire amount by using a front-end loader or other suitable equipment until a consistent blend is achieved.

Add moisture gradually and evenly during the blending and mixing operation as required to produce the required moisture content. Add soil amendments to alter soil fertility, including fertilizer and pH adjustment at the rates recommended by soil test results. The soil pH shall be adjusted to fall between 5.5 and 6.5 two months after mixing, if the material is stored. The soil component Carbon/Nitrogen ratio shall be adjusted to be less than 1:33 within two months after mixing.

Mix sufficient quantity in advance of the time the material is needed at the job site to allow adequate time for the required quality control testing. Storage piles shall be protected from rain and erosion by covering with plastic sheeting.

e. Installation:

Locate and confirm the locations of all underground utility lines and structures prior to starting any excavation in the area to receive Structural Soil by calling New York City/Long Island Call One Center, (800) 272-4480. You will be liable to repair any damage to underground utilities or structures caused by their activity during the progress of this work, at their own expense. Where tree roots larger than one inch (1") diameter are encountered, hand excavate around such roots and ensure that damaged root sections are cleanly cut with sterilized pruning equipment.

Structural Soil shall only be installed after the installation of all walls, curbs, footings, and utility work in the area has been completed. For site elements dependent on the Structural Soil for foundation support, postpone installation until immediately after the installation of the Structural Soil. You shall be responsible for any and all damage caused by the installation of structural soil and all disturbed areas shall be restored to their original condition, to the satisfaction of the Engineer.

Site Preparation: The excavated area shall be compacted to the proposed subgrade to the required depths and dimensions indicated on the drawings or as directed in the field. Do not over excavate compacted subgrades of adjacent pavement or structures. Confirm that the subgrade is at the proper elevation and compacted as required. The excavation shall be cleared of all construction debris, trash, rubble, and foreign material.

Install the first six inch (6") lift of Structural Soil mix over the prepared subgrade. Install succeeding layers in six inch (6") lifts and compact each lift. Compact all materials to not less than ninety five percent (95%) of peak dry density from a

standard AASHTO compaction curve (AASHTO T 99). No compaction shall occur when moisture content exceeds the maximum listed herein. Delay compaction at least twenty four (24) hours if moisture content exceeds the maximum allowable, and protect the Structural Soil during delays in compaction with plastic or plywood, as directed by the Engineer.

Prior to placing pavement, the licensed CU Soil provider and the Engineer shall check the CU Soil material for consistency with the color and Any mix which varies significantly from the approved testing results, as determined by the Engineer, shall be removed and new Structural Soil installed that meets the specifications.

License: You are required to use a licensed CU Structural Soil manufacturer.

2. Plant Pest Control Requirements

You are reminded to comply with Federal and State Department of Agriculture regulations for plant pest control. In general, State Department of Agriculture regulations requires contractors operating in infested areas to thoroughly clean all equipment units before moving them to non-infested areas. Full information can be obtained from Federal and State Pest Control personnel.

A. ASIAN LONGHORNED BEETLE

Quarantine zones for the Asian Longhorned Beetle currently cover large areas of Brooklyn, Manhattan, Queens, and part of Staten Island. You must read and understand the nature and area of the quarantine as presented in Rule Making Activities, New York State, Department of Agriculture & Markets, Emergency Rule Making (Asian Longhorned Beetle; I.D. No. AAM - 53 96 00016 - E). You shall become familiar with restrictions and regulations established by all authorities having jurisdiction.

Anyone working within the Quarantine Zone must have certification from the New York State Department of Agriculture and Markets to do so.

Tree species listed as hosts for the Asian Longhorned Beetle are generally prohibited from planting within all of Brooklyn, Manhattan, Queens, and parts of Staten Island. Exceptions will be made on a case-by-case basis with the approval of the Parks Forester.

