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Chapter 12
Tree Planting & Protection Guidelines

Design Specifications & Requirements Manual

October 2003

Updated January 2024

City of London
Design Specifications and Requirements Manual

The design information contained in this manual is intended to provide guidance beyond legislative and standard design practices for use in the City of London (the City). There will be site specific situations where the design will depart from these practices as it is not possible nor is it the intention of the City to anticipate every situation. The City intends to review and revise the Manual from time to time. The City also acknowledges that other references such as the 'Standard Contract Documents for Municipal Construction Projects' are to be used in conjunction with this manual. The 2012 update of this manual incorporates design information from the City's former 'Subdivision & Development Guide Manual' to provide consistent and current design information for development projects.

The City of London maintains its right to accept or refuse any design submissions and requires an acceptable design for any given circumstance.

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12.1 Introduction

Through its Urban Forest Strategy, and many supporting Policies and Strategies endorsed by council, the City of London has made a strong commitment to the preservation and enhancement of the urban forest. The stated mission to “plant more, protect more, and maintain better” requires clear and robust guidelines for protecting, planting and maintaining City trees during new and infill development. By following the provisions outlined in this document, London’s green infrastructure can be enhanced by high quality, well planned landscaping. As green infrastructure, trees provide many benefits that include temperature regulation, CO2 absorption, rainfall interception, and pollution reduction. These benefits increase as a tree matures. Therefore, tree retention through proper tree protection is prioritized in this document.

Prior to any construction, it is important to evaluate the existing trees to ensure we retain as many trees as possible and we recommend a Certified Arborist with appropriate training and experience be employed to carry out such evaluations on both private and public lands.

All trees located on City boulevards are subject to protection under the Boulevard Tree Protection By-law - C.P.-22. Other sites may also be subject to the Tree Protection By-law C.P.-1555-252, Parks and Recreation Area By-law PR-2, and other City By-laws.

The purpose of this document is to outline the expectations of the City of London in regard to tree preservation and tree planting for development, Capital Projects and right of way (R.O.W.) works. It aims to establish guidelines, standards and specifications for the preservation, protection, and maintenance of new and existing City trees, and ensure that adequate care is taken to preserve the health of existing trees when there is potential risk of damage during construction or demolition. These standards, guidelines and best management practices are informed by existing practices in the City of London, as well as other major municipalities and jurisdictions.

Types of Tree Damage

Physical tree damage can occur when construction equipment is allowed to come in close proximity to tree. This can lead to broken branches, wounds on the trunk, scorching of branches or other physical wounds which may be fatal, give cause to remove the tree, or require remedial action.

Root damage may occur if there is any excavation within the rooting area of the tree. Depending on the extent of excavation, the health of a tree can be seriously affected, causing a tree to decline to the point where the tree may need to be removed. Most of the fibrous roots of the tree, which are responsible for the uptake of nutrients and water,

are contained in the top 30 cm of soil and are easily severed during excavation. Structural roots are located deeper. Hand digging, low pressure hydro-vac, or air spade exploratory digging will aid in determining the extent of the root system and what steps will need to be taken to minimize impacts.

Soil compaction happens when vehicles cross over the rooting area, especially when the soil is wet. This compaction reduces the pores within the soil which contain the water and air needed for the proper biological function of the tree. This reduces soil function with the potential to cause a decline in the health of the tree, killing off many of the feeder roots which sustain the tree. This could also lead to a premature removal of a once healthy tree.

The following standards and guidelines have been produced so that adequate care can be taken to ensure the health of trees when there is potential risk of damage during construction or demolition. They are a combination of standards, guidelines and best management practices from London, other major municipalities, and jurisdictions. The requirements and measures may include an arboricultural impact assessment, a tree protection plan, identification of tree protection zones, installation of tree protection barriers, pruning of branches and roots and remediation measures to mitigate the impact of damage.

12.1.1 Scope

This document outlines the tree protection procedures that shall be followed when a City tree of any size is present on, or adjacent to, a construction or demolition site. Trees that are adjacent to a proposed site and have a Root Protection Area (RPA) that falls within the boundary must be included and considered for protection.

All new subdivisions require a Tree Protection Plan and a planting plan.

For site plans, the City will recommend at the site plan pre-consultation meeting whether a tree protection plan is warranted for a site or adjacent trees.

A Tree Protection Plan is required for every Capital Works project. Current City practices have included the preparation of a Tree Protection Plan for any projects which will affect City trees in some way, where there is excavation within the roadway of a City street or on other City property or equipment is moving past City trees to enter a worksite.

12.1.2 Terms Defined for the Use of This Document

“**Arborist**” is an educated professional with a recognized ISA (International Society of Arboriculture) certification which is current and valid.

“**Barrier**” is the fence placed a specific distance away from and around either a single tree or grouping of trees to create a Tree Protection Zone (TPZ).

“**Boundary Tree**” means a tree having any part of its trunk located on the boundary between adjoining lands. For the purposes of this definition, ‘trunk’ means that part of the tree from its point of growth away from its roots up to where it branches out to limbs and foliage.

“**City**” means The Corporation of the City of London.

“**Critical Root Zone (CRZ)**” shall mean an area defined by a measured circle around a living Tree that is deemed to contain the portion of Tree roots that are essential for the Tree’s structural integrity and capability to remain alive and upright. For mature trees, this is typically understood to be a minimum of three times the DBH.

“**Damage**” shall mean any activity that may injure or kill a tree, above or below the ground.

“**Developer or Contractor**” means the landowner, or a landowner’s agent who represents and acts on behalf of and with the consent of the landowner, applying for any kind of Permit which would include any sort of work around City trees.

“**Diameter at breast height (DBH)**” is the diameter of the tree measured at 1.4 meters above the ground.

“**Dripline**” is the location on the ground directly beneath the theoretical vertical line from the tips of the outermost branches of the tree.

“**Good Forestry Practices**” shall be as defined by the Forestry Act R.S.O. 1990, c. F-26 and any amendments thereto.

“**Habitat**” by reference to wildlife or Species At Risk shall have the same definition as that defined in the Endangered Species Act R.S.O. 2007 and any amendments thereto.

“**Injure a tree**” includes but is not limited to cutting of trees or branches, topping, removing tree bark, leaves or fruit, removing whole tree or cutting or breaking of tree roots.

“**Landscape Architect (LA)**” shall mean a person who is a full member of the Ontario Association of Landscape Architects (OALA) with seal, in good standing with the OALA, and has demonstrated competence in arboriculture, urban forestry, tree identification and tree risk assessment.

“**RPF**” is a Registered Professional Forester who is a member in good standing with the Ontario Professional Foresters Association (OPFA) and eligible to work in Ontario.

“**Tree Protection Zone (TPZ)**” shall refer to the calculated area around the base of a tree that is designated for tree protection both above and below ground.

12.2 Prior to Construction

12.2.1 Site Plan Approval

Specific Site Plan Approval submission requirements should be determined during a pre-consultation meeting. The tree preservation and compensation review process must be scheduled early in the development approvals process to ensure that the requirements and opportunities for the protection of trees can be identified, and appropriate compensation for permitted tree removals can be determined.

This process begins with a tree inventory and arborist report, and may involve the following types of plans, discussed in more detail below.

- Tree Protection Plan (TPP)
- Soil Protection Plan OR Soil Modification Plan
- Landscape Plan (LP)/Reference Plan
- Planting Plan
- Sections
- Details and Specifications

12.2.2 Requirements for Approved Tree Inventory and Protection Plan (TPP)

There shall be a requirement for a Tree Inventory and Protection Plan, approved by the City, for all City trees which are on a boulevard adjacent to a construction or demolition site or on property adjacent to a developing property. Trees on lands adjacent to the developing property will be included if they have a critical root zone that touches or crosses the Limit of Work. Any tree numbering to assist in the inventory must be done in a manner which will not harm the trees. No tags or other articles may be affixed to trees within the Road Allowance using nails, screws, or other permanent or invasive means.

A Tree Protection Plan shall be completed by an Arborist and submitted to the City for approval by the Manager, Forestry Operations or designate prior to the start of construction or other works. Tree Protection Plans completed more than 18 months prior to submission will be updated no less than 6 months prior to submission. Tree Protection Plans more than 24 months old will not be accepted and must be re-done.

If there is a Woodland within or adjacent to the project limits, the work proposed within or adjacent to the Woodland must be reviewed by a Registered Professional Forester (RPF) working within their approved scope of practice. For Woodlands, buffers shall be shown in accordance with the most current version of the City of London's Environmental Management Guidelines. Where significant grading will occur adjacent to woodlands, a water balance study may be required as well.

No onsite construction or other works that could cause damage to trees either above or below ground is permitted without an approved Tree Protection Plan.

The tree protection plan shall include, but is not limited to:

A complete inventory of all trees on site, on the boulevard(s) adjacent to the site, or on adjacent properties that have a critical root zone that touches or crosses the Limit of Work. This includes tree species, DBH, and recommendations for future tree management described in detail. If there is a recommendation for removal, a detailed explanation including photographs, must be included with the tree quality assessment of that tree; any proposed removal of City trees will be conditional and subject to the approval of a consensual removal as per the Boulevard Tree Protection By-law - C.P.-22 Schedule A and any fees therein.

A map showing:

i. The location of all existing trees and the extent of their crowns as well as their critical root zones. If the extent of the existing tree crowns is impacting clarity of drawings, a request can be made to only show critical root zone, ensuring symbology for trees reflect their relative critical root zone, based on dbh.

ii. The location of all trees to be retained, removed, replaced or relocated. Trees to be retained will be indicated on the plans by a green symbol. Trees proposed for removal will be indicated on the plans by a red X though their symbology.

iii. The Tree Protection Zones and the precise location of their barriers.

iv. Any additional ground protection that is required.

v. Designated travel corridors and storage compounds, portable rooms/buildings, and any other facilities for on-site work for both workers and equipment;.

vi. Any existing structures or grade changes.

Foreseeable remedial actions to ensure the health of the remaining trees such as but not limited to branch pruning, deep root fertilization, tree watering, soil replacement or planting.

If there is maintenance required on any tree that is designated for retention, that maintenance should be completed prior to construction or demolition. This can include but is not limited to crown pruning, deep root fertilization, tree watering, and/or soil replacement.

Note: any restrictions regarding pruning of oak trees (*Quercus*) must comply with current advice and best practices at the time of the work. No pruning of oaks will take place between April 1 and September 30 (or as recommended by the CFIA) to avoid the active period for the insect vector for Oak Wilt.

12.2.3 Requirements for Approved Soil

Suitable soils are a critical component of a healthy road allowance environment to support tree growth. Existing soil can be amended in-situ with compost, forest product residuals and other approved amendments to improve organic matter content, chemical qualities, or infiltration rate. Thought should be given early in the development planning process to the protection of existing soils on site, and any soil amendments that might be required.

12.2.3.1 Soil Volume Requirements

For tree plantings to be successful trees must be provided with sufficient uncompacted, good-quality soil volume, along with good drainage, adequate water, and sufficient soil nutrients. The soil volume available for rooting must be large enough to support the expected tree size, as there is a direct relationship between available space for root growth and tree size. Table 12.1 below is given for informational purposes of ideal soil volumes, and is for guidance only.

Table 12-1 Ideal minimum soil volume requirements per tree

Expected Tree DBH at Maturity (cm)	Minimum Soil Volume per Tree (m^3)	Minimum Soil Volume per Tree for Shared Continuous Soil Volume (m^3)
Small (20)	15 m^3	10 m^3
Medium (40)	23 m^3	15 m^3
Large (40+)	30 m^3	20 m^3

Design Considerations for Soil Volume:

- Consolidated planting areas are more effective than individual tree pits with insufficient resources.
- Planting in restricted environments should incorporate site specific design using enhanced planting strategies such as root paths, continuous soil zones, structural soils, structural soil cells, etc.
- Topsoil must meet the requirements of the City of London Growing Medium Specification, or be suitable native soil as defined in the specification.
- Existing soil should be analyzed for suitability and preserved and protected from compaction, contamination, and degradation, and re-used for planting. Please refer to the City of London Growing Medium Specification for additional detail.
- Only the growing medium portion of structural soil counts towards minimum soil volume requirements. This is typically 20%.

As of January 1st, 2023, the following changes come into effect and are applicable to all new applications and any active subdivision within the buildout phase that has not been assumed by the City. Prior to assumption the Developer shall ensure that:

a. A minimum topsoil depth of 500mm should be specified for tree planting areas, providing that the root ball is placed on a compacted base where the root collar is flush with finished grade.

b. Based on the 500mm minimum depth, the maximum volume of acceptable growing medium possible will be created in the road allowance between the driveway, curb line, and other boulevard appurtenances.

12.2.3.2 Topsoil and Growing Medium

Submit for approval soil test analysis reports, representing no less than 10% of the proposed future planting sites, to the City's Representative for each sample of topsoil and growing medium, as well as for Woody Biomass, Sand and Compost. All tests must be from an approved soil-testing laboratory. Test reports including a complete sample analysis of the proposed topsoil and growing medium must also be submitted to the City of London for approval prior to installation.

All soil and growing medium tests shall be conducted by soil laboratories accredited by The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). A current listing of Accredited Soil Testing Laboratories in Ontario is available on the Ministry of Agriculture, Food and Rural Affairs website.

All laboratory testing will be administered by the City.

12.2.3.3 Reuse of Existing Site Soil as Growing Medium

Existing site soil for seeding, sodding and tree planting may be used as growing medium at sites where the existing soil has been analyzed by an agricultural soil scientist and determined to be suitable for its intended purpose. Acceptable topsoil to be reused shall be stockpiled on site. Soil stockpiles that will exist for more than 60 days will be seeded down with a cover crop such as grass or other green manure crop, and sediment control shall be placed around the perimeter.

The written report must be forwarded to the City. The City may approve the use of existing soils and may require additional amendments for the soil where recommended by the soil report. A minimum of 10% of the sites proposed as tree planting sites will be sampled and analyzed by the City.

Topsoil texture shall be loam, sandy loam to sandy clay loam with clay content between 15 and 20% and a combined gravel and stone content of no more than 8%.

Topsoil shall not contain quack-grass rhizomes, *Agropyron repens*, or the nut-like tubers of nutgrass, *Cyperus esculentus*, or all other primary noxious weeds,

Topsoil pH value shall be between 5.5 and 7.8.

All screened topsoil must be certified free of Atrazine.

Topsoil shall have a maximum salinity of saturation extract conductivity: 3.0 mmhos/cm or dS/m at 25 degrees C.

Topsoil shall be harvested from approved source locations that comply with all regulations governing the removal of topsoil.

Topsoil may be purchased from a source of collected topsoil from development sites provided the sources of the soil stockpile is of similar textures and meets the requirements of this specification.

12.2.4 Reuse of Existing Site Soil as Growing Medium

Soil Modification Plan

If soil is compacted, or is to be amended in-situ, a Soil Modification Plan shall be required.

Prepare and submit a “Soil Modification Plan,” indicating the extent of soil work. This shall be required for projects reusing existing soil or amending existing soil in-situ. Show

all areas of proposed staging, vehicle or equipment access, trenching, excavating, excavating with compressed air tool or other disturbance to soils. Include:

Submit schedule of existing trees to be affected.

Submit a description of each type of proposed specialized root zone and soil excavation operation and the reason for and location of each type described. Specialized root zone and soil excavation operations shall include, but not be limited to:

- Surface Soil decompaction (Tilling)
- Surface Soil decompaction (Radial Trenching)
- Subsurface Soil decompaction (Soil Ripping)
- Subsurface Soil decompaction (Soil Fracturing)
- Subsurface Soil decompaction (Trenching)
- Soil Amendment (Low Organic Matter)
- Soil Amendment within the Root Zone of Existing Trees
- Soil aeration and decompaction with pneumatic air knife
- Vertical mulching with pneumatic air knife
- Radial trenching with pneumatic air knife

12.3 Tree Protection Zones

Tree protection zones (TPZ) shall be established based on the criteria in **Table 12.22**; Barriers will not be placed within the TPZ rather on the outside of the predetermined area.