3. Materials

A. PLANTS

- a. Digging.* All trees shall be dug immediately before moving unless otherwise specified. All trees shall be dug to retain as many fibrous roots as possible. Balled and burlapped trees shall have a solid ball of earth of the minimum specified size (28”), securely held in place by untreated burlap and stout rope (nylon rope is NOT acceptable). Oversize or exceptionally heavy trees are acceptable if the size of the ball or spread of roots is proportionally increased. Loose, broken, or manufactured balls are unacceptable.
- b. Form and structure.* All trees shall be typical of their species or cultivar. They shall have normal, well developed branches and a fibrous root system. They shall be sound, healthy, vigorous trees, free from defects, disfiguring knots, sunscald, injuries, abrasions of the bark, plant diseases, insect eggs, borers and all forms of infestations. All trees shall have a single, straight trunk, with leader intact and be branched at least six feet from the ground. All trees shall be limbed up to a minimum of 5 feet.
- c. Provenance and tree size.* All trees shall be nursery grown in a USDA hardiness zone of 7B or lower (material collected from the wild is unacceptable), except with permission from Central Forestry. Tree size shall be at least 2.5 inches measured at six inches from the ground and no larger than 3.5 inches in caliper unless otherwise authorized by Parks & Recreation.
- d. Plant names.* Plant names shall agree with the nomenclature of “Standardized Plant Names” as adopted by the American Joint Committee on Horticultural Nomenclature 1942 edition. Size and grading standards shall conform to those of the American Association of Nurserymen American Standards for Nursery Stock, 1996 Edition, unless otherwise specified. All tree cultivars, patented or otherwise must be certified by the supplying nursery. All nurseries shall be required to have a registration certificate from the Department of Agriculture & Markets, Division of Plant Industry, New York State certifying that plant material is apparently free from injurious insect and plant diseases. A similar certificate shall be required from other states where plant material is obtained.
- e. Species selection.* Species shall be selected from the list of approved Street Trees for New York City. Guidelines on this chart must be followed, as well as any conditions described on the permit. Restrictions may include species recommended for specific planting seasons and locations. Ultimately, it is Parks decision what species of tree will be planted. Take special note of species prohibited from planting in Brooklyn, Manhattan, Queens, and parts of Staten Island due to the Asian Longhorned Beetle.

B. BACKFILL

Material shall consist of natural loam topsoil with the addition of humus only, and no other soil type, such as a sand or clay soil type, shall be accepted. Topsoil must be free from subsoil, obtained from an area which has never been stripped. It shall be removed to a depth of one (1) foot, or less if subsoil is encountered. Topsoil shall be of uniform quality, free from hard clods, stiff clay, hardpan, sods, partially disintegrated stone, lime, cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, sticks or any other

undesirable material. If a truckload of topsoil is considered by the Agency to contain too much undesirable material to be corrected on the site, the entire truck load shall be rejected. No topsoil shall be delivered in a frozen or muddy condition. Topsoil shall comply with the following requirements:

- a. *Organic Matter.* Must be between eight (8) and twelve (12) percent by weight, as determined by the Dry Combustion Method for Total Carbon and Organic Carbon (using a multiplying factor of 2) as described in Methods of Soil Analysis, #9, Part 2, 2nd ed. published by the American Society of Agronomy. The organic content shall not exceed fourteen percent (14%).
- b. pH range. Shall be 6.0 to 7.0 inclusive.
- c. *Sieve Analysis* (by Wash Test, ASTM Designation C-117). Passing 2" sieve (100%); Passing 1" sieve (95% to 100%); Passing #4 sieve (90% to 100%); Passing #100 sieve (30% to 60%).
- d. *Clay.* The test method to measure the clay content of the soil shall be ASTM D 422.

The Engineer reserves the right to reject topsoil in which more than 60% of the material passing the No. 100 U.S.S. Mesh sieve consists of clay as determined by the Buoyocous Hydrometer or by the decantation method. All percentages are to be based on dry weight of sample. When the topsoil otherwise complies with the requirements of the specification but show a deficiency of not more than one (1) percent in organic matter, it may be incorporated when and as permitted by the Engineer. Electrical Conductivity shall be less than 1500 mhos/cm. A higher level would indicate excessive salt content. The testing method must be the saturated paste method.

At final inspection if soil does not appear to meet specifications you will not receive a final sign-off of your permit. If directed, topsoil which varies only slightly from the specifications may be made acceptable by such corrections as the Inspector deems necessary.

C. MULCH

Shredded bark mulch shall be a natural forest product of 98% bark containing less than 2% wood or other debris. It shall be of White or Red Fir and/or Pine bark of a uniform grade with no additives or any other treatment. Size of bark shall be from 5/8" to 1-1/4".The pH factor should range from 5.8 to 6.2. Shredded bark may also be used.

D. WATER

If conditions do not allow the use of New York City water sources, you must obtain your own source of water.

E. MYCORRHIZAL INOCULANT

The mycorrhizal inoculant shall be a granular product containing both Endo and Ectomycorrhizal fungi to colonize the roots of trees and shrubs when applied to the root zones of plants at planting time such as Mycor™ Tree™ Saver Transplant, as manufactured by Plant Health Care, Inc. (800-421-9051) or an approved equal. Shall be applied by means of a three ounce (3 oz.) premeasured dry formulation packet, such as Mycor Tree Saver Transplant®, as manufactured by Plant Health Care, Inc., Pittsburgh, Pa., or approved equal. Packets shall contain, as a minimum: one thousand (1000) live spores of Vesicular-Arbuscular fungi, including: *Entrophosphora columbiana*, *Glomus clarum*, *Glomus etunicatum*, and *Glomus sp.*; seventeen million five hundred thousand (17,500,000) live spores of Ectomycorrhizal fungi, including: *Pisolithus tinctorius*; biostimulants including *Yucca schidigera* extract; soluble sea kelp extract derived from *Ascophyllum nodosum*; humic acids; and acrylamide copolymer gel as a water absorbent medium.