Table 12-2 Tree Protection Zones (TPZ)

Trunk Diameter (DBH)	Minimum Protection Distances Required City-owned Trees	Minimum Protection Distances Required for Areas Designated Open Space or Woodlands
	Whichever of the two is greater:	Whichever of the two is greater:
< 10cm	The drip line or 1.2 m	The drip line or 1.2 m
10-29 cm	The drip line or 1.8 m	The drip line or 3.6 m
30-40 cm	The drip line or 2.4 m	The drip line or 4.8 m
41-50 cm	The drip line or 3.0 m	The drip line or 6.0 m
51-60 cm	The drip line or 3.6 m	The drip line or 7.2 m
61-70 cm	The drip line or 4.2 m	The drip line or 8.4 m
71-80 cm	The drip line or 4.8 m	The drip line or 9.6 m
81-90 cm	5.4 m	The drip line or 10.8 m
91-100 cm	6.0 m	The drip line or 12.0 m
>100 cm	6 cm protection for each 1 cm diameter	12 cm protection for each 1cm diameter or the drip line

An exception to the minimum distance of the TPZ may be when the tree is flanked by a curb, sidewalk, and or asphalt road. In such cases the barrier may be limited to the furthest extent of the grassed boulevard area however root pruning using approved methods must be incorporated to reduce impacts on tree roots due to ripping or tearing of roots. Hand digging, low pressure hydro-vac or air spades may be used to uncover roots for pruning or avoidance by an arborist and roots may be pruned to a depth which will meet the construction requirements. This operation is only to be done with the approval of the City. Roots that are exposed should be covered with wet burlap or soil as soon as possible and must be in place by the end of the day during which the exposure occurs. Watering to keep the covering material moist is required until such time as the topsoil and sod has been replaced satisfactorily or as otherwise directed by the City.

Within a TPZ there must be:

a. No construction.

b. No altering of grade by adding fill, excavating, trenching, scraping, dumping or disturbance of any kind.

c. No storage of construction materials, equipment, soil, construction waste or debris wash facilities, portable rooms/buildings.

d. No disposal of any liquids e.g. concrete sleuth, gas, oil, paint.

e. No movement of vehicles, equipment, or pedestrians.

f. No parking or storage of vehicles or machinery.

g. Directional micro-tunneling and boring may be permitted within the limits of the TPZ subject to approval from the City.

Minimum protection distances required for areas designated Open Space or Woodlands shall be as per the current version of the City of London's Environmental Management Guidelines.

12.4 Tree Protection Barriers

All barriers shall be erected, secure, and complete with signage posted prior to any demolition, construction or other works.

Materials must comply with all barrier specifications, as well as all supports and bracing used to secure the barrier should be located outside the TPZ. All supports and bracing shall be located as to minimize damage to roots.

Barrier Specifications **Figure 12.1**

i. Height can be 1.2 m (4'), visibility on boulevards must be maintained;

ii. T-Bar Posts are to be used for support

iii. 2''x4''s are to be used for top rails;

iv. Spacing between vertical posts to be no further apart than 2.4 m (8');

v. Structure must be sturdy with posts driven firmly in to the ground;

vi. Continuous plastic mesh screening (e.g. orange snow fencing) is to be used;

vii. Signage must be posted, sign must be a minimum of 40cm x 60cm and water proof, **Figure 12.3**;

viii. Where some excavate or fill has to be temporarily located near tree protection barrier, plywood must be used to ensure no material enters the Tree Protection Zone;

ix. In addition to tree protection fencing, sediment fencing might be required, this will be determined in the Tree Protection Plan by an Arborist.

12.4.1 Example for Boulevard Trees

Figure 12.1 Tree Preservation Details (TPP-1)

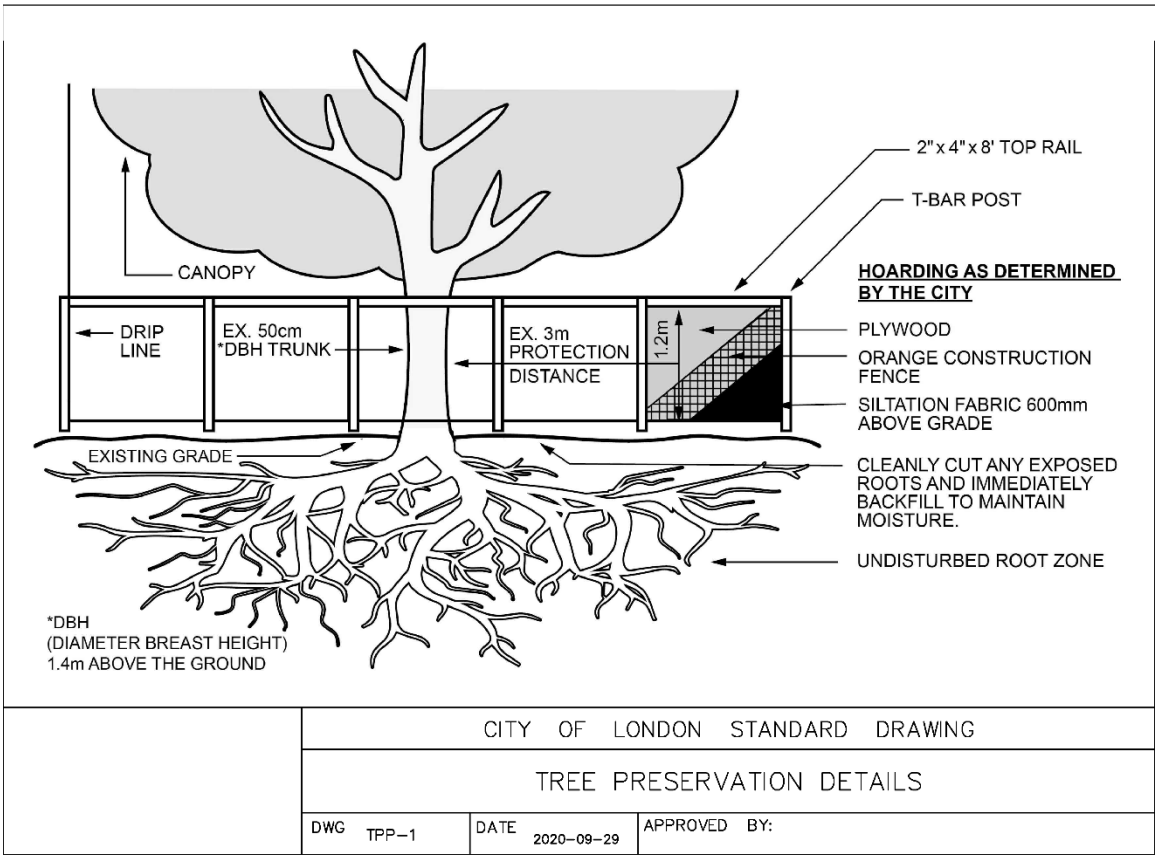
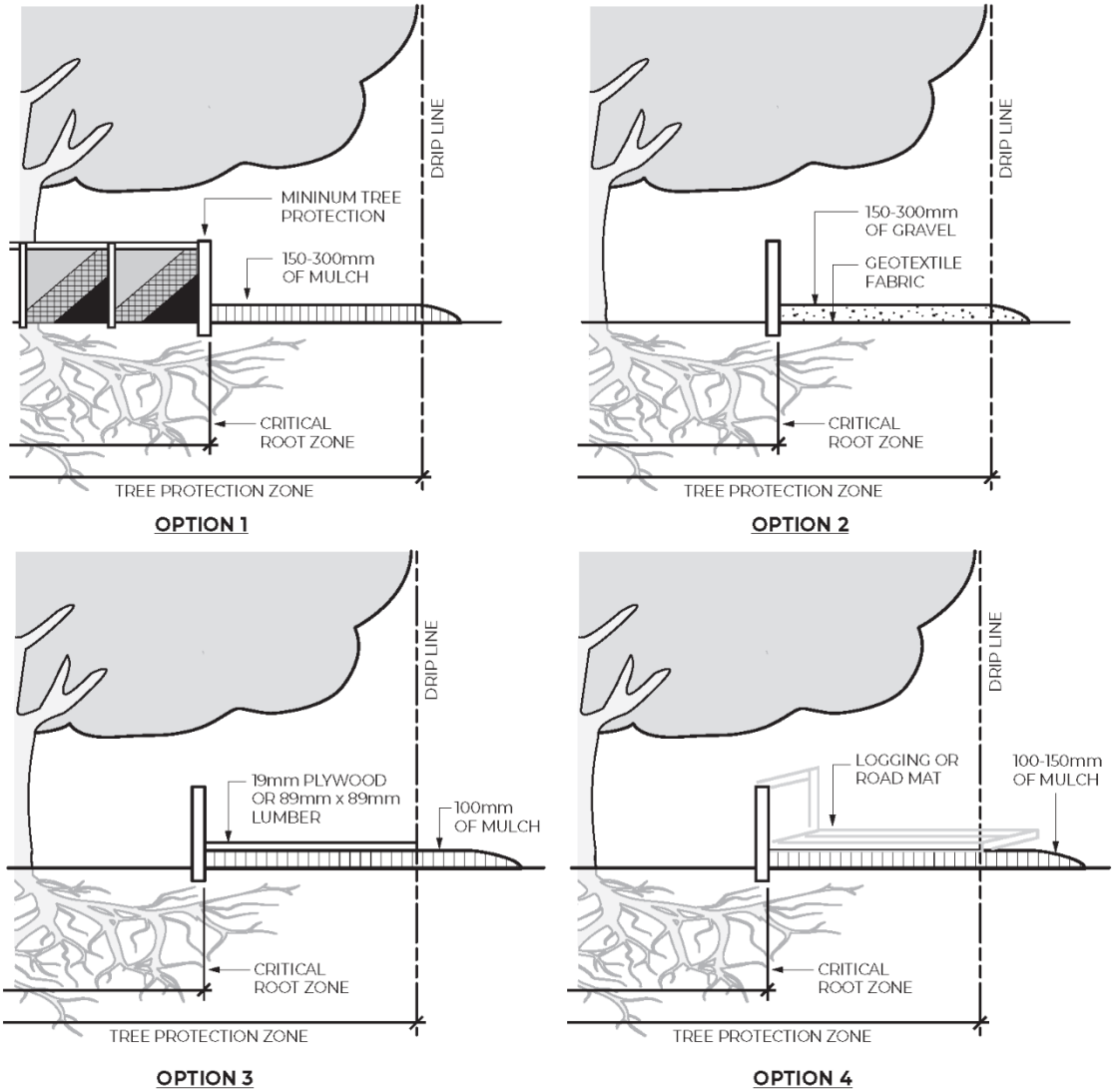


Figure 12.2 Tree Preservation Details (TPP-2 Horizontal Tree Protection)



NOTES

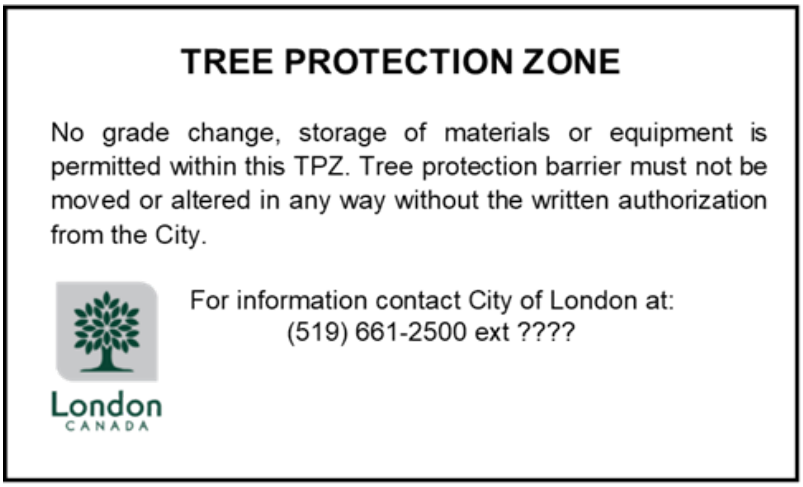
1. HORIZONTAL TREE PROTECTION (HTP) TO BE USED IN COMBINATION WITH TREE PROTECTION BARRIERS WHEN A FULL TREE PROTECTION ZONE CANNOT BE PROVIDED.
2. THE FOLLOWING DETAILS ARE EXAMPLES ONLY, AND PROJECT SPECIFIC HTP SHOULD BE DESIGNED BY THE PROJECT ARBORIST, SUBJECT TO APPROVAL BY THE CITY.
3. STONE, GEOTEXTILE AND MULCH EXCEEDING 100MM MUST BE REMOVED FROM THE TPZ ONCE THE THREAT OF ROOT DAMAGE OR COMPACTION HAS PASSED.
4. THE USE OF HTP DOES NOT RELIEVE THE CONTRACTOR OF THE OBLIGATION TO PROTECT THE TREE FROM ABOVE AND BELOW GROUND DAMAGE. ANY PRUNING REQUIRED TO MINIMIZE CONSTRUCTION DAMAGE IS SUBJECT TO PRIOR APPROVAL FROM FORESTRY OPERATIONS.
5. FOR USE WHERE FULL TREE PROTECTION ZONES CANNOT BE PROVIDE. DESIGN AND APPLICATION TO BE APPROVED BY THE CITY OF LONDON ON SITE-SPECIFIC BASIS.

2 TPP **HORIZONTAL TREE PROTECTION**

SCALE NTS

12.4.2 Tree protection signage

Figure 12.3 Tree Protection Zone Signage



12.5 During Construction

12.5.1 Site monitoring

Site monitoring will be the responsibility of the developer, contractor or project manager. Random checks may be done by City staff at any time and without notice.

A weekly photograph will be taken by the developer, contractor or project manager and submitted to the City depicting a well maintained and intact barrier with weather proof signage posted.

If there are any proposed changes to the TPZ, the City will require notification immediately and no changes may be made without prior written approval from the City.

Any damage to a tree during construction must be reported to the City immediately and an Arborist shall make recommendations on how remediation will take place. Any remediation will take place as soon as possible to protect the health of the tree. Failure to do so may result in penalties under the Boulevard Tree Protection By-law and/or as listed in the Standard Contract Documents for Municipal Construction Section 5 part B.

12.5.2 Avoiding damage to trees above ground

Any tree damage during construction must be reported to the Manager, Forestry Operations or designate immediately. This includes the following:

a. The topping or removal of branches from a tree other than in accordance with the approved Tree Protection Plan and accepted arboricultural practices.

b. The cutting or tearing of the roots of a tree within the drip line other than in accordance with the approved Tree Protection Plan and accepted arboricultural practice.

c. The scraping, gouging or compaction of the soil within the Tree Protection Zone by the placement of soil, fill, heavy equipment, vehicles, building or other materials thereon or by the movement of vehicles or equipment there over.

d. Depositing within the tree's drip line any fill, or toxic/harmful substance.

e. The removal of soil from within a tree's drip line.

12.5.3 Avoiding damage to trees below ground

Any roots outside the TPZ that require pruning or exposure, shall be located by hand digging or low pressure hydro vac/ Air spade excavation and pruned to the face of the excavation by a Certified Arborist.

If at any point, roots that have grown out past the drip line, become exposed or severed it is required that an Arborist is notified and proper root pruning procedures are employed.

If roots are exposed but not severed and do not require pruning it is mandatory that they are properly covered with soil or burlap and watered at least twice a day or as needed. This shall continue until the soil and sod have been replaced or until otherwise directed by the Arborist, or the City.

To avoid damage to tree roots, existing ground levels shall be retained within the TPZ

Subject to justification, in a circumstance where digging within the TPZ is permitted, only hand held tools or a displacement tool such as compressed air or hydro-vac systems are permitted.

Where equipment must travel across City property to access the work area, designated travel corridors shall be established to the satisfaction of the City in order to minimize soil compaction or damage to trees and other values.

If there is a barrier within 1 metre of a path that is to be used by any vehicle or machinery during work at any time, additional protection such as horizontal tree protection, is required (3.3.8).