Inoculant shall be added after the trees have been placed in their hole. Open three packets for each 2 ½" - 3" cal. tree and open four packets for each 3 ½" - 4" cal. tree and thoroughly mix the inoculant into the upper 6-8 inches of the backfill mix.

F. WATER RETENTION ADDITIVE

Water Retention Additives shall be a granular polyacrylamide polymer of a potassium base and not a sodium base. The product should slowly release moisture into the root zone, such as Terra-Sorb, as manufactured by Plant Health Care, Inc., Pittsburgh, Pa., or approved equal. The additive shall be applied at the time of planting during a dry planting season as defined by Parks & Recreation.

4. Planting Specifications

Planting shall consist of excavating all tree pits, planting, and maintaining new trees of the type and size designated on the approved list. All work shall be in accordance with these specifications and to the satisfaction of the Parks representative.

If any new tree pits have to be cut, a permit must first be obtained from the Department of Transportation. A permit shall be required for each block where the pavement is broken for a new pit. It is your responsibility to notify all owners/operators of underground facilities (code 753). Owners/operators of underground facilities include but are not limited to Keyspan, Con Edison and telephone authorities. Code 753 notifications are to be made to the NYC/LI One Call Center, Briarwood Plaza, Suite 202, 36-35 Bell Boulevard, Bayside, NY 11361. Telephone No. 1-800-272-4480. A code 753 number must be obtained before any work can begin.

No pits shall be dug until proposed locations have been marked on the ground by Parks & Recreation staff to insure compliance with all City, State and Utility regulations. Once work begins you take full responsibility for the tree pit locations. All excavated materials shall be

removed from the site and disposed of. The area is to be made safe and secure at the end of the workday.

You are only permitted to occupy an eight-foot lane adjacent to the curb. Traffic shall not be blocked off at any time during planting operations. Work shall not be performed on opposite sides of the street at the same time. Existing parking regulations shall be complied within so far as "No Standing" rules apply for the time limits specified.

Where subsurface obstructions (vaults, utilities, sprinklers) are encountered during excavation, and restrict the planting of a tree you shall restore the disturbed area to its original condition. If damage is done to an underground obstruction it is the responsibility of the contractor to restore the site to its original condition. A new planting location will be designated if conditions permit.

Site characteristics, such as overhead power lines, existing vegetation, and infrastructure items, such as curbs and sidewalks, shall be considered. Trees that grow taller than 25 feet should not be planted directly under power lines. When possible the tree leader shall be offset from power lines.

Trees shall be transported and handled with utmost care to insure adequate protection against injury and desiccation. When transported in closed vehicles, plants shall receive adequate ventilation to prevent sweating. When transported in open vehicles, plants shall be protected by tarpaulins or other suitable cover material. Balled and burlapped trees shall be set on the ground and balls covered with soil. Until planted, all materials shall be properly maintained and kept adequately watered.

A. PLANTING SEASONS

Trees may be planted only while dormant during the season recommended in the street tree planting list. Spring planting shall commence no earlier than March 15th and conclude no later than May 15th and fall planting shall be from October 15th to December 1st, unless otherwise directed by the Central Forestry representative.

B. TREE PIT SIZE

Tree pits should be as large as possible to allow for ample growing space for tree roots and crown. The overall width of a sidewalk can limit the size of a tree pit. Ideal tree pit sizes are 4 feet by 10 feet or 5 feet by 10 feet where space allows. If the recommended tree pit size does not match the builders pavement plan, the plan must be revised. Please refer to the *Sample Tree Pit Configuration Sheet* on page 23 for a range of possible tree pit sizes.

C. INSTALLATION

Remove all materials from the tree pit for the full length and width of the tree pit to the depth of the tree's root ball (see diagram). For excavation of a tree lawn, excavate an area at least three times the diameter of the root ball, or to the satisfaction of a Parks representative. Extreme care shall be taken not to excavate to a depth greater than required. The subgrade below the root ball shall be tamped slightly to prevent settlement.

Place balled and burlapped material in the prepared planting pit by lifting, and carry it by the rootball so that the ball will not be loosened. Set the tree straight and in the center of the pit. All trees shall set, after settlement, at the level of the base of the trunk and the beginning of the roots known as the "trunk flare". If the top of the rootball is not consistent with this area, soil will be added or removed to make it so, and the depth of the planting site adjusted accordingly. Care shall be exercised in setting the trees plumb.

Cut and remove rope and wire from the top fifty percent of the rootball. Cut and remove burlap from the planting pit. At least fifty percent of the burlap shall be removed, and the remaining burlap pulled back and adjusted to prevent the formation of air pockets. All ropes, stones, etc. shall be removed from the planting site before backfilling. Backfilling mixture shall be loose and friable, and not frozen. Soil shall be firmed at six to eight inch intervals.