Horizontal Tree Protection will consist of Geoterra construction Mats or an approved equivalent, or a 100mm minimum mulch path that spans the width of the widest piece of equipment that will be used on site for the duration of the work. Plywood boards will then be placed on top of the mulch. An image of this will be included in the photograph that is to be submitted weekly to the Manager, Forestry Operations or designate.

Any amendments required by the City to maintain the tree protection measures on site shall be implemented to the satisfaction of the City.

Failure to maintain an approved Tree Protection Plan will result in a warning by the City with 1 day to comply and bring the tree protection measures in line with the approved Tree Protection Plan. A second infraction may be dealt with by the issuance of a Stop Work order and possible fines as per the Boulevard Tree Protection By-law or the Tree Conservation By-law and/or as listed in the Standard Contract Documents for Municipal Construction Section 5 part B.

12.6 Post Construction

12.6.1 Inspection

An ISA Certified Arborist shall inspect all retained trees and their rooting area to assess if any additional remediation work is required to ensure their future health and survival.

12.6.2 Remediation Plan

If the inspection indicates damage to retained trees, the Arborist shall prepare a post construction remediation plan for approval to the Manager, Forestry Operations or designate. The remediation plan may include but is not limited to: Pruning, deep root fertilization; irrigation; aeration; tree planting; either as a single activity or as a combination.

12.6.3 Remediation Plan Inspection

An Arborist or Landscape Architect shall inspect the project site and certify that any and all measures specified in the tree protection plan or post construction remediation plan have been completed as per the plan. This certification is required before final acceptance and approval of the work by the city.

12.6.4 Project Approval

An assessment will be done by an Arborist or Landscape Architect to confirm that all protocols were met during construction or demolition.

12.7 Tree Planting

12.7.1 Introduction

Tree planting on the public right-of-way is a long-term initiative. What is done today can have a serious impact on street tree maintenance activities for years to come. It is therefore imperative that tree planting be done with care and planning. Planning is critical to ensure that the final product is sustainable and aesthetically pleasing. Trees of similar shape but different species, if carefully selected, will provide the desired effect

of tree arch over the street. The mix of species is essential to reduce the chances of insect epidemics, to guard against the spread of disease as trees are trimmed in efficient block treatments, to prevent widespread neighbourhood complaints and to eliminate extensive tree removal programs when single species plantings die (e.g. Dutch Elm Disease on American Elm, Verticillium wilt on Norway Maples).

Designs should reflect patterns which show a use of random plantings of diversified species. Consideration should be given to adjacent lands where existing trees may exist to ensure that continuous plantings are not created, in particular infill projects of limited frontage.

12.8 Policy

12.8.1 Security (at Development Agreement Stage)

Security is required to ensure that funds are available in the event of default by the developer. Currently, this is a standard subdivision development requirement and will continue to be required in the amount of $25.00 per linear metre of street frontage (both sides) within the plan of subdivision.

12.8.2 Planting Plan (at time of assumption request by developer)

The developer will submit a planting plan showing actual planting locations (with all site amenities know and shown on the plan) and proposed species of trees (common and Latin names shown). **The services of a full member of the Ontario Association of Landscape Architects in good standing must be retained.** This will ensure that an appropriate planting plan is in place which considers species diversity, tree form location and design. The planting plan must be stamped by the Landscape Architect and be shown on the standard plan of subdivision drawing or grading plan which shows lot dimensions (particularly frontages) as prepared by the consulting engineer. The Landscape Architect should adhere to the principle of “Right Tree, Right Place” and consider soil depth, quality, volume, and compaction when selecting planting sites and tree species. Proposed planting sites must consider future maintenance requirements of the trees and the ability to comply with OTM Book 7 Traffic Control set-ups. The plan will be reviewed and approved by City staff. The plan is to be submitted to the Manager, Forestry Operations or designate for review. Soil tests as specified in **Section 12.2.3** must accompany the Planting Plan.

12.8.3 Guidelines for Planting Plan Preparation All trees are to be planted on City property.

Tree planting locations will be determined on a site specific basis. As a goal, no less than one tree should be planted for each lot. Larger lots and corner lots may have more than one tree.

Since large trees contribute more to the environment and the neighbourhood than small ones, the largest tree that is suitable for the location is to be planted, considering eventual size at maturity. Plantable space may include the boulevard in front of or rear of the sidewalk (where present). Tree locations may be staggered and/or grouped where appropriate to make the best use of available planting and growing space. The preferred location for trees will be in the boulevard between sidewalk and curb, where present. All trees are to be planted on City property.

Adjacently planted trees will be shown approximately every 3.0m – 12.0m on centre where practical and where growing space is available, according to species. Ornamental trees will be spaced more closely than medium trees, and medium trees more closely than large trees.

The following guidelines will assist:

Table 12-3: Tree Planting Guidelines

Boulevard Width	Tree Planting Requirement
< 2m	No Tree (Consider planting between sidewalk and property line)
2 – 4m	Small, Medium*
> 4m	Small, Medium, Large*

* Select the largest tree appropriate to the site given the specifics of the site including boulevard width and all other guidelines.

Table 12-4: Setback Distance from Back of Curb

Road Type	Minimum distance back of curb to edge of rootball at planting
Provincial Highway	refer to MTO Table
Expressway	refer to MTO Table
Urban Thoroughfare	3.0m
Rapid Transit Boulevard	3.0m
Civic Boulevard	3.0m
Main Street	2-3 depending on traffic volume
Neighbourhood Connector	1.5m
Unclassified	1.5m
Rural Thoroughfare	3.0m
Rural Connector	3.0m

12.8.4 Curb to Property Line Considerations

Where no sidewalks exist, trees are to be shown at least 3.5m from the back of curb, but no closer than 0.6m to the private property boundary on City property. However, this location should not be so far from the curb as to not contribute to a street canopy.

12.8.5 Site Considerations

- **Plant per Electrical Safety Authority Guidelines** - only small under or within 4.5m of high voltage overhead utility lines or poles. Medium or Small trees are permitted from 4.5m to 7.6m from lines or poles. Large, Medium, or Small trees may be planted 7.6m or farther from overhead lines or poles.
- No tree is to be planted closer than 3.6m to the doors or 1.5m from the sides of an above ground hydro vault (transformer).
- Trees may be planted at 0.5m (measured horizontally) from buried street light cable, not closer than 0.9m (measured horizontally) from other buried electric

cables and not closer than 0.3m (measured horizontally) from buried telephone and/or TV service cables.

- No tree is to be shown closer than 2.0m to a driveway or 0.5m from a lead sidewalk going into a property
- No tree is to be shown closer than 6m in line of sight to a stop sign or Railway Crossing Sign on a residential street only (i.e. not a collector or arterial road).
- No tree is to be shown closer than 15.0m in line of sight to a stop sign or traffic signal light or Railway Crossing Sign on any collector or arterial road.
- No tree is to be shown closer than 3m to the front and sides of a fire hydrant.
- No tree is to be shown closer than 0.3m (measured horizontally) to a water main, or 0.7m from a shutoff. (Under review)
- No tree is to be shown closer than 0.2m (measured horizontally) to a gas line, or 3.2m to a Vital Main as defined by the most current version of Enbridge's Third-Party Requirements in the Vicinity of Natural Gas Facilities Standard.
- No tree may be shown closer than 2.0m (measured horizontally) to a sanitary sewer.
- No tree may be shown closer than 3.0m to another tree.
- No tree is to be shown closer than 4.0m to a street light pole.
- Trees only are required for cul-de-sac island or roundabout areas and will be shown on the planting plan.
- The cost for any shrub or perennial plantings will be at the expense of the developer and will be shown on the planting plan for review and approval in accordance with city guidelines and specifications. Planting of shrubs and/or perennials should coincide with City guidelines and specifications. Should this be required in advance of scheduled planting operations by City staff (i.e., for model homes, etc.), the developer should discuss the scheduling of this planting with City Staff prior to work being carried out.

12.8.6 Design and Species Considerations

- Mature trees are the most visible and desirable component of our streetscapes. However, to increase resistance to insect and disease problems, tree species must be mixed in order to avoid a continuous mono-culture situation. Where several phases make up the M-Plan, the plan should reflect the character of planting in adjacent phases.
- Use of native species over non-native species is desirable. Native means naturally occurring (indigenous) in Ontario.

- Invasive species (see Appendix 5) will be avoided except in special circumstances.
- ‘Small’ (previously ‘Oranmental’) tree means a tree that typically achieves a mature height of not more than 4.5m.
- ‘Medium’ tree means a tree that typically achieves a mature height greater than 4.5m and less than 7.6m.
- ‘Large’ tree means a tree that typically achieves a mature height greater than 7.6m.
- No more than five of any one species or variety is to be shown on one side of the street in a row. Trees should be matched one side of the street to the other (maximum of 10 matched trees) to provide a ‘closed canopy’ effect at maturity.
- Where several phases make up the M-Plan, the plan should reflect the landscape character of plantings in adjacent phases. It is not necessary and may not be desirable to match species on adjacent phases, but consideration should be given to a neighbourhood identity with similar tree shape and size at maturity.
- In order to integrate species diversity into each plan, the species mix shall provide no more than 10% of any one species, 20% of any one genus or 30% of any one family (percentage of the entire number of trees within the plan). Individual phases may diverge from this percentage if deemed reasonable (e.g. cul-de-sac of 12 lots) so long as the overall object of 10% species mix is maintained within the plan of subdivision.
- Trees with similar shape (i.e.: vase, oval, upright) are to be selected to provide a neighborhood landscape character.
- No species other than those listed in Appendix 5 are to be shown on the planting plan without prior consultation with City of London staff. Other species may be considered for approval if it can be shown the proposed species are appropriate to the proposed planting locations and to permit trial plantings of new (to the City) species or cultivars.
- Trees with large or messy fruit may be planted only in limited situations;
- Trees with large thorns are not permitted.
- Coniferous needle-bearing trees will not be shown in the boulevard where they will cause sight line obstructions but may be planted rear of the sidewalk.
- Ash (*Fraxinus*) species may not be shown or planted on any City boulevard until further notice – no exceptions.

12.9 Planting

12.9.1 Planting (Post Assumption)

Once the planting plan and soil quality reports are approved at the time of assumption, the City of London will implement street tree planting before end of warranty of the subdivision through City of London tender processes and administration.

12.9.2 Species Substitutions

The City will implement the approved tree planting plan, as accurately as possible, with the tree species specified. Once the planting plan is prepared, substitutions will be done only as necessary and should not be a common occurrence. Should substitution be required due to unforeseen circumstances, the City reserves the right to substitute with a suitable species without further consultation or approvals through the developer.

Note: substitute species will endeavour to match the size and shape of the originally planned species. The overall limits by species, genus, and family shall still apply.

12.9.3 Timely Planting

The City of London will commit to planting trees within one year of assumption. Any subdivisions assumed prior to October 1 of the current year would be incorporated into the Tender process for planting the following year. If assumptions are processed after that date, they could be planted the following year, depending upon availability of plant material specific to the planting plan, and depending upon when the Tender documents are distributed.

If assumption of the subdivision is unduly delayed, with at least 50% of homes already occupied, the City of London may work with the developer to arrange for planting of trees prior to assumption by the City, recognizing the high benefit to the neighbourhood and the environment of planting trees as early as possible.

12.9.4 Fee

There are several components which comprise the cash-in-lieu amount charged for street tree planting. The fee must cover all costs associated with implementing the program, including the cost to supply and install the tree, a two-year replacement warranty policy and associated administration costs (planning, organizing and implementing of tree planting as well as surveying and compliance checks). Soil modifications will be included in this fee if the soils at the time of assumption do not meet City standards, as specified in **Section 12.2.3** of this document.

Once the trees are planted, the City will forward an invoice to the developer reflecting the actual cost of planting trees in that subdivision with an additional 15% administration fee (plus all applicable taxes).

12.10 At End of Subdivision Warranty

12.10.1 Fee

Payment for tree planting as invoiced by the City of London is a requirement at the time of end of warranty of the subdivision. If payment is not received, end of subdivision warranty will not be granted. See **Section 19.2.5.2** for information on end of warranty requirements.

12.10.2 Security

For information on the subdivision warranty period, please refer to **Section 19.2.5**, and for information on securities, please refer to the City of London's Subdivision and Development Agreement Security Policy.

12.10.3 Public Relations

Should homeowners inquire about tree planting operations, the developer will explain that trees will be planted post-assumption. Further inquiries may be directed to the City of London.

12.10.4 Procedure Summary

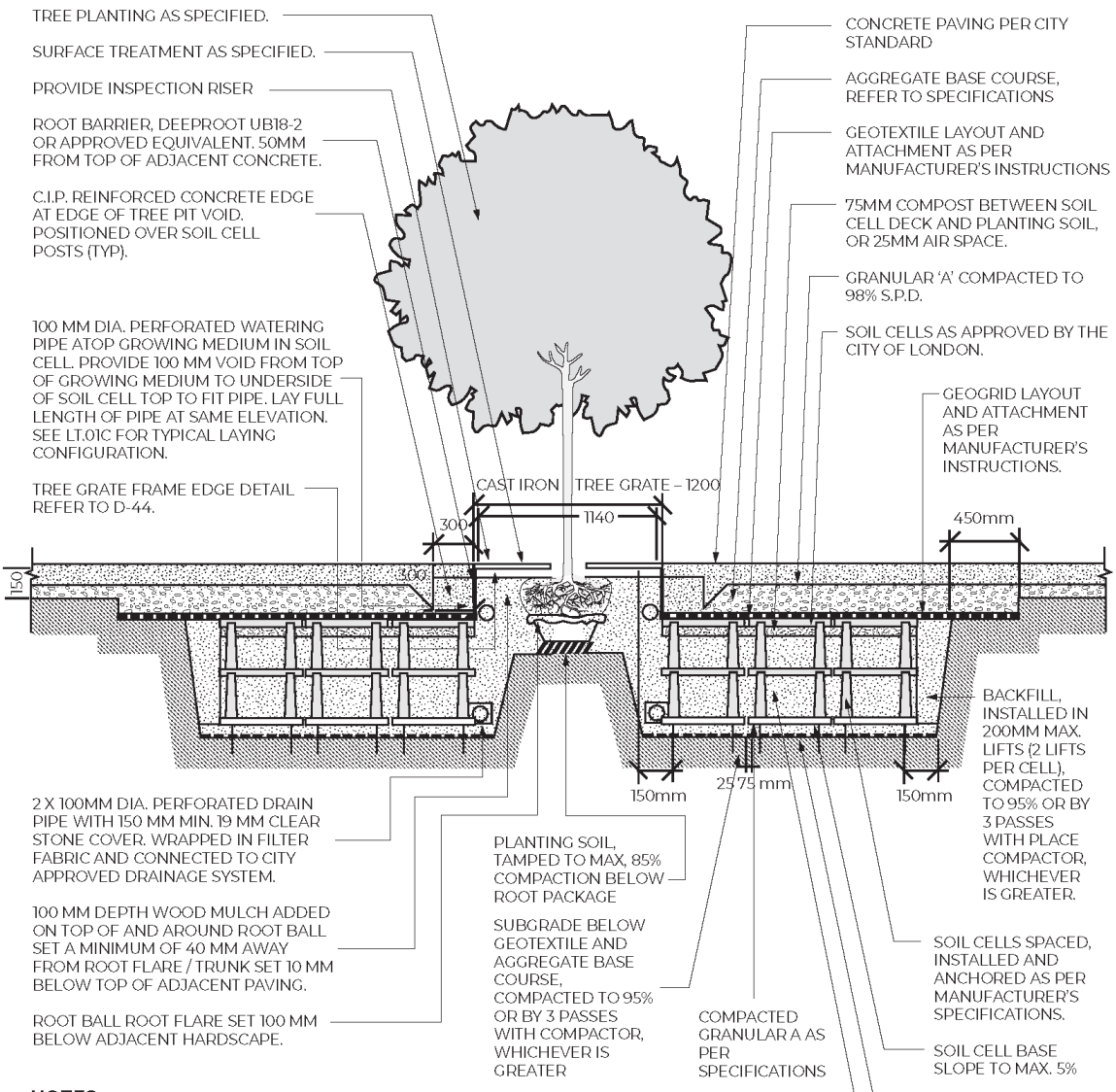
- The developer will provide a planting plan for review and approval at time of assumption.
- The plan will be reviewed and approved by City staff. The plan is to be submitted to the Manager, Forestry Operations or designate for review.
- City Staff will plant trees between assumption and end of warranty of the subdivision.
- The City will invoice the developer for tree planting operations.
- The developer will forward payment as invoiced to the Finance Division, City Hall, Room 406.
- City staff will acknowledge receipt of payment and communicate to the Engineering Review Department that all requirements with regards to tree planting have been met for the area being assumed.