Mycorrhizal inoculant shall be added after the trees have been placed in their hole. Open three packets for each 2 1/2" - 3" cal. tree and thoroughly mix the inoculant into the upper 6-8 inches of the backfill mix. One packet (3 ounces) is to be used per 1" caliper.

Cultivate and rake over finished planting areas and shall leave them in an orderly condition. On level ground or slight slopes, a shallow basin a little larger than the diameter of the tree ball shall be left around each tree. At no time should topsoil be mounded to cover the trunk of the tree. Final soil level, except for the shallow basin, shall be flush with the surrounding sidewalk grade to prevent potential tripping hazard. All excavated materials shall be removed from the site and disposed of. All tree pits are to be closed and filled with topsoil or backfill and made level with existing conditions.

D. TREE WRAP

No tree trunks shall be wrapped. Remove all nursery tags and protective wrapping.

E. STAKING

All staking shall be done during planting operation and shall be maintained throughout the first year of the two (2) year guarantee period.

Stakes shall be of white cedar with bark attached and shall show no sign of cracking or decay. They shall have a maximum allowable deflection of ten percent (10%). All trees shall be supported by two (2) stakes, they shall be eight (8) feet long; the diameter at the middle shall be not less than (2) inches nor more than two and three quarters (2-3/4) inches and the diameter at the butt shall not exceed three (3) inches. Stakes shall be placed a minimum distance of one (1) foot away from the trunk of the tree, taking care to stay clear of the roots, driven thirty (30) inches into the ground, and shall be fastened to the tree with a suitable length of 3/4" wide, flat, woven polypropylene material such as Arbortie™ as manufactured by DeepRoot®, San Francisco, CA or approved equal that is knotted around the tree stakes.

Unless otherwise directed, trees shall be staked as shown on the plans and in accordance with these specifications. Stakes shall be set parallel to curbs. Trees shall stand plumb after staking. Stakes and Arbortie™ shall be removed at the end of the first year of the two (2) year guarantee period, unless directed otherwise by the Project Manager. At the time the stakes are removed any holes left by the stake shall be filled with topsoil of the same quality as that specified in Section B- Backfill.

F. PRUNING

Only crossing, broken or badly bruised branches shall be removed. These shall be pruned with a clean cut. All pruning shall be done with sharp pruning tools. At the time of planting, pruning cuts shall be made at the base of the branch at such a point and angle that neither the branch collar nor the bark of the stem is damaged, and that no branch stub extends from the collar. Crowns of young trees shall not be cut back to compensate for root loss. No leaders shall be cut.

G. WATERING

At the time of planting, the soil around each tree shall be thoroughly saturated with at least twenty gallons of water. Soil shall be firmed at six to eight inch intervals and thoroughly settled with water. Water shall be free from oil, have a pH not less than 6.0 nor greater than 8.0 and shall be free from impurities injurious to vegetation. Unless otherwise directed, water may be drawn from mains owned by or supplying water to the City of New York.

Water shall not be applied in a manner which damages plants, plant saucers, stakes or adjacent areas. Each plant saucer shall be carefully filled with water in a manner which does not erode the soil or the plant saucer. Watering shall not cause uprooting or exposure of plant's roots to the air.

H. MULCHING

Bark Mulch shall be applied as a ground cover to the surface of all planting beds at the time of planting and again after the tree stakes have been removed, one year after planting. Bark Chip Mulch shall be natural forest product of 98% bark containing less than 2% wood or other debris. It shall be of White or Red Fir and/or Pine bark of a uniform grade with no additives or any other treatment. Size of bark shall be from 5/8" to 1-1/4". The pH factor should range from 5.8 to 6.2.

Mulch shall be applied to a uniform depth of three (3) inches and shall be so distributed as to create a smooth, level cover over the exposed soil. A gap of approximately 2" should be left between the mulch and the trunk of the tree to avoid mounding above the trunk flare.

5. Seasonal Maintenance

The cost of maintenance shall be included in the price bid for the tree planting item in the contract. You are liable for any damage to property caused by planting operations and related work. **All disturbed areas shall be restored to their original condition.**

A. WATERING

Watering shall also take place throughout the two (2) year guarantee period, at least 20 gallons at approximately two week intervals from May 1 to October 31. You may need to increase or reduce the frequency of watering based on weather conditions, resulting soil water content or other factors.

Water shall not be applied in a manner that damages plants, plant saucers, stakes or adjacent areas. Each plant saucer shall be carefully filled with water in a manner that does not erode the soil or the plant saucer. Watering shall not cause uprooting or exposure of plant's roots to the air. Damages resulting from these operations shall be immediately repaired at the your expense.

B. OTHER MAINTENANCE ACTIVITIES

All newly planted trees shall be maintained until two (2) years after the final inspection of permitted planting.

Maintenance shall include weeding, cultivating, edging, pruning, adjustment and repair of stakes, and Arbortie™, repair of minor washouts, soil replacement and other horticultural operations necessary for the proper growth of all trees, and for keeping the entire area within the planting area neat in appearance.

All planting areas shall be cultivated and weeded with hoes or other approved tools within the period from May 1st to October 31st, and such cultivating and weeding shall be repeated at least every three (3) weeks. Under no conditions shall weeds be allowed to attain more than six (6) inches of growth.

Pit pavement shall be maintained flush with adjacent pavement during the two (2) year guarantee period. At the expiration of the guarantee period the area around the tree shall be cultivated and weed free.

6. Guarantee Period

All trees must be guaranteed for two (2) years. All legitimate contractors and nurseries provide a guarantee for their trees. Make sure to confirm the two (2) year guarantee, and beware of suppliers who claim not to provide this service.

A. TREE REPLACEMENT

Any planted tree that is dead or, in the opinion of the Project Manager, is in an unhealthy or unsightly condition, and/or has lost its natural shape due to dead branches, excessive pruning, inadequate or improper maintenance, or other causes including vandalism, prior to final acceptance, shall be replaced in the next planting season. There shall be a two (2) year guarantee on trees commencing after the final inspection of the permitted planting. The topsoil in the tree pit shall be changed when any replacement tree is planted.

Where dead trees have been identified, whether due to natural causes or vandalism, the dead material shall be removed, including stakes, and Arbortie™ **within three (3) weeks of notification**. When necessary, topsoil, grass seed or appropriate paving material shall be added to the pit to eliminate potential tripping hazards at the time of removal.

B. VANDALISM

Where vandalism or related causes are agreed as the cause for tree replacement, you shall be responsible for one replacement during the two (2) year guarantee period after final inspection of the permitted planting. It will be necessary to prove that the tree was vandalized using photo-documentation.

7. Finishing

Paving blocks, installed in the manner described below, are required within each sidewalk tree pit, unless a tree pit guard is going to be installed. Please note that Parks will take action if the tree guard or paving endangers the long-term health and survival of city-owned trees. Parks does not allow tree grates to be installed around newly planted or existing trees.

A. PAVING BLOCKS

a. Materials

Granite Block Pavers: Granite blocks shall be new or used and shall be cut from fine to medium grained sound and durable granite. The granite shall be reasonably uniform in quality and texture throughout and shall be free from an excess of mica and feldspar and from seams, scales or evidence of disintegration. If used blocks are utilized they shall be clean, free from mortar, asphalt, etc.

Blocks shall be fairly rectangular in shape and shall be not less than four (4) inches nor more than twelve (12) inches in length; not less than three (3) nor more than five (5) inches in width; not less than three (3) nor more than five (5) inches in depth. The blocks shall be cut so that opposite faces will be approximately parallel and adjoining faces approximately at right angles to each other. Granite blocks shall be so dressed that they may be laid with one (1) inch joints. All blocks shall have one reasonably smooth split head.

b. Installation

Paving blocks shall be installed using a sand cushion. The sand shall consist of clean, hard, durable, uncoated stone particles, free of lumps of clay and all deleterious substances and shall be so graded when dry, one hundred percent shall pass a ¼ inch square opening sieve; not more than thirty-five percent by weight shall pass a No. 50 sieve. Sand shall conform to ASTM C-33.

Trim and tamp the subgrade to smooth, uniform lines prior to placing the pavers. The pavers shall be laid on a sand cushion with a minimum thickness of one inch. The sand cushion shall be compacted by hand tamping, or as directed by the Engineer. Joints between pavers shall be a maximum of one inch and a minimum of three quarters inch in width. Joints around the edge of the pit shall be hand tight. Joints along the inner ring of blocks must be filled with a cement mortar of a wet mixture of one part Portland cement and two parts sand.

Care should be taken to leave a maximum amount of tree pit surface area uncovered, without pavers (see drawing). The installation of tree guards shall not interfere with the