12.10.5 End of Tree Warranty – Inspection Procedure

Trees shall be planted under a 2-year warranty from time of planting, as prescribed in the tender documents. A tree warranty inspection shall be conducted prior to the expiry of the 2-year warranty period. This shall be conducted as per the guidance in Appendix 6 and included in the tree planting tender (contract). Trees that fail inspection shall be replaced within a suitable timeframe.

12.11 Forestry Figures

D-34 Soil Cell Tree Planting in Concrete Paving



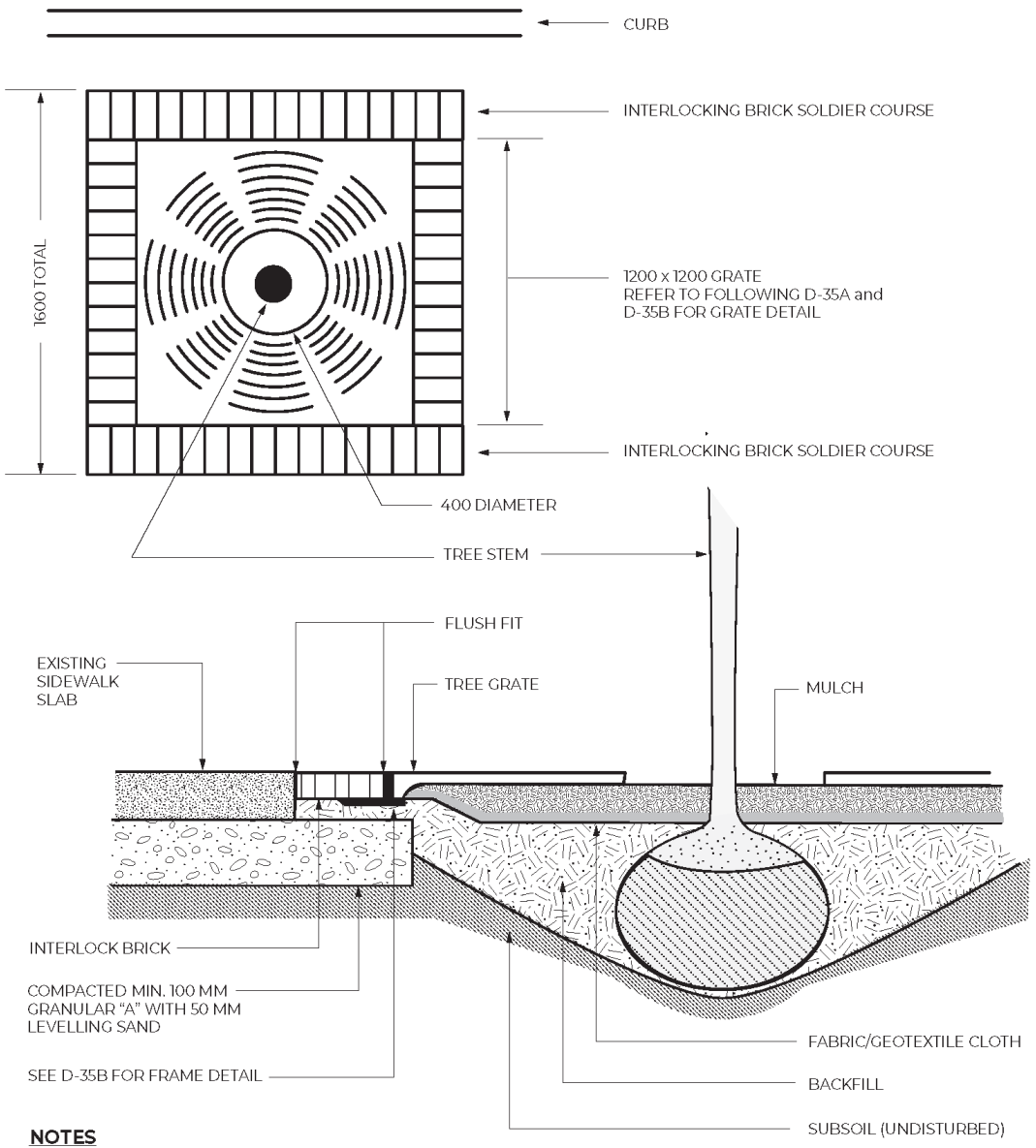
NOTES

1. TREES SHALL HAVE ACCESS TO A MINIMUM OF 10, 15 OR 20 CUBIC METERS OF GROWING MEDIUM IN A SHARED TREE PIT OR 15, 23 OR 30 CUBIC METERS OF GROWING MEDIUM IN AN INDIVIDUAL TREE PIT, DEPENDING ON WHETHER THE TREE IS CATEGORIZED AS SMALL, MEDIUM OR LARGE RESPECTIVELY.
2. SOIL CELL SYSTEM OR PRODUCT TO BE APPROVED BY THE CITY OF LONDON.
3. SITE SPECIFIC DRAWINGS OF THE SOIL CELL SYSTEM, STAMPED BY A STRUCTURAL ENGINEER LICENSED IN ONTARIO ARE REQUIRED.
4. ALL SOIL CELL SYSTEMS ARE TO BE IRRIGATED, USING PASSIVE (STORMWATER) OR ACTIVE SYSTEMS (IRRIGATION SYSTEMS), WATER MUST BE EVENLY DISTRIBUTED THROUGHOUT THE TREE PIT. IF A PASSIVE SYSTEM IS SPECIFIED, PROVISIONS MUST BE TAKEN TO PREVENT THE BUILD-UP OF DE-ICING SALTS IN THE TREE PIT.

D 34 **SOIL CELL TREE PLANTING IN CONCRETE PAVING**

SCALE NTS

D-35 Tree Grate and Planting Detail



NOTES

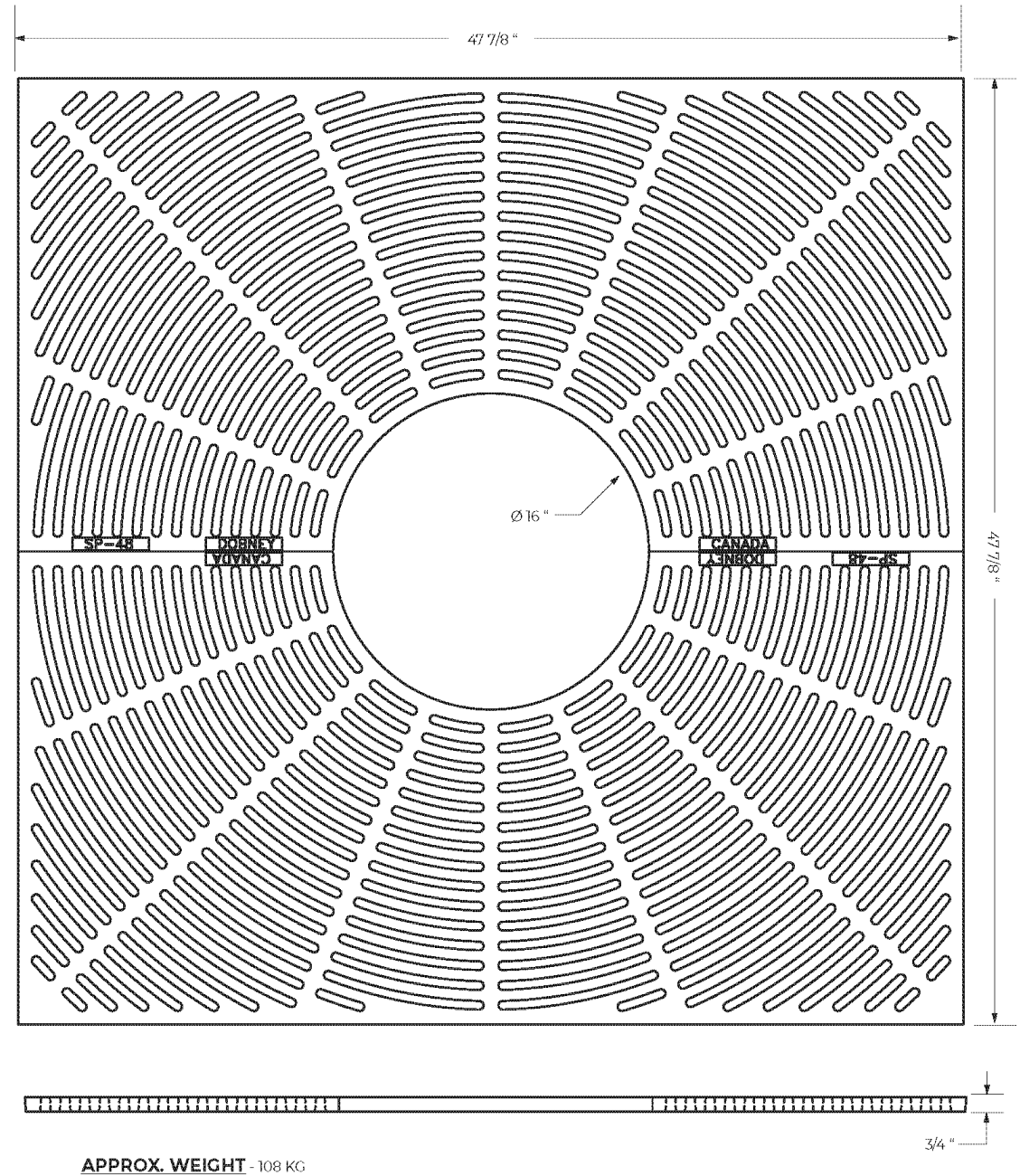
WHERE NEXESSARY TO MEET A 1.8M MINIMUM SIDEWALK REQUIREMENT. THE CURB AND SIDEWALK SOLDIER BRICK ARE TO BE LAID SIDEWAYS TO PROVIDE 1600X1400 OPENING.

ALL DEMENSIONS ARE IN MM UNLESS OTHERWISE SHOWN.

D 35 **TREE GRATE AND PLANTING DETAIL**

SCALE NTS

D-35A Tree Grate



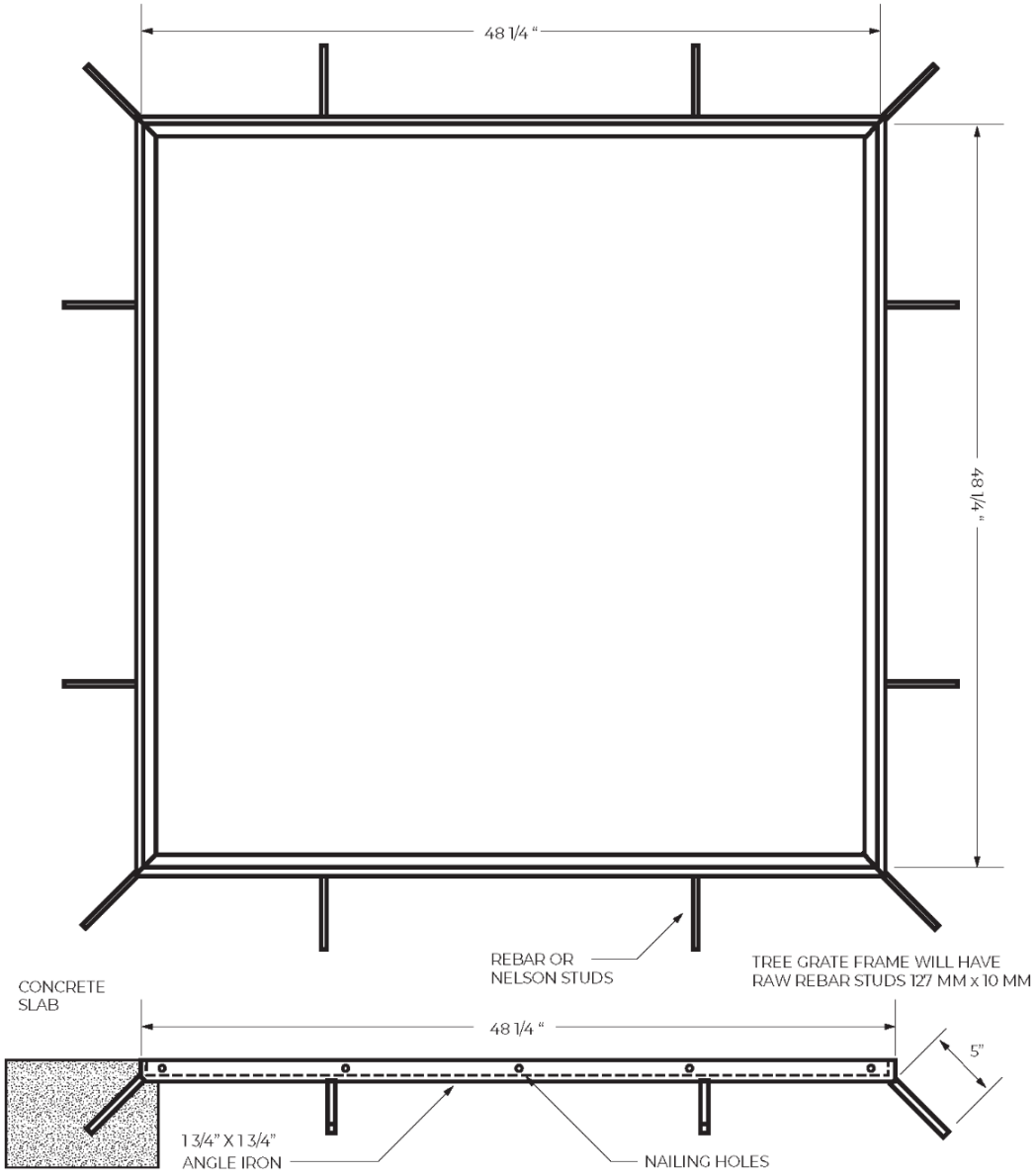
APPROX. WEIGHT - 108 KG

D
35A

TREE GRATE

SCALE NTS

D-35B Tree Grate Frame



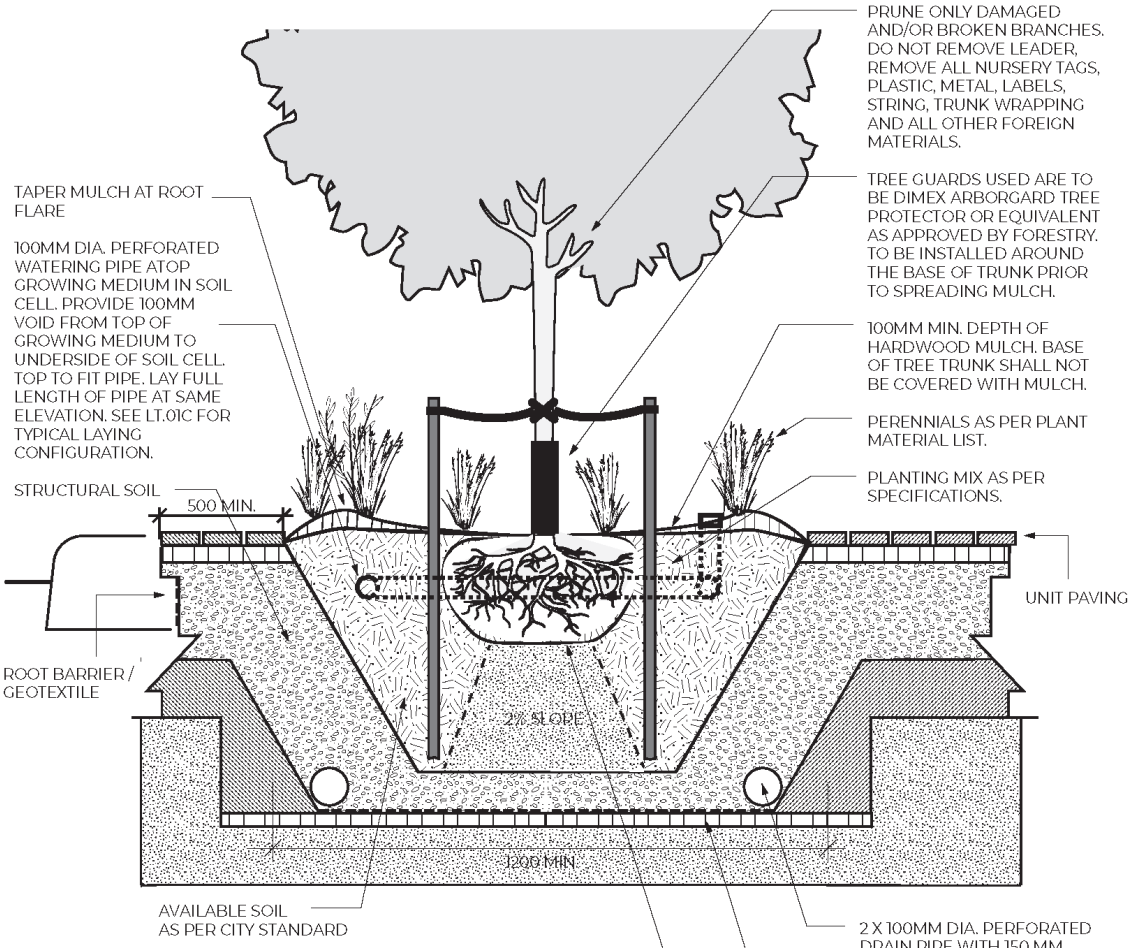
THE TREE GRATE FRAMES ARE MADE WITH MILD STEEL THAT MEETS ASTM A36 REQUIREMENT.
TREE GRATE FRAME HAVE RAW NATURAL FINISH.