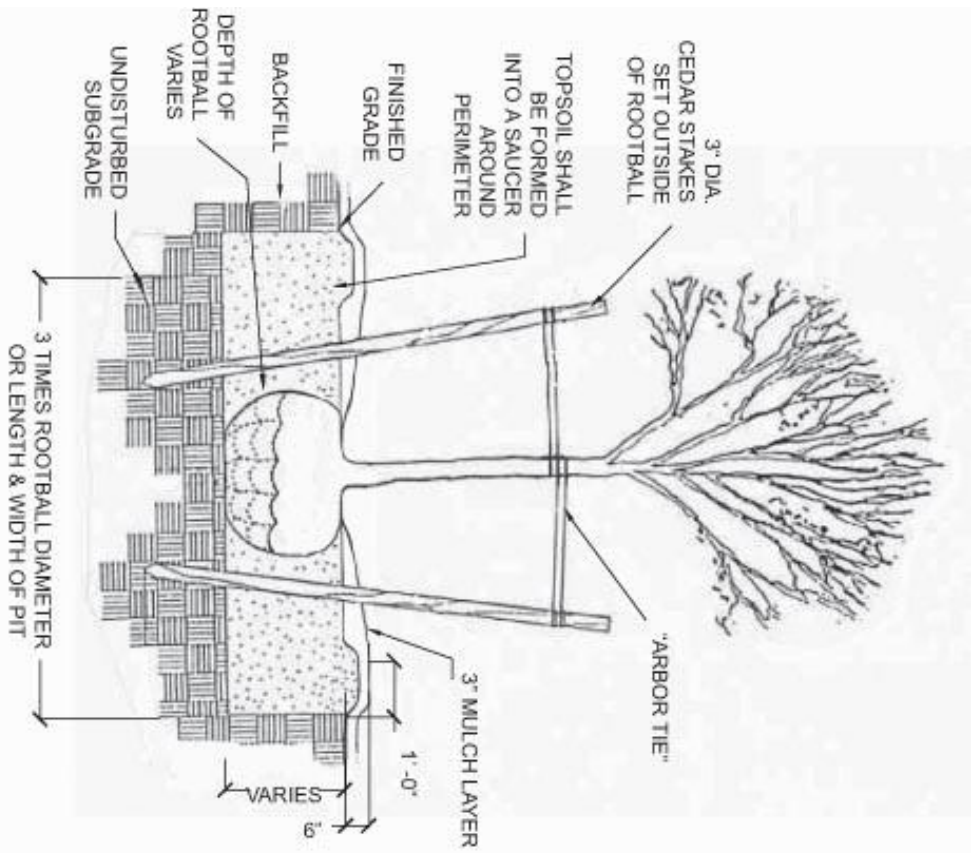
proper grade of the tree; trees cannot be planted deeper to accommodate pavers and root balls cannot be damaged during installation.

B. TREE PIT GUARDS

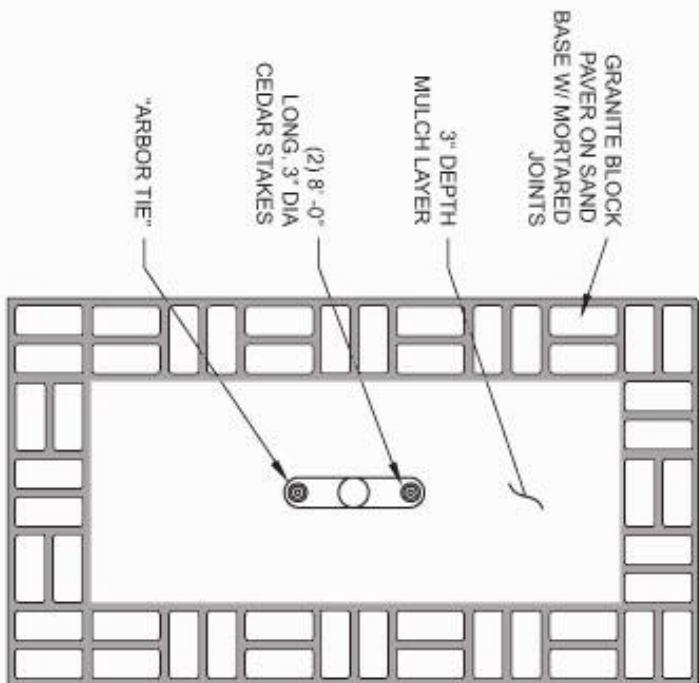
Tree pit guards are not required by Parks. A tree pit guard is a device, usually a cast-iron fence or wrought-iron wickets, installed around a tree pit for protection. Parks & Recreation recommends a low cast-iron fence or wrought-iron wickets from 18" to 30" high, around the perimeter of the tree pit. This will protect the tree from dogs and pedestrians and give it enough space to grow for many years to come.

Guards should not be installed close to tree trunks. They strangle the tree as it grows and fail to protect the root zone. Sidewalk-level tree grates are not permitted; granite paving should be used as an alternative. They do not protect the tree trunk and the tree will grow into them and die if the openings are not periodically widened. They also serve as receptacles for litter and if raised by the tree's growth will cause a trip hazard.

Do not install brick or concrete tree wells. The interior space created by the solid wall encourages property owners to add soil over the root zone for plantings, unwittingly suffocating tree roots.