D
35B

TREE GRATE FRAME

SCALE NTS

D-40 Street Tree Planting – Structural Soil



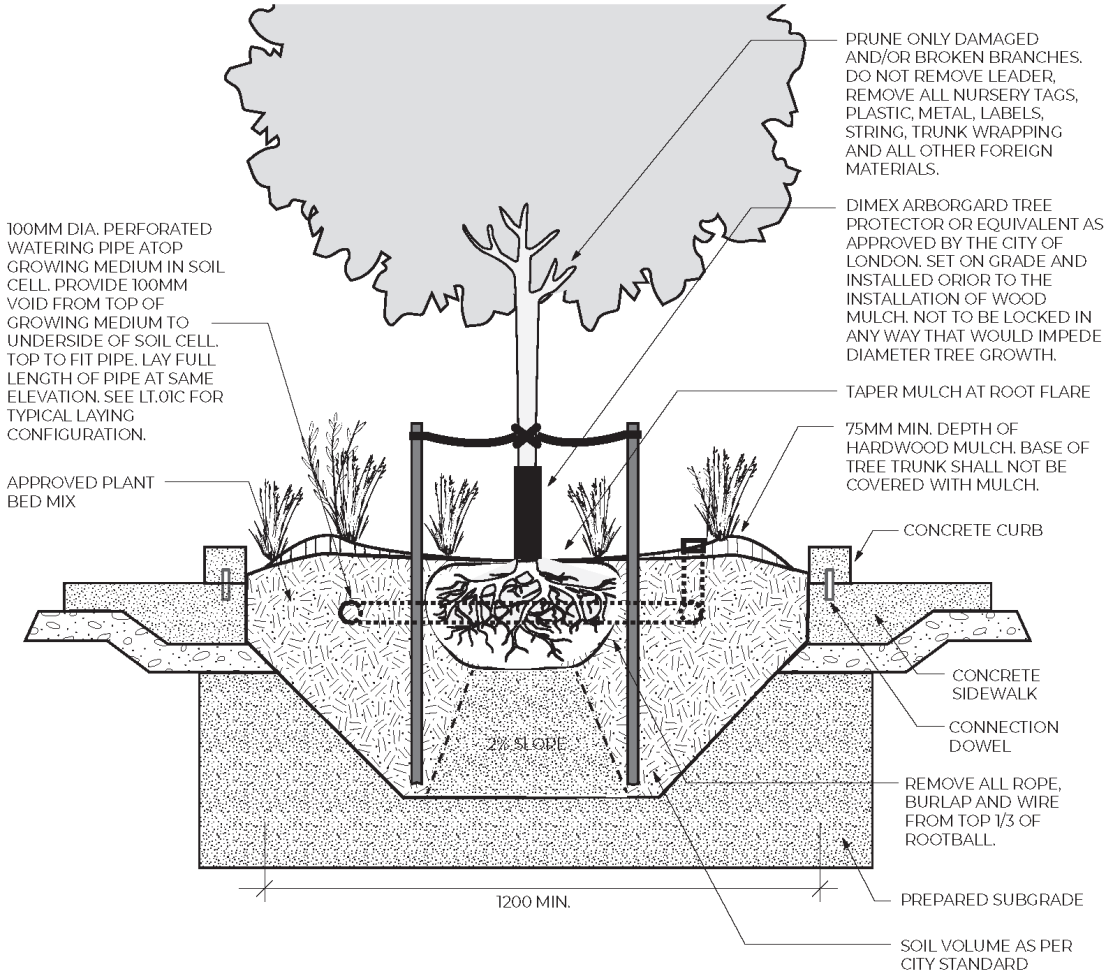
NOTES:

1. WIDTH OF TREE PIT CAN BE REDUCED TO A MINIMUM WIDTH OF 1200MM IF TREE SOIL VOLUME IS MET. ROOT BARRIERS WOULD BE RECOMMENDED AT THE CURB (FOR A SMALLER WIDTH).
2. TRUNK TO BE PLANTED 50-100MM HIGHER THAN FINISHED GRADE TO ALLOW FOR SETTLING.
3. SAUCER TO BE SOAKED WITH WATER AND MULCHED IMMEDIATELY FOLLOWING PLANTING.
4. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. ALL TWINE AND BURLAP AROUND ROOTBALL MUST BE BIO-DEGRADABLE, NYLON ROPE WILL NOT BE ACCEPTED.
6. NO TREE PIT SHALL BE LEFT OPEN OVERNIGHT.
7. CALIPER AND HEIGHT OF TREE MUST MEET CONTRACT REQUIREMENTS.
8. PLANT BED SOIL MIX TO BE AS PER SPECIFICATIONS.
9. IF A WATER SERVICE OF WATER MAIN IS LOCATED UNDER THE PLANTING BED THEN INSULATION WILL BE REQUIRED.
10. SOIL VOLUME: $30M^3$ FOR LARGE TREE, $15M^3$ FOR SMALL/MEDIUM TREE: CAN BE ACHIEVED WITH SOIL CELLS, STRUCTURAL SOIL, CONTINUOUS TRENCH, SOIL VAULT, ROOT PATHS.

D 40 **STREET TREE PLANTING - STRUCTURAL SOIL**

SCALE NTS

D-42 Downtown Raised Planter Open Bed



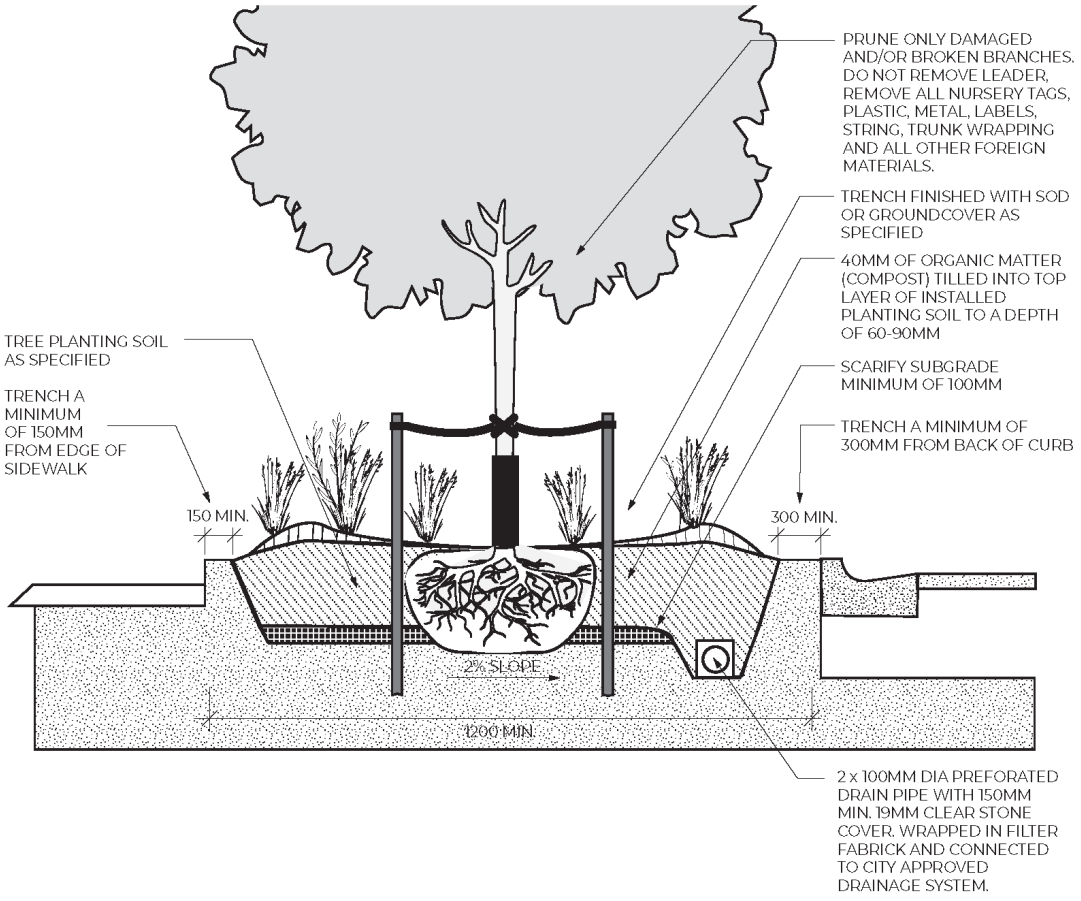
NOTES:

1. WIDTH OF TREE PIT CAN BE REDUCED TO A MINIMUM WIDTH OF 1200MM IF TREE SOIL VOLUME IS MET. ROOT BARRIERS WOULD BE RECOMMENDED AT THE CURB (FOR A SMALLER WIDTH).
2. TRUNK TO BE PLANTED 50-100MM HIGHER THAN FINISHED GRADE TO ALLOW FOR SETTLING.
3. SAUCER TO BE SOAKED WITH WATER AND MULCHED IMMEDIATELY FOLLOWING PLANTING.
4. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. ALL TWINE AND BURLAP AROUND ROOTBALL MUST BE BIO-DEGRADABLE, NYLON ROPE WILL NOT BE ACCEPTED.
6. NO TREE PIT SHALL BE LEFT OPEN OVERNIGHT.
7. CALIPER AND HEIGHT OF TREE MUST MEET CONTRACT REQUIREMENTS.
8. PLANT BED SOIL MIX TO BE AS PER SPECIFICATIONS.
9. IF A WATER SERVICE OF WATER MAIN IS LOCATED UNDER THE PLANTING BED THEN INSULATION WILL BE REQUIRED.
10. SOIL VOLUME: 30M³ FOR LARGE TREE, 15M³ FOR SMALL/MEDIUM TREE: CAN BE ACHIEVED WITH SOIL CELLS, STRUCTURAL SOIL, CONTINUOUS TRENCH, SOIL VAULT, ROOT PATHS.

D 42 **DOWNTOWN RAISED PLANTER - OPEN BED**

SCALE NTS

D-45 New Construction Softscape Boulevard Soil Trench for Tree Planting



NOTES:

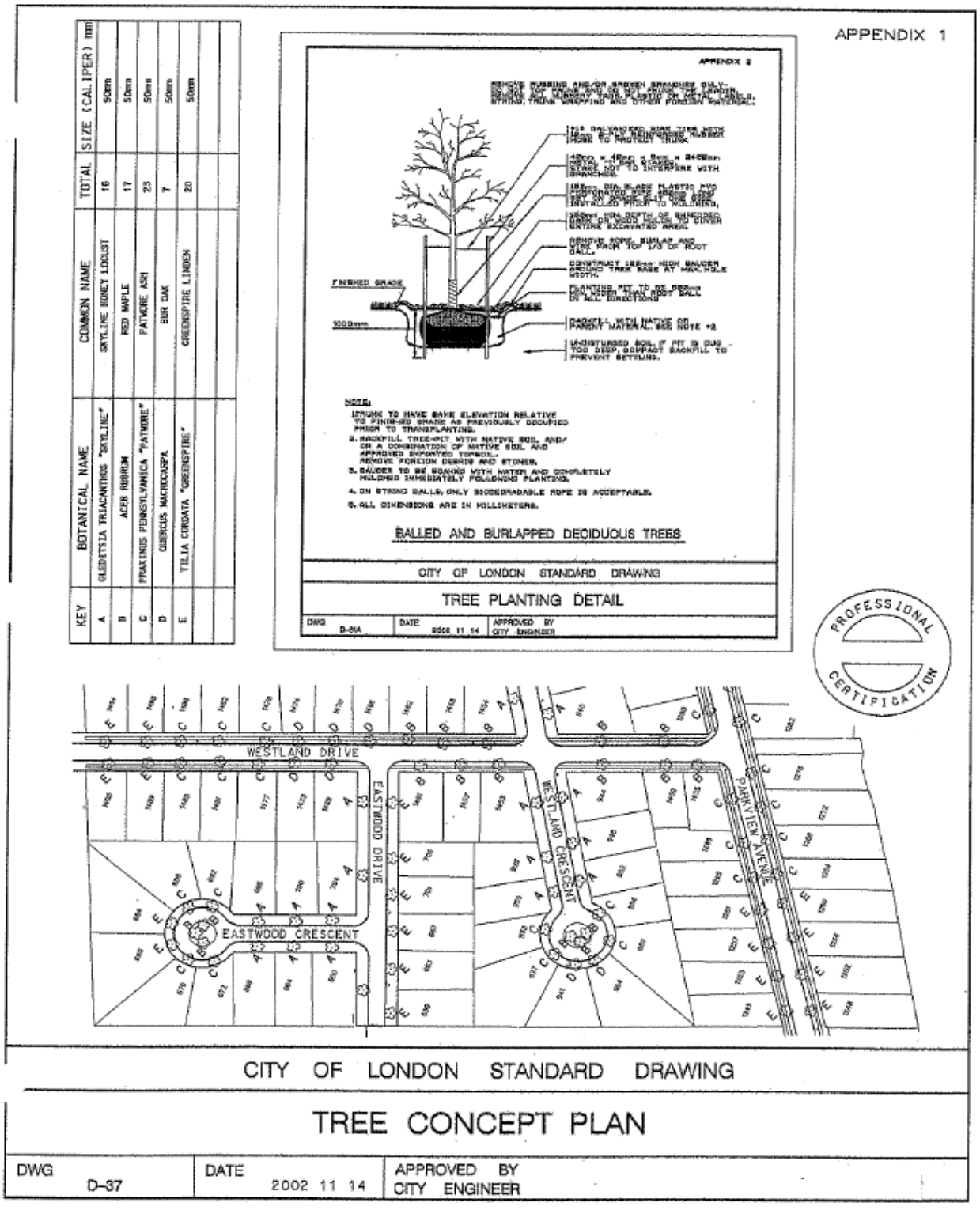
1. PLANTING SOIL MIXTURE SHALL CONFORM TO CITY OF LONDON SPECIFICATIONS FOR PREPARATION AND INSTALLATION OF TREE GROWING MEDIUM.
2. SUBGRADE SOIL TO BE TILLED TO A DEPTH OF 25-50MM PRIOR TO INSTALLING PLANTING SOIL.
3. SCARIFY SUBGRADE MINIMUM OF 100MM PRIOR TO INSTALLING GROWING MEDIUM.
4. REMAINING PLANTING SOIL SHALL BE INSTALLED IN LIFTS OF 150MM-300MM AND COMPACTED BETWEEN 75% AND 80% OF MAXIMUM DRY DENSITY (PROCTOR).
5. TILL 40MM OF ORGANIC MATTER (COMPOST) INTO TOP LAYER OF INSTALLED PLANTING SOIL TO A DEPTH OF 60-90MM.
6. BOULEVARD SOIL TRENCH TO BE FINISHED WITH SOD OR GROUNDCOVER. IN ACCORDANCE WITH CITY OF LONDON SPECIFICATIONS.
7. 150MM UPGRADE TO "T" OUTLET INTO EXISTING CATCH BASIN IN ACCORDANCE WITH CITY OF LONDON SPECIFICATIONS.