SECTION:
TREE PLANTING & STAKE DETAIL
 NOT TO SCALE



PAVING DETAILS: GRANITE BLOCK
 NOT TO SCALE

SAMPLE TREE PIT CONFIGURATIONS

TREE PIT DIMENSIONS*			
	Length (ft)	Surface Area (sf)	Soil Volume (cu ft)
Width: 7 ft			
	6	42	84
	7	49	98
	8	56	112
	9	63	126
	10	70	140
	⋮	⋮	⋮
	25	175	350
	⋮	⋮	⋮
	50	350	700
	⋮	⋮	⋮
	100	700	1400
Width: 6 ft			
	6	36	72
	8	48	96
	9	54	108
	10	60	120
	⋮	⋮	⋮
	25	150	300
	⋮	⋮	⋮
	50	300	600
	⋮	⋮	⋮
	100	600	1200
Width: 5 ft			
	6	30	60
	7	35	70
	8	40	80
	9	45	90
	10	50	100
	⋮	⋮	⋮
	25	125	250
	⋮	⋮	⋮
	50	250	500
	⋮	⋮	⋮
	100	500	1000
Width: 4 ft			
	7	28	56
	8	32	64
	9	36	72
	10	40	80
	⋮	⋮	⋮
	25	100	200
	⋮	⋮	⋮
	50	200	400
	⋮	⋮	⋮
	100	400	800

Notes:

These dimensions illustrate the variety of tree pit sizes and configurations that are possible. They are not meant to be fixed. Tree pits should always be as large as possible. The larger the soil volume the larger the tree size will be at maturity and the better chance it has for long-term survival.

The longer tree pit lengths on the chart at left show the soil volumes achieved in continuous tree pits, which are underground trenches that are generally treated with structural soil belowground and sidewalk pavement aboveground, except for the area around the tree which resembles the open area of a traditional tree pit.

General rules for proximity to built infrastructure:

- 20 feet from light poles
- 30 feet from stop signs
- 6 feet from traffic signs
- 5 feet from parking meters
- 2 feet from water drains
- 2 feet from utilities
- 5 feet from hydrants
- 7 feet from driveways
- 39 inches minimum passage for ADA considerations
- 5 feet passage general requirement NYC DOT
- 15 to 25 feet from other trees

Note: these are general infeasibility criteria meant to guide designers. Specific rules and allowances will be established during the DPR permitting process, since exact tree siting varies by tree species selection, local site conditions, and other agency requirements .

*all calculations based on a tree pit depth of 2 feet. In general, tree pit depth should match root ball height. In the case of structural soil, pit can be deeper.

Street Tree List						
City of New York Parks and Recreation						
TREE SPECIES		Form	GROWTH RATE		Fall Color	NOTES
Scientific Name	Common Name		Slow	Medium		
Large Trees-Mature Height Greater Than 50 Feet						
Ginkgo biloba	Ginkgo	Upright	X		Yellow	Male Only - Does Not Bear Fruit
Quercus spp. 'Fastigiata'	Fastigiata Oak	Upright	X		Maroon	Similar tree is Quercus robur
Liquidambar styraciflua	Sweetgum	Pyramidal		X	Yellow	Plant Spring Only, lawn pits only, look for 'Rotundiloba'
Metasequoia glyptostroboides	Dawn Redwood	Pyramidal		X	Orange/ Bown	Can Grow 2 to 3 Feet per Year
Taxodium distichum	Baldcypress	Pyramidal		X	Orange/Brown	Ideal For Wet Soils
Tilia cordata	Littleleaf Linden	Pyramidal		X	Yellow	Fragrant Flowers
Gymnocladus dioicus	Coffeetree	Rounded		X	Yellow	Needs Lots of Space
Gleditsia triacanthos var. inermis	Honeylocust	Rounded		X	Yellow	Tolerates Tough Conditions
Liriodendron tulipifera	Tulip Tree	Pyramidal		X	Yellow	Tree Does Best in Lawn Pits
Quercus rubra	Northern Red Oak	Rounded		X	Maroon	Plant Spring Only
Quercus bicolor	Swamp White Oak	Rounded		X	Yellow	Plant Spring Only
Quercus imbricaria	Shingle Oak	Rounded		X	Yellow	Plant Spring Only
Quercus palustris	Pin Oak	Rounded		X	Maroon	Needs large tree pit
Quercus phellos	Willow Oak	Rounded	X		Yellow/orange	Plant Spring Only
Tilia americana	American Linden	Rounded		X	Yellow	Excellent Tree for Partial Shade, Fragrant Flowers
Tilia x euchlora	Crimean Linden	Rounded		X	Yellow	Pest Resistant
Tilia tomentosa	Silver Linden	Rounded		X	Yellow	Fragrant Flowers
Zelkova serrata	Japanese Zelkova	Vase-Like		X	Red / Bronze	Village green' or 'Halka'
ASIAN LONG HORN BEETLE QUARANTINE SPECIES - PLANTING NOT RECOMMENDED IN BROOKLYN, MANHATTAN, QUEENS, AND STATEN ISLAND						
Celtis occidentalis	Hackberry	Rounded		X	Yellow	Native Species
Fraxinus pennsylvanica	Green Ash	Pyramidal		X	Yellow	Patmore'
Platanus x acerifolia	London Plane	Rounded		X	Yellow	Tolerates Tough Conditions
Ulmus americana	American Elm	Vase-Like		X	Yellow	Liberty', 'Homestead', 'Pioneer', 'Accolade'