D
45

NEW CONSTRUCTION SOFTSCAPE BOULEVARD SOIL TRENCH FOR TREE PLANTING

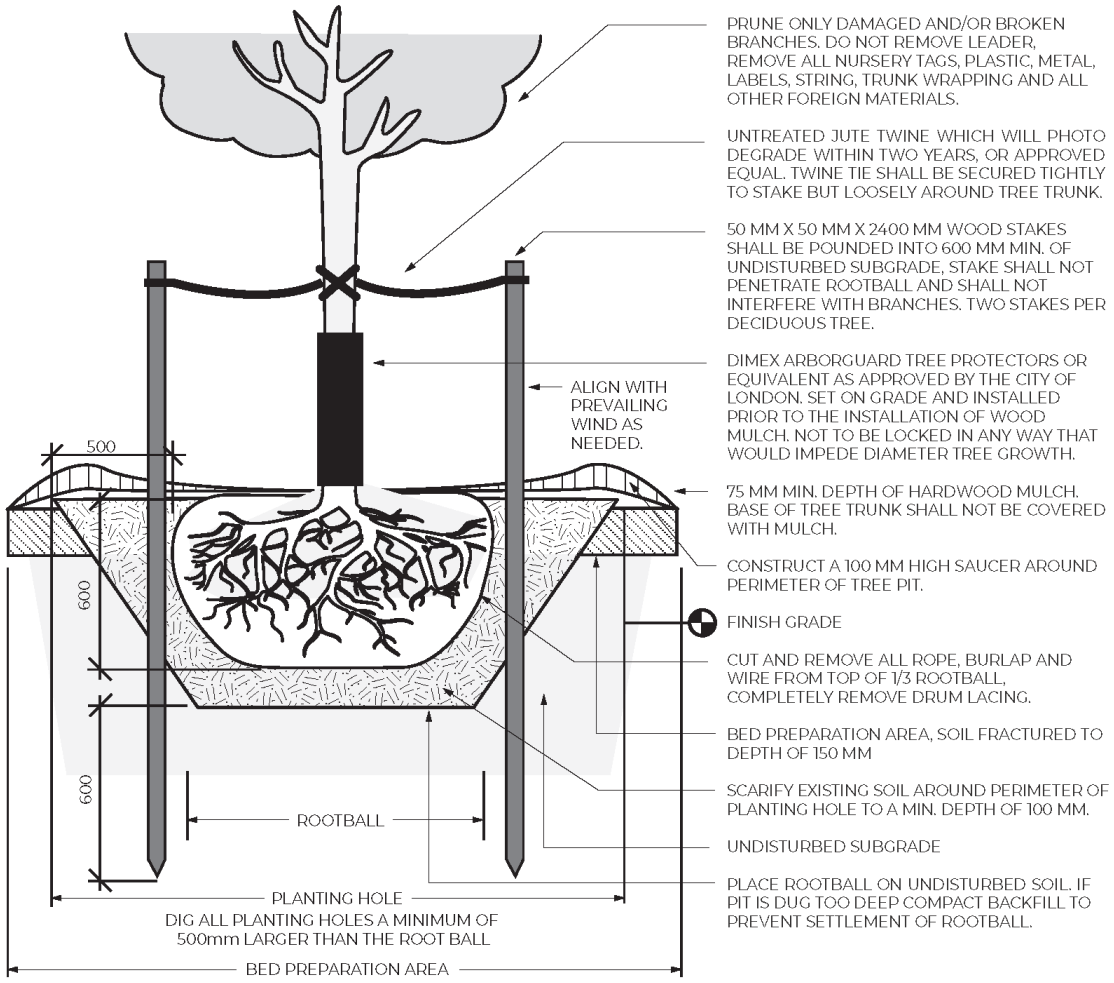
SCALE NTS

Appendix 1: Tree Concept Plan (D-37)



Appendix 2: Tree Planting Details

D-31A Deciduous Tree Planting Detail



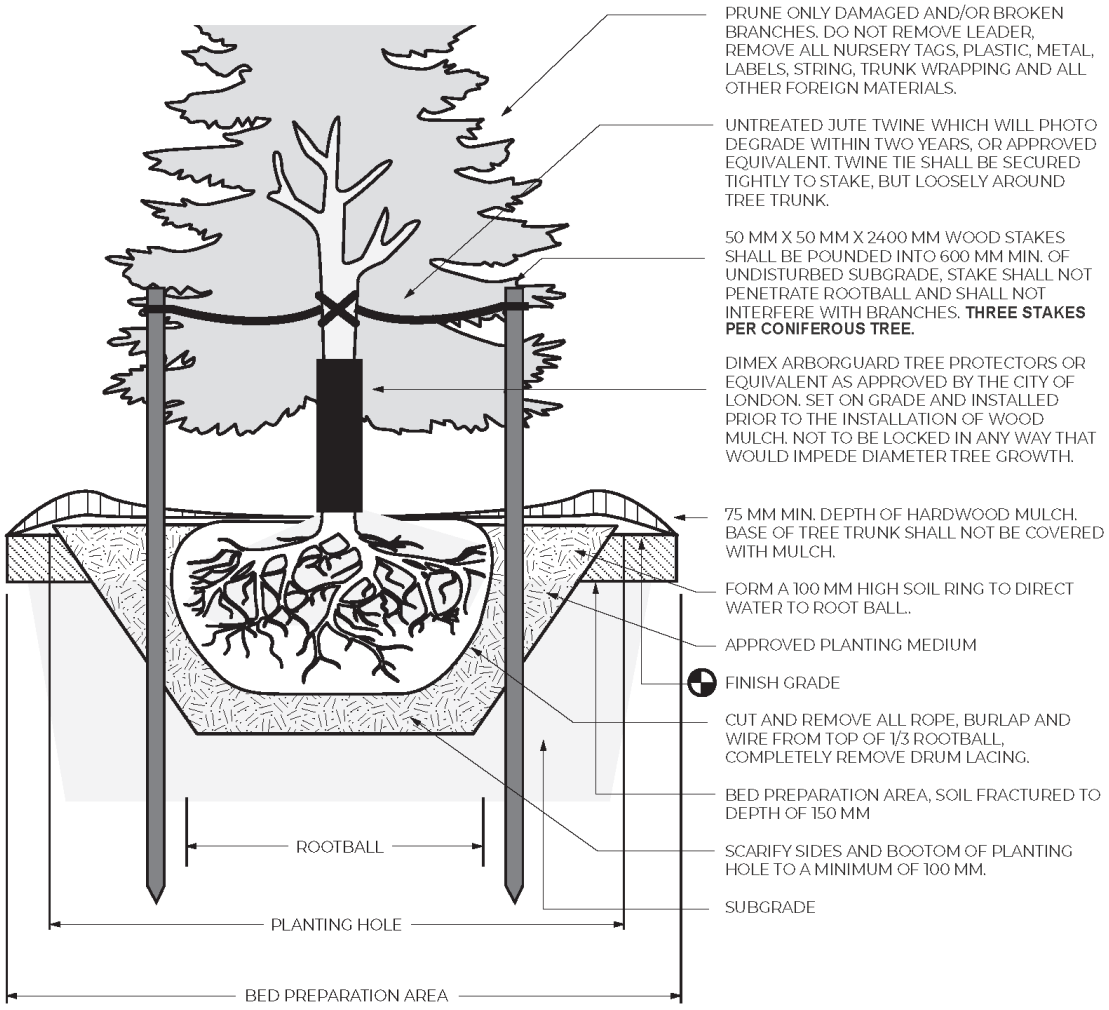
NOTES

1. ROOT FLARE TO BE PLANTED 50-100 MM HIGHER THAN FINISHED GRADE TO ALLOW FOR SETTLING.
2. THE CITY OF LONDON WILL PERFORM INDUSTRY ACCEPTED SAMPLING METHODS IN CONJUNCTION WITH THE CONTRACTOR TO DETERMINE IF EXISTING AND EXCAVATED SOIL IS ACCEPTABLE GROWING MEDIUM OR IF AUGMENTATION IS REQUIRED PRIOR TO BACKFILLING. REFER TO SPECIFICATIONS AND D-31C FOR FURTHER INFORMATION.
3. SAUCER TO BE SOAKED WITH WATER AND MULCHED IMMEDIATELY FOLLOWING PLANTING.
4. BACKFILL AREA SHOULD BE WATER SETTLED TO ENSURE CONTACT BETWEEN ROOTBALL AND AREA. BACKFILL TO BE INSTALLED IN LIGHTLY TAMPED 150 MM LIFTS TO AVOID AIR POCKETS.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
6. ALL TWINE AND BURLAP AROUND ROOTBALL MUST BE BIO-DEGRADABLE. NYLON ROPE WILL NOT BE ACCEPTED.
7. CALIPER OR HEIGHT OF TREE MUST MEET CONTRACT REQUIREMENTS.
8. PLANTING DETAIL TO BE READ IN CONJUNCTION WITH TREE PLANTING SPECIFICATIONS.

D 31A **DECIDUOUS TREE PLANTING DETAIL**

SCALE NTS

D-31B Coniferous Tree Planting Detail



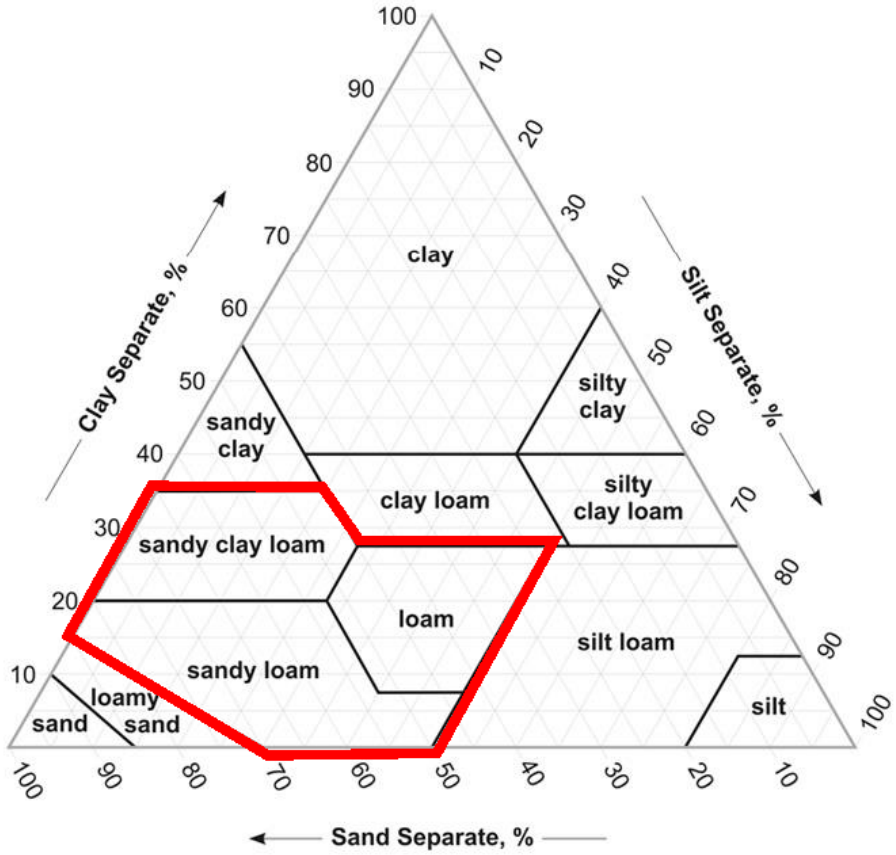
NOTES

1. ROOT FLARE TO BE PLANTED 50-100 MM HIGHER THAN FINISHED GRADE TO ALLOW FOR SETTLING.
2. THE CITY OF LONDON WILL PERFORM INDUSTRY ACCEPTED SAMPLING METHODS IN CONJUNCTION WITH THE CONTRACTOR TO DETERMINE IF EXISTING AND EXCAVATED SOIL IS ACCEPTABLE GROWING MEDIUM OR IF AUGMENTATION IS REQUIRED PRIOR TO BACKFILLING. REFER TO SPECIFICATIONS AND D-31C FOR FURTHER INFORMATION.
3. SAUCER TO BE SOAKED WITH WATER AND MULCHED IMMEDIATELY FOLLOWING PLANTING.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. ALL TWINE AND BURLAP AROUND ROOTBALL MUST BE BIO-DEGRADABLE. NYLON ROPE WILL NOT BE ACCEPTED.
6. CALIPER OR HEIGHT OF TREE MUST MEET CONTRACT REQUIREMENTS.
7. PLANTING DETAIL TO BE READ IN CONJUNCTION WITH TREE PLANTING SPECIFICATIONS.
8. ALL STAKES AND SUPPORT SYSTEMS TO BE REMOVED AFTER ONE FULL GROWING SEASON.

D 31B **CONIFEROUS TREE PLANTING DETAIL**

SCALE NTS

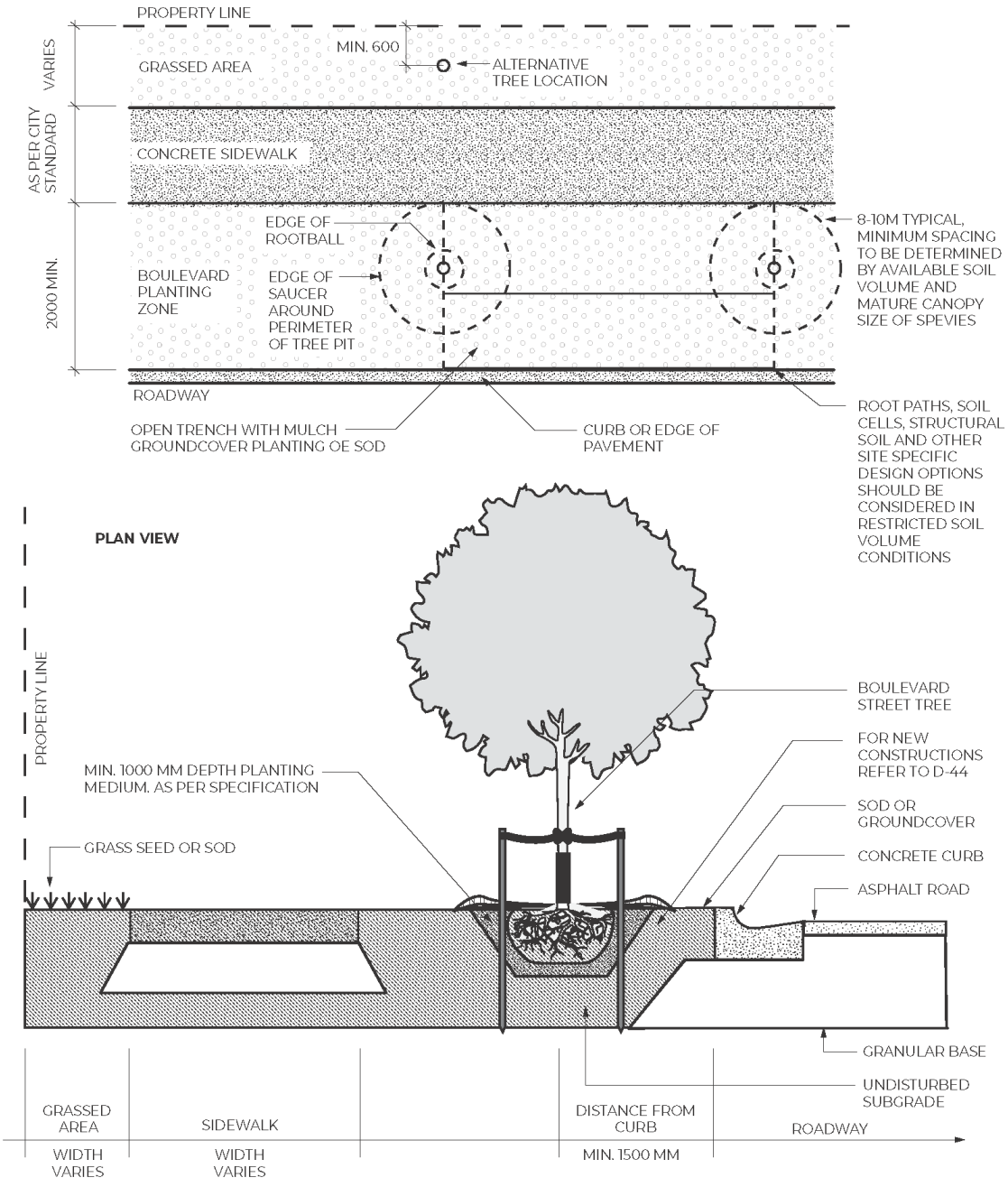
D-31D Planting Soil Reference Detail



NOTES
1. RED OUTLINE DENOTES THE TARGET COMPOSITION FOR PLANTING SOILS.

D 31D **PLANTING SOIL REFERENCE DETAIL**

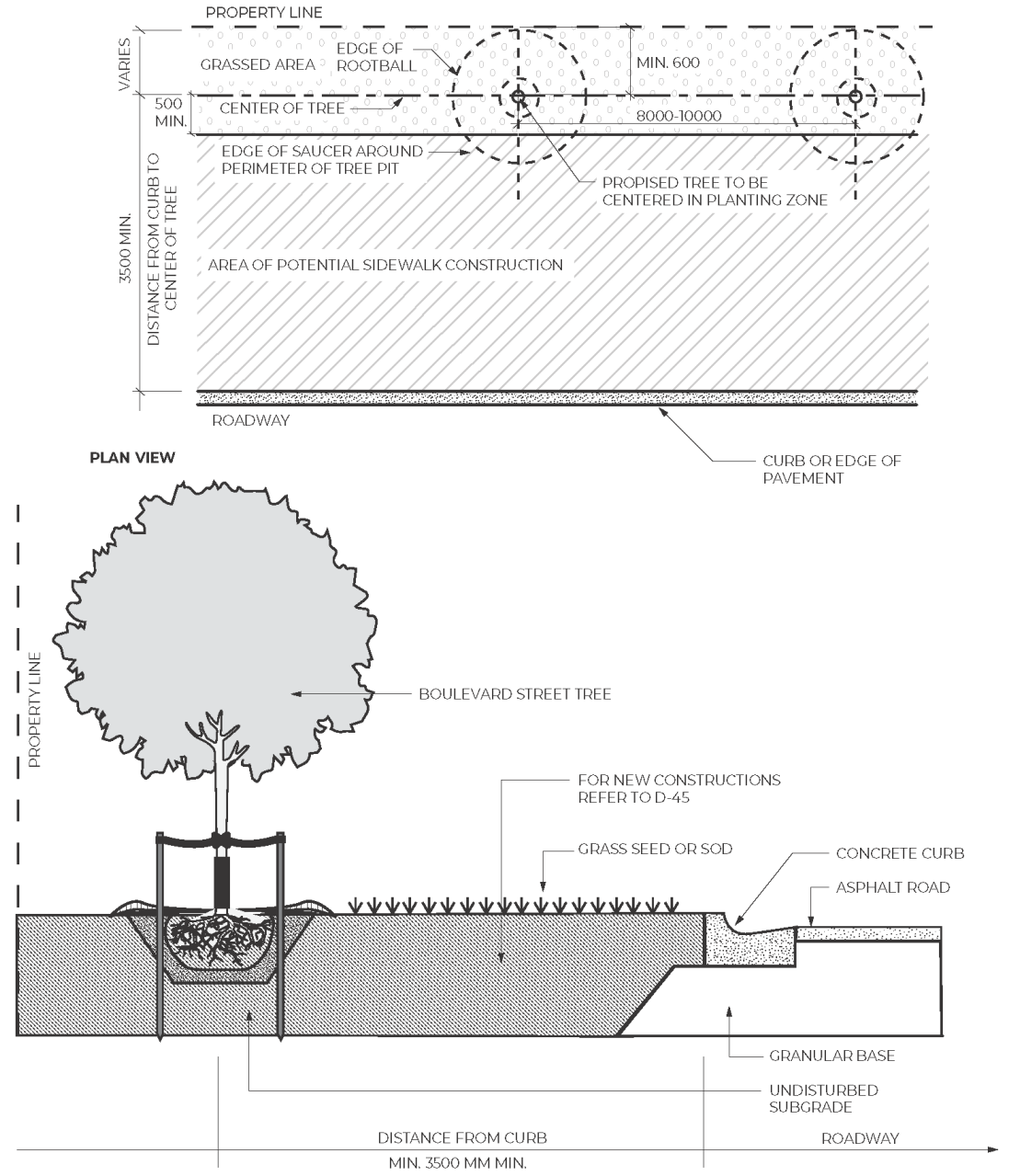
D-36A Tree Planting: Softscape Boulevard with Sidewalk



D 36A **TREE PLANTING: SOFTSCAPE BOULEVARD WITH SIDEWALK**

SCALE NTS

D-36B Boulevard Tree Planting Detail Without Sidewalk



D 36B **BOULEVARD TREE PLANTING DETAIL - WITHOUT SIDEWALK**

SCALE NTS

Appendix 3: General Notes

General Notes

1. All plant materials shall be #1 nursery stock meeting Canadian standards.
2. Stake all deciduous trees.
3. Dig all tree pits 500.0 mm larger all around than the root ball and place tree centred in pit on undisturbed soil. Backfill with parent material and replace debris (e.g. Brick, dry wall, etc.) with screened topsoil.
4. For grading and drainage, see engineering plans.
5. Specific tree locations for each lot are to be determined by Tree Planting Guidelines set by the City of London Environmental Services Department and as shown on Lot Grading Certification Plans.
6. All dimensions are in millimetres unless otherwise noted.
7. All plant materials to be guaranteed for two growing seasons from the date of provisional acceptance.
8. Prior to the commencement of construction, all existing underground utilities within the limits of the construction site shall be located and marked. Any utilities damages or disturbed during construction shall be repaired or replaced to the satisfaction of the City of London at the Contractor's expense.
9. Plant materials to be installed as shown in Tree Planting Detail (12-18).
10. Substitutions allowed only after consultation with the Landscape Consultant and the City of London.
11. Predominant soil type in the area must be considered when selecting species.

Appendix 4: Approved Trees

Approved Trees

The selection of trees for individual locations is a difficult process. It must give careful consideration to the neighbourhood and the existing conditions including soil type, moisture, available growing space above ground, proximity to hard physical plant (hydro wires, gas, lighting, hydrants, vaults, sidewalks) and future rooting and growing space demands.

In recommending the species in the table we recognize that they are not all suitable for all locations. Carefully select the species which possess the characteristics that most closely meet the environmental conditions of each site. As well, not all cultivars of each species are listed. The design professional may suggest species not listed and they will be reviewed by City staff through the approval process.

Other concerns include:

- **Stress:** considers the tolerance to conditions such as compacted soil, diseases, drought, insects, road salt spray
- **Time:** considers which species can be transplanted/moved at specific times in the year e.g., spring only
- **Native:** considers the suitability of trees indigenous to this region for use in highly disturbed soils, traditionally found in streetscapes and new subdivisions
- **Fruit:** consider the size and season and abundance of fruit produced by some species making them less desirable in specific locations
- **Disease:** consider the potential for widespread mortality and costly removal and replacement programs generating public and political complaints with trees such as Norway maple (Verticillium wilt) American Elm (Dutch Elm Disease) Austrian Pine (Diplodia Tip Blight). Avoid mass planting of single species.

Variety

In an effort to promote long term sustainability, cost effective block trimming operations and increase ability to manage street tree risk management, we encourage a variety of tree species on each and every street. We also support aesthetically pleasing street tree designs and therefore encourage the planting of tree species mixtures which have similar form.

Commonly the landscape architect or registered professional forester is responsible for proper design and species selection taking the above points into consideration.

In an attempt to assist the design and species selection process, a list of recommended trees is included. The list has been prepared using a number of references and you are encouraged to search these out and provide input with respect to other species for consideration.

References include:

- Dirr, M.A. 1990 Manual of Woody Landscape Plants
- Farrar, J.L. 1995 Trees in Canada
- Gerhold, H.D. et.al., 1989 Street Tree Factsheets
- Himelick, E.B., 1981 Tree & Shrub Transplanting Manual
- Poor, J.M. (Editor) 1984 Plants That Merit Attention Vol. 1
- Rehder, A. 1940 Manual of Cultivated Trees & Shrubs
- Sternberg, G, & J. Wilson 1995 Landscaping with Native Trees
- Watson, G.W. 1992 Selecting and Planting Trees

TREE FORMS:

Figure 12.4 Tree Forms

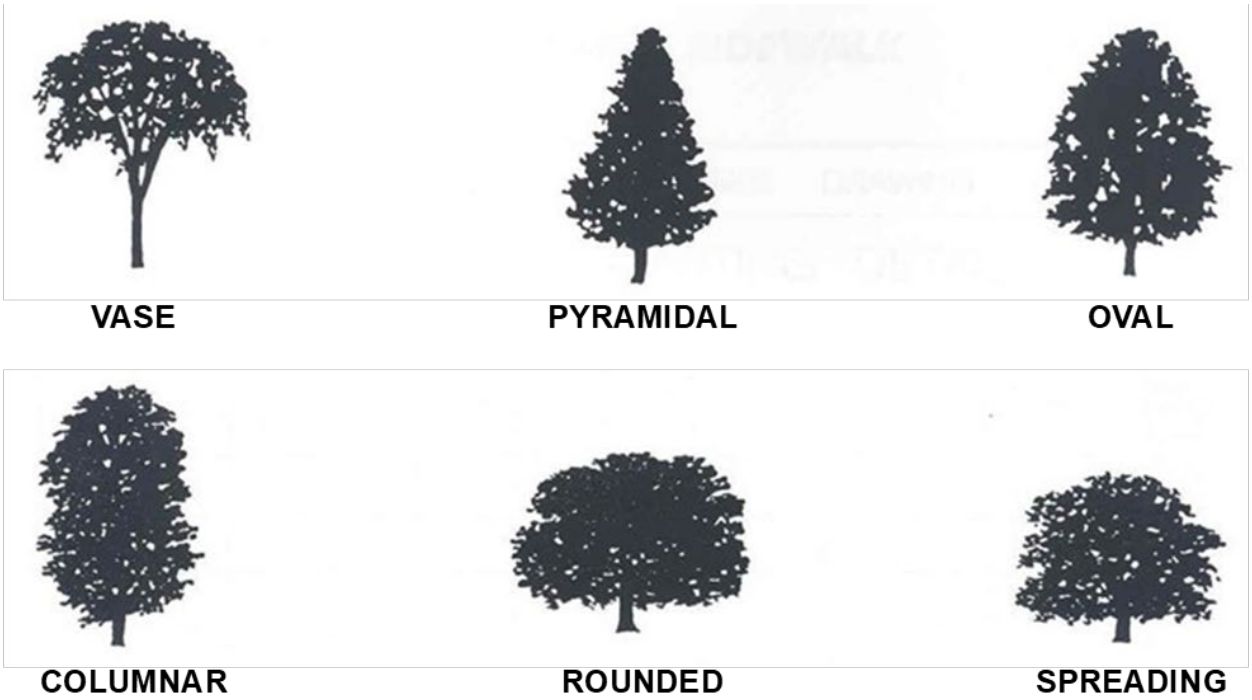


Table 12-5 Approved Trees

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Acer campestre** Hedge Maple	**Non- Continental**	Boulevard	**Limit planting of Acer to reduce percentage in London's tree canopy.** Compact form/trunk suckers require extra maintenance.	Large	Rounded	7
Acer ginnala** Amur Maple	**Non- Continental**	Boulevard	**Limit planting of Acer to reduce percentage in London's tree canopy.** (by prior approval Only) Multi-stem Compact form/red & yellow face colour/lots of seeds/tends to sucker/specify single stem form	Small	Rounded	4
Acer nigrum Black Maple	**Native to Ontario**	Boulevard Park	**Limit planting of Acer to reduce percentage in London's tree canopy.** Lots of seed for winter interest/rare/needs moist soil	Large	Oval	~7 (assumed to be same as sugar maple)
Acer pennsylvanicum Striped Maple	**Native to Ontario**	Boulevard Park	**Limit planting of Acer to reduce percentage in London's tree canopy**. Specify single stem.	Medium	Rounded	6
Acer rubrum Red Maple ▪ 'October Glory' ▪ 'Red Sunset'	**Native to Ontario**	Boulevard Park	**Limit planting of Acer to reduce percentage in London's tree canopy**. Green summer foliage & yellow to red fall colour tolerates wet soil	Large	Oval-Rounded	*1
Acer saccharinum Silver Maple	**Native to Ontario**	Boulevard Park	**Limit planting of Acer to reduce percentage in London's tree canopy.** Fast growing softwood maple; Maintenance issues as tree nears maturity due to weak wood.	Large	Oval-Rounded	Males: 9 Females: *1

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Acer saccharum Sugar Maple	**Native to Ontario**	Boulevard Park	**Limit planting of Acer to reduce percentage in London's tree canopy.** Upright form/fall colour varies/prefers	Large	Oval-Rounded	7
Acer spicatum Mountain Maple	**Native to Ontario**	Boulevard Park	**Limit planting of Acer to reduce percentage in London's tree canopy.** **Specify single stem.** **Shade tolerant, seldom thriving in the open.** **Prefers cool shade.** **May spread by root shoots.**	Small	Oval-rounded	Not available
Acer tataricum** Tatarian Maple	**Non- Continental**	Boulevard	**Limit planting of Acer to reduce percentage in London's tree canopy.** **Specify single stem. Good red & yellow fall**	Medium	Rounded	5
Acer x freemanii Hybrid Soft Maple	**Native to Ontario**	Boulevard	**Limit planting of Acer to reduce percentage in London's tree canopy.** **Caution: Many cultivars of Acer rubrum and A. saccharinum exist under the name Freemanii, each with different characteristics**	Large	Oval-Rounded	Autumn Fantasy, Indian Summer and Morgan all 1 Autumn Blaze 7
Aesculus glabra Ohio Buckeye	**Native to Ontario**	Park	**Likes moist soil. For use in limited circumstances**	Medium	Oval	7
Aesculus hippocastanum Horsechestnut ▪ 'Baumannii'	**Non- Continental**	Park	**Good spring flower with no fruit/limit use due to disease susceptibility**	Large	Rounded	7
Amelanchier Arborea Downy Serviceberry	**Native to Ontario**	Boulevard Park	**Showy flower & fruit/ tolerant of wet & dry soil**	Medium	Rounded	Not available