TREE SPECIES		Form	GROWTH RATE		Fall Color	NOTES
Scientific Name	Common Name		Slow	Medium		
Medium Trees- Mature Height 35-50 Feet						
Carpinus betulus	European Hornbeam	Upright		X	Yellow	Fastigiata' cultivar is best for narrow spaces
Quercus robur	English Oak	Upright	X		Yellow	Plant Spring Only
Cercidiphyllum japonicum	Katsura Tree	Rounded		X	Yellow/ orange	Tree Does Best In Lawn Pits
Corylus colurna	Turkish Filbert	Pyramidal		X	Yellow	Also known as Turkish Hazelnut
Nyssa sylvatica	Black Gum	Pyramidal		X	Red	Should only be planted in extremely wet sites
Ostrya virginiana	American Hophornbeam	Rounded	X		Yellow	Plant Spring Only
Quercus acutissima	Sawtooth Oak	Rounded		X	Yellow	Plant Spring Only
Eucommia ulmoides	Hardy Rubber Tree	Rounded	X		Yellow	Tolerates Tough Conditions
Styphnolobium japonicum	Scholar Tree	Rounded		X	Cream	Tolerates Tough Conditions
ASIAN LONG HORN BEETLE QUARANTINE SPECIES - PLANTING NOT RECOMMENDED IN BROOKLYN, MANHATTAN, QUEENS, AND STATEN ISLAND						
Acer rubrum	Red Maple	Rounded		X	Red	Tree Does Best In Lawn Pits
Ulmus parvifolia	Chinese Elm	Rounded		X	Yellow	Accolade'
Intermediate Trees- Mature Height 25-35 Feet						
Koelreuteria paniculata	Goldenraintree	Rounded		X	Yellow	Tolerates tough conditions
Maackia amurensis	Amur Maackia	Rounded	X		Yellow	Fixes Its Own Nitrogen in the Soil, Late Bloomer
Pyrus calleryana	Callery Pear	Rounded		X	Maroon	Plant sparingly
ASIAN LONG HORN BEETLE QUARANTINE SPECIES - PLANTING NOT RECOMMENDED IN BROOKLYN, MANHATTAN, QUEENS, AND STATEN ISLAND						
Acer truncatum	Shantung Maple	Rounded	X		Yellow	Spring foliage is purplish-red and changes to green
Acer campestre	Hedge Maple	Rounded	X		Yellow	'Queen Elizabeth'
Small Trees- Mature Height Less Than 25 Feet						
Amelanchier canadensis	Serviceberry	Rounded	X		Red/ Yellow	Autumn Sunset,' Cumulus,' and 'White Pillar'
Cercis canadensis	Eastern Redbud	Rounded		X	Yellow	Does Best in Lawn Pits
Carpinus caroliniana	American Hornbeam	Rounded	X		Yellow/ orange	Plant Spring Only
Fraxinus 'Leprechaun'	Leprechaun Green Ash	Rounded	X		Yellow	Good for wet sites under wires
Malus spp.	Crabapple	Rounded	X		Red/ yellow	M. zumi , and 'Donald Wyman'
Crataegus spp.	Hawthorn	Rounded		X	Maroon	Winter King' and 'Princeton Sentry'
Cornus mas	Cornelian Cherry	Rounded		X	Yellow	One of the first flowering spring trees
Prunus virginiana 'Schubert'	Schubert Cherry	Pyramidal		X	Maroon	Tolerates Tough Conditions
Syringa reticulata	Japanese Tree Lilac	Rounded		X	Yellow	Ivory Silk'
Prunus cerasifera	Purpleleaf Plum	Rounded		X	Maroon	Atropurpurea' and 'Thundercloud'
Prunus 'Okame'	Okame Cherry	Rounded		X	Red/ bronze	Earliest Blooming Cherry
Prunus padus	European Birdcherry	Rounded	X		Yellow/ bronze	One of the First Trees to Leaf Out in the Spring
Prunus sargentii	Sargent Cherry	Rounded	X		Red/ bronze	'Accolade' is Semi-double Flowering;
Prunus serrulata 'Kwanzan'	Japanese Flowering Cherry	Rounded	X		Red/ Orange	Double-flowering
Prunus x yedoensis	Yoshino Cherry	Rounded		X	Yellow	Tree Does Best in Lawn Pits
ASIAN LONG HORN BEETLE QUARANTINE SPECIES - PLANTING NOT RECOMMENDED IN BROOKLYN, MANHATTAN, QUEENS, AND STATEN ISLAND						
Acer ginnala	Amur Maple	Rounded	X		Red	Tolerates Tough Conditions