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Amelanchier laevis Smooth Serviceberry	**Native to Ontario**	Boulevard Park	**Multi-stem specimens by prior approval only**	Small	Rounded	3
Amelanchir canadensis Shadblow Serviceberry	**Native to Ontario**	Boulevard Park	**Difficult to maintain single stem Four-season interest** **Tolerates moist soil**	Medium	Rounded	Not available
Asimina triloba Pawpaw	**Native to Ontario**	Park	**Large fruit has food value to humans**	Large	Rounded	
Betula alleghaniensis Yellow Birch	**Native to Ontario**	Parks	**Interesting bark features and good fall colour**	Large	Rounded-Spreading	7 (but only has a short blooming period)
Betula papyrifera White Birch	**Native to Ontario**	Parks	**Interesting bark features and good fall colour**	Large	Rounded-Oval	7
Carpinus caroliniana Blue beech or Musclewood	**Native to Ontario**	Park	**Difficult to transplant** **keep away from road salt & spray likes wet soil** **thin bark and sculptured trunk**	Medium	Rounded	8 (Rating for genus only)
Carya cordiformis Bitternut Hickory	**Native to Ontario**	Parks	**Difficult to transplant due to large tap root** **messy fruit**	Large	Oval-Vase	8-10* (Rating for genus only)
Carya glabra Pignut Hickory	**Native to Ontario**	Parks	**Difficult to transplant due to large tap root** **messy fruit**	Large	Oval-Vase	8-10*
Carya laciniosa Big Shellbark Hickory	**Native to North America**	Parks	**Difficult to transplant due to large tap root** **messy fruit**	Large	Oval-Vase	8-10*

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Carya ovata Shagbark Hickory	**Native to Ontario**	Parks	**Difficult to transplant due to large tap root** **messy fruit**	Large	Oval-Vase	10
Celtis laevigata Sugarberry	**Native to North America**	Boulevard Park	**Compact form/good in moist soils**	Large	Vase	8
Celtis Occidentalis Common Hackberry	**Native to Ontario**	Boulevard Park	**Requires pruning for general form. Very tolerant.**	Large	Vase	8
Cercidiphyllum japonicum Katsura Tree	**Non- Continental**	Boulevard	**Multi-stem by prior approval only. Difficult to transplant. Thin bark.** **Needs supplemental water.**	Large	Rounded	Males: 8 Females: *1
Cercis canadensis Redbud	**Native to Ontario**	Boulevard Park	**Seeds readily. Suitable for lawns but** **not formal boulevard due to low branching.**	Medium	Vase-Rounded	5
Cladrastis kentukea (lutea) Yellowwood (Single Stem Only)	**Native to North America**	Boulevard Park	**Few problems/use local seed sources or stock only/prune early**	Large	Rounded	5
Cornus alternifolia Alternate-leaf Dogwood	**Native to Ontario**	Boulevard Park	**Use local winter hardy material only Specify single stem**	Medium	Rounded	5
Cornus florida Flowering dogwood	**Native to Ontario**	Park	**Specify single stem only** **Use local winter hardy material only good flower** **specify single stem** **Can be very sensitive. Prefers acid soil** **Limited use only.**	Small	Rounded	5

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Cornus kousa Kousa dogwood	**Non- Continental**	Boulevard Park	**Resistant to dogwood anthracnose; berries have human food value**	Small	Vase	5
Corylus colurna Turkish Hazel	**Non- Continental**	Boulevard	**Good form/ difficult to transplant/ winter interest/ needs supplemental water**	Large	Pyramidal	8
Crataegus (varieties) Hawthorns	**(Dependent on species)**	Boulevard Park	**Thornless & disease resistant varieties only.** *** For use in limited circumstances** **Crataegus monogyna is invasive***	Medium	Rounded	4
Fagus grandifolia American Beech	**Native to Ontario**	Park		Large	Oval	7
Fagus orientalis Oriental beech	**Non- Continental**	Park		Large	Oval-Rounded	7
Fagus sylvatica European Beech	**Non- Continental**	Park	**Needs moist soil/different leaf colours with varieties/sensitive to activity within root zone/leaves persist through winter/thin bark**	Large	Oval-Rounded	7
Ginkgo biloba Maidenhair tree (Male cultivar only)	**Non- Continental**	Boulevard	**Good yellow fall colour thin bark** **Tolerant of city conditions & pollution slow growing but very large at maturity** **virtually pest and disease free**	Large	Pyramidal Spreading	Males: 7 Females: *2
Gleditsia triacanthos var. inermis Thornless Honey Locust ▪ 'Shademaster' ▪ 'Skyline'	**Native to North America**	Boulevard	**Provides a filtered shade/susceptible to defoliation by leafhopper/susceptible to canker and other pests and diseases**	Large	Spreading	Males: 7 Females: *1 Bisexual: 4

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Halesia tetraptera Carolina Silverbell	**Native to North America**	Park	**Low branched tree with broad, rounded crown reserve for lawn areas**	Large	Rounded	3
Juglans nigra Black Walnut	**Native to North America**	Park	**Messy fruit/needs large area * For use in limited circumstances**	Large	Oval	8-*9
Koelreuteria paniculata Goldenrain tree	**Non- Continental**	Boulevard Park	**Good yellow flower & fruit susceptible to winter damage weak**	Medium	Rounded	4
Laburnum (varieties) Golden chain tree	**Non- Continental**	Park	**Poisonous pea-like seeds. yellow chain like flower winter hardy local varieties only borderline hardiness * For use in limited circumstances**	Medium	Rounded	7
Liquidambar styraciflua Sweetgum	**Native to Eastern Northe America**	Boulevard Park	*** For use in limited circumstances Borderline hardy - good for sheltered locations, lawn areas**	Large	Rounded	
Liriodendron tulipifera Tulip tree	**Native to Ontario**	Boulevard Park	**Good flowers and yellow fall colour/local sources/moist well drained soil/very large tree most appropriate for lawn areas/somewhat weak wooded**	Large	Rounded	4
Maackia amurensis* Amur Maackia	**Non- Continental**	Boulevard	**Small, round headed tree/slow growing/summer flowering/bronze coloured bark**	Small	Rounded	3
Maclura pomifea Osage Orange	**Native to Ontario**	Park		Large	Rounded	
Malus (most) ** Flowering & Domestic Crab Apple	**(Dependent on species)**	Park	**Maintenance problems disease & insect problems tolerates most soils Choose persistent fruit- holding, or**	Small to Medium	Rounded-Spreading	4

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
			poorly-fruiting types.			
Malus coronia Wild Crabapple	**Native to Ontario**	Park		Large	Rounded	4 (Genus only)
Nyssa sylvatica Black Gum	**Native to Ontario**	Boulevard Park	**Difficult to transplant due to tap root interesting summer and fall foliage not for heavily polluted areas Tolerated a wide range of soil conditions**	Large	Rounded	Males: 9
Ostrya virginiana Hop Hornbeam or Ironwood	**Native to Ontario**	Boulevard Park	**Mainly an understory species**	Medium	Oval	7
Phellodendron amurense Amur corktree	**Non- Continental**	Boulevard	**Good winter texture in bark** **lots of black berries use in protected areas**	Medium	Spreading	Males: 8 Females: 1
Pinus strobus White Pine	**Native to Ontario**	Boulevard Park	**Locate with care in boulevards, due to possible sight line and access issues when mature (bushy)** **Avoid Ribes (alternate host for white pine blister rust)**	Large	Pyramidal	4
Platanus occidentalis Sycamore	**Native to Ontario**	Boulevard Park	**Frost cracks on trunk/attractive peeling bark/fruit can cause problems/very large at maturity – reserve for large lots and lawn areas**	Large	Spreading	9
Platanus x acerifolia London Planetree	**Hybrid of Platanus occidentalis (N. America) and Platanus orientalis**	Boulevard	**Prone to frost cracks on trunk attractive peeling bark** **fruit can cause problems** **very large at maturity – reserve for large lots and lawn areas**	Large	Spreading	9
Populus ssp. Balsam Poplar, Eastern Cottonwood, Large-tooth Aspen, Trembling Aspen	**Balsam Poplar, Eastern Cottonwood, Large-tooth**	Park Not permitted in Boulevard	**Wood is light, soft and weak, breaks easily in storms, drops flowers, fruit, twigs and branches**	Large	Pyramidal	Males: 9 Females: 1

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
	Aspen: Native					
Populus ssp. Dwarf varieties.		Boulevard or Park	**Limited numbers may be considered in Boulevards on a trial basis**	Medium	Varies	
Prunus (flowering varieties) Flowering Cherry	**(Dependent on species; most popular flowering cherries are non-**	Boulevard	**Weeping cankers; prone to fungal infections** *** For use in limited circumstances**	Small to Medium	Vase	
Prunus Americana American plum	**Native to Ontario**	Park	**Somewhat thorny** **Not Suitable for boulevards**	Small	Rounded	2
Prunus nigra Canada plum	**Native to Ontario**	Park	**Somewhat thorny** **Not Suitable for boulevards**	Medium	Rounded	3
Prunus pensylvanica Pin Cherry	**Native to Ontario**	Park	**Excellent flowers with no fruit single stem to be specified weeping cankers** *** For use in limited circumstances**	Small	Oval	5
Prunus serotina Black Cherry	**Native to Ontario**	Boulevard Park	**Interesting bark, messy fruit; Better in lawns than in formal boulevard.** ***For use in limited circumstances**	Large	Oval	5 (Genus only)
Prunus virginiana Choke Cherry	**Native to Ontario**		**green spring foliage & red in summer/bark tends to split**	Small	Rounded	6
Rhus ssp. Staghorn Sumac, Smooth Sumac	**Native to**	Park	**Spreads quick, freely suckers from** **roots creating wide spreading colonies.**	Small	Rounded - Spreading	Males: 10 Females: 7

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Sassafrass albidum Sassafrass	**Native to Ontario**	Boulevard Park	**Prefers sandy soils**	Large		Males: 7 Females: 1.
Sophora japonica Japanese Pagoda Tree	**Non- Continental**	Boulevard	**Excellent white flower green stem when young limit use due to messy**	Large	Spreading	5
Syringa reticulata Japanese Tree Lilac (Ivory Silk)	**Non- Continental**	Boulevard	**Good white summer flower excellent small specimen Prone to over-use**	Medium	Rounded	6
Tilia americana Basswood	**Native to Ontario**	Boulevard Park	**Prefers deep moist fertile soil will grow on drier heavier soil needs large space**	Large		7
Tilia cordata Littleleaf Linden ▪ 'Glenleven' ▪ 'Greenspire' ▪ 'Greenglobe'	**Non- Continental**	Boulevard	**Aphid & borer problems; suckers from base; messy species**	Medium	Pyramidal	7
Tilia tomentosa Silver Linden	**Non- Continental**	Boulevard	**Heat and drought tolerant.**	Medium	Pyramidal-Oval	7
Tilia x euchlora Crimean Linden	**Non- Continental**	Boulevard	**Fruit messy suckers from base** *** For use in limited circumstances**	Medium	Rounded	7
Ulmus americana Elm ▪ 'Pioneer'	**Specific cultivars hybrydized for disease resistance**	Boulevard	**Choose with care. Cultivars vary in resistance to Dutch elm disease and elm leaf beetle. Ulmus Pumila hybrids are not permitted.**	Large	Vase	8

Tree Species	Native Range	Use	Comments and Notes	SIZE Based on Electrical Safety Authority Guidelines	Form	OPALS Rating7
Zelkova serrata Japanese Zelkova ▪ 'Green Vase' ▪ 'Village Green'	**Non-Continental**	Boulevard	**Rapid growth** **narrow branch angles promote fork split** **frost susceptibility when young**	Large	Vase	*10

Table 12.4: Species NOT PERMITTED for use

Tree Species	Native Range	Comments and Notes	Size	Form	OPALS Rating[7]
Acer platanoides **OR** ***Acer x platanoides*** Norway Maple (many cultivars) or Norway maple cross	**Non-Continental**	Surface roots conflict with and turf/girdling roots/aphid and wilt problems.	Medium	Various Forms	8
Acer pseudoplatanus ** Sycamore Maple	**Non-Continental**	Limit planting of Acer to reduce percentage in London's tree canopy. Cankers cause high maintenance	Large	Oval-Rounded	8
Ailanthus altissima Tree of Heaven	**Non-Continental**				
Alnus glutinosa European Alder	**Non-Continental**	Tolerant of wet & dry soil. Invasive tendencies checked by dry sites.	Medium	Pyramidal	9
Caragana arborescens	**Non-Continental**	Toxic	Small	Varies	
Carpinus betulus European Hornbeam	**Non-Continental**	Difficult to transplant Keep away from road salt & spray	Large	Pyramidal-Oval	8
Eleagnus angustifolia Russian Olive	**Non-Continental**				
Fraxinus **(Entire Genus)** Ash		No Ash permitted due to Emerald Ash Borer	Large		

Tree Species	Native Range	Comments and Notes	Size	Form	OPALS Rating[7]
Gymnocladus dioicus Kentucky Coffee tree	Native to Ontario	Species At Risk Status: Threatened	Large	Oval	Males: *9 Females: *1
Maackia amurensis Amur Maackia	Non-Continental	Small, round headed tree/slow growing/summer flowering/bronze coloured bark	Small	Rounded	3
Magnolia acuminata Cucumber tree	Native to Ontario	Species at Risk Status: Endangered	Medium	Oval-Rounded	Deciduous: 6 Evergreen: 5
Paulownia spp.					
Ptelea trifoliata Hop Tree	Native to Ontario	Species At Risk Status: Threatened	Medium	Rounded	
Pyrus calleryana Callery Pear ▪ 'Chanticleer' ▪ 'Bradford'	Non-Continental	Fireblight problems Graft incompatibility problems with some rootstocks. Objectionable smell.	Small	Pyramidal	Ornamentals:4 Fruiting: 3
Quercus (Entire Genus) Oaks	Native to Ontario	NO OAKS PERMITTED A TTHIS TIME DUE TO CONFIRMATION OF OAK WILT IN ONTARIO	Large	Rounded	8
Sorbus x thuringiaca Oakleaf Mountain Ash	Non-Continental	Forms a tight, rounded crown White flowers/red fruit/Leathery dark green leaves	Small	Rounded	4 (Genus only)
Sorbus aria Whitebeam Mountain Ash	Non-Continental	Leathery, gray-green leaves white flowers in May fall colour varies from pale green to golden brown to reddish	Medium	Pyramidal-Oval	4 (Genus only)

Tree Species	Native Range	Comments and Notes	Size	Form	OPALS Rating[7]
Sorbus aucuparia European Mountain Ash	Non-Continental	Scab disease & insect problems; Limit use due to fruit and other problems.	Medium	Oval	4
Ulmus x pumilla hybrids	Non-Continental	Ulmus Pumila hybrids are not permitted.	Large	Vase	8

Appendix 5: Tree Assessment Criteria

Tree Assessment Criteria

It is critical that the inspections of trees are done in a consistent manner so that all developers and landscapers are treated fairly. We must also ensure that the City assumes a quality product that will not result in high maintenance costs.

To help facilitate this, the following tree assessment criteria are to be followed by the Certified Arborist in recommending tree assumption to the City. If these criteria are followed, City staff should be able to quickly approve trees for assumption.

Tree assessments are to be conducted from May 1 to September 1 only.

Tree Crown

- leaf area must be 75% or more
- branch ratio must be 50% of total tree height and there must be 9 to 11 branches, well spaced and ascending the main trunk in a spiral fashion. The crown must be well balanced.
- leaf size must be normal for the species
- leaf colour must be normal for the species

Tree Stem

- the main leader must be intact – not cut
- the trunk must be single and straight
- the tree must be planted straight
- there must be 175 – 200 cm of clean stem below the branches
- there must be no major scrapes or cuts on the bark
- the tree must meet the diameter class as specified on the concept plan
- trees must be planted as on the concept plan or an explanation provided
- trees must be planted at the same height as in the nursery. We will accept maximum 4 inches high where necessary for survival. We will not accept trees planted deep, i.e.: below the level they were in the nursery.

Planting Methods

- stakes, ties, labels, and wrap must be removed prior to acceptance
- saucer and mulch are to be left in place
- No mounding of soil or volcano mulching is acceptable.

A professionally stamped report by address is to be submitted with your recommendation to both the Parks Planning & Design Division (for Parks) and Forestry Operations Division (for road allowance